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1) The average age of 120 employees of a large company was found to be 37.4 years. Classify the group of 120 employees.
   A) The group of 120 employees is a population in this study.
   B) The group of 120 employees is a sample in this study.
   C) The group of 120 employees is a parameter in this study.
   D) The group of 120 employees is a statistic in this study.

2) The average age of 120 employees of a large company was found to be 37.4 years. Classify the value 37.4 years of age.
   A) The value 37.4 years of age is a parameter.
   B) The value 37.4 years of age is both a statistic and a parameter.
   C) The value 37.4 years of age is a statistic.
   D) The value 37.4 years of age is neither a statistic nor a parameter.

3) A poll of 500 voters in a Central Illinois community following the Republican National Convention showed that 56% expected the Republican ticket to win over the Democrat ticket no matter whom the Democrats chose for vice-president. The margin of error was 3 percentage points. There are 20,000 registered voters in the community. Find the range likely to contain the population parameter.
   A) 10,600 to 11,800
   B) 19,500 to 20,500
   C) 53\% to 59\%
   D) 265 to 295

4) Based on a poll, a newspaper reported that between 52\% and 60\% of voters would be likely to vote for a school bond issue. Find the margin of error of the poll.
   A) 6\%
   B) 25\%
   C) 30\%
   D) 4\%

5) A student wanted to know the favorite lunch at a large high school with a closed campus. Identify the first step in conducting a statistical study to answer the question.
   A) None of the other answers is the first step.
   B) Select a random sample of students and teachers.
   C) Select a random sample of students.
   D) Select a random sample of teachers.
   E) The study could begin by selecting a random sample of students and teachers or by selecting a random sample of students or by selecting a random sample of teachers.
6) A poll of 700 persons that attended the Taste of Chicago showed that 455 persons, 65% of the sample, believed that the food was overpriced. It is estimated that 1,250,000 persons attended the Taste. Statistics suggests that although 65% plus or minus 5% of attendees believed that the food was over priced, the Taste was a popular event. Identify the raw data of the study.

A) 700 persons, 455 persons  
B) (60%, 70%)  
C) 65% of the sample  
D) 1,250,000 persons, 700 persons, 455 persons

7) The average age of 120 employees of a large company is 37.4 years. Determine if the data is census data or sample data.

A) The data are from a census.  
B) The data are sample data.  
C) The data are both census and sample data.  
D) The data are neither census nor sample data.

8) The father of a junior high student wants to determine the most popular book among junior high students. Select the sample most representative of the population of interest.

A) A randomly selected group of 10 book sellers.  
B) A randomly selected group of 30 junior high students.  
C) The group of 30 junior high students attending the birthday party of the researcher's child.  
D) A randomly selected group of 30 junior high students leaving the public library.

9) A researcher wants to determine the status of the electorate one month before the presidential election. Select the sample most likely to produce biased data.

A) A group of 30 persons from one church who voted in the last election.  
B) A random group of 30 persons in the phone book.  
C) A random group of 30 persons on the voter registration list.  
D) A random group of 30 persons contacted by phone with the numbers randomly chosen numbers.
10) The father of a junior high student wants to determine the most popular book among junior high students. Select the sample with the least potential bias.
   A) A randomly selected group of 30 junior high students leaving the public library.
   B) A randomly selected group of 10 book sellers.
   C) A randomly selected group of 30 junior high students.
   D) The group of 30 junior high students attending the birthday party of the researcher's child.

11) A researcher wants to determine the status of the electorate one month before the presidential election. Identify the sample most likely to yield valid raw data for the study.
   A) A random group of 30 persons in the phone book
   B) A random group of 30 persons on the voter registration list
   C) A random group of 30 persons from a church who voted in the last election
   D) A random group of 30 persons contacted by phone with the numbers randomly chosen

12) A researcher randomly selected 49, 34, and 48 students from the Sophomore, Junior, and Senior classes with populations of 496, 348, and 481 students respectively. Identify the type of sampling.
   A) Simple random
   B) Cluster
   C) Stratified
   D) Convenience

13) A college has 14 dorms each with 4 floors. A researcher numbered the floors from 1 through 56 and randomly selected 5 floors. He administered his research instrument to each resident of the five selected dorm-floors. Identify the type of sampling.
   A) Simple random
   B) Cluster
   C) Systematic
   D) Convenience

14) A marketing firm did a survey to determine how many people use a product. Of the one hundred people contacted, 15 said they used the product. Identify the type of study.
   A) Experimental
   B) Observational
   C) Neither experimental nor observational
   D) The study has both observational and experimental components.
15) A nutritionist conducts a study to validate the efficacy of an herb as an aid in weight loss. She randomly assigns half of a group of overweight persons to a treatment group. The treatment group is given the herb with instructions and a planned diet for six weeks. The other half of the group is given parsley with the same instructions and same diet. The nutritionist weighs each subject on Friday of each week. Select the potential source of confounding.
A) Placebo effect
B) Method of assignment to treatment and control groups
C) Experimenter effect
D) The study is essentially free of potential confounding

16) A nutritionist conducts a study to validate the efficacy of an herb as an aid in weight loss. She randomly assigns half of a group of overweight persons to a treatment group given the herb with instructions as to use and a planned diet for six weeks. The other half of the group is given parsley with the same instructions and same diet. A nurse at the nutrition center weighs each subject on Friday of each week. Select the potential source of confounding.
A) Placebo effect
B) The study is essentially free of potential confounding
C) Method of assignment to treatment and control groups
D) Experimenter effect

17) Is the Addison Wesley Algebra I text superior to the currently used text in promoting learning of Algebra? Identify the type of study most appropriate to the question.
A) Double blind experiment
B) Observational
C) Case-control observational
D) Single blind experiment

18) Analysis of the raw data of a statistical study showed that of 100 married couples, three met on a blind date. Select the question that most probably represents the purpose of the study.
A) What percent of married couples initially met on a blind date?
B) What percent of blind dates lead to marriage?
C) Neither question represents the purpose of the study.
D) Either question is correct. They ask the same thing.

19) Analysis of the raw data of a statistical study showed that of 100 couples who met on a blind date, three married. Select the question that most probably represents the purpose of the study.
A) What percent of marriages began with a blind date?
B) What percent of blind dates lead to marriage?
C) Neither question is appropriate to the purpose of the study.
D) Either question is correct. They ask the same thing.
20) A homeowner put a brand-name fertilizer/weed killer on half his lawn and a generic fertilizer/weed killer on the other half. After three weeks the generic side had 1 weed per square meter, the other side 1.7 weeds per square meter. The generic side required two mowings in the 3 weeks, the brand-name side one. The homeowner concluded that the generic was superior to the brand-name. Select the guideline most likely to cause questioning of the results of the study.

A) Researcher bias
B) The type of study
C) Confounding variables
D) The sample with respect to the population
Multiple Choice. Choose the one alternative that best completes the statement or answers the question.

1) The average age of 120 employees of a large company was found to be 37.4 years. Classify the entire group of employees of the large company.
   A) The group of employees is a population in this study.
   B) The group of employees is a sample in this study.
   C) The group of employees is a parameter in this study.
   D) The group of employees is a statistic in this study.

2) Based on a study of 120 employees of a large company, the average age of the workforce was found to be 37.4 years. Classify the value 37.4 years of age.
   A) The value 37.4 years of age is a statistic.
   B) The value 37.4 years of age is both a statistic and a parameter.
   C) The value 37.4 years of age is a parameter.
   D) The value 37.4 years of age is neither a statistic nor a parameter.

3) A poll of 500 voters in a Central Illinois community following the Republican National Convention showed that 60% expected the Republican ticket to win over the Democrat ticket no matter whom the Democrats chose for vice-president. The margin of error was 3 percentage points. There are 30,000 registered voters in the community. Find the range likely to contain the population parameter.
   A) 29,500 to 30,500
   B) 57% to 60%
   C) 60% to 63%
   D) 17,100 to 18,900

4) Based on a poll, a newspaper reported that between 58% and 62% of voters would be likely to vote for a school bond issue. Find the margin of error of the poll.
   A) 8%
   B) 2%
   C) 31%
   D) 4%

5) A student wanted to know the favorite lunch at a large high school with a closed campus. Identify the first step in conducting a statistical study to answer the question.
   A) Identify the population the study targets.
   B) Select a random sample of students and teachers.
   C) Select a random sample of students.
   D) Select a random sample of teachers.
   E) The study could begin by selecting a random sample of students and teachers or by selecting a random sample of students or by selecting a random sample of teachers.
6) A poll of 700 persons attending the Taste of Chicago showed that 455 persons, 65% of the sample, believed that the food was overpriced. It is estimated that 1,250,000 persons attend the Taste. Statistics suggests that although 65% plus or minus 5% of attendees believe that the food is over priced, the Taste is a popular event. Identify the population of the study.
A) The 700 persons polled.
B) The 455 who responded that the food was overpriced.
C) The persons likely to attend the Taste in the future.
D) The estimated 1,250,000 persons who attended the Taste of Chicago.

7) The average age of the employees of a large company is 37.4 years. Determine if the data is census data or sample data.
A) The data is from a census.
B) The data is sample data.
C) The data is both census and sample data.
D) The data is neither census nor sample data.

8) The father of a junior high student wants to determine the most popular book among junior high students. Select the sample least representative of the population of interest.
A) A randomly selected group of 10 book sellers.
B) A randomly selected group of 30 junior high students.
C) The group of 30 junior high students attending the birthday party of the researcher's child.
D) A randomly selected group of 30 junior high students leaving the public library.

9) A researcher wants to determine the status of the electorate one month before the presidential election. Select the sample least likely to produce biased data.
A) A group of 30 persons from one church who voted in the last election.
B) A random group of 30 persons in the phone book.
C) A randomly selected group of 30 persons on the voter registration list.
D) A group of 30 persons contacted by phone with randomly chosen numbers.
10) A community organization wants to determine what type of movies attract the greatest number of junior high school students. Select the process with the greatest potential for bias.
   A) Observers count the number of junior high students at movies of various types.
   B) An observer asks a randomly selected group of 30 junior high students what type of movies they like best.
   C) Parents are requested to ask their children what type of movies they prefer and then to report this data.
   D) All the students in a junior high school are asked to complete a form by checking the type of movies they most like. A sample of the forms is analyzed.

11) A researcher wants to determine the status of the electorate one month before the presidential election. Identify the sample least likely to yield valid raw data for the study.
   A) A random group of 30 persons in the phone book
   B) A group of 30 persons on the voter registration list
   C) A group of 30 persons from a local Elk's club who voted in the last election.
   D) A group of 30 persons contacted by phone with the numbers randomly chosen numbers.

12) A researcher randomly selected 87 students from the Sophomore, Junior, and Senior classes with populations of 496, 348, and 481 students respectively. Identify the type of sampling.
   A) Simple random
   B) Cluster
   C) Stratified
   D) Convenience

13) A college has 14 dorms each with 4 floors. A researcher numbered all of these from 1 through 56. She randomly selected a number from 1 through 56 and then interviewed 5 randomly selected students from every fifth floor after the first floor was selected. Identify the type of sampling.
   A) Simple random
   B) Cluster
   C) Systematic
   D) Convenience

14) A marketing firm did a survey to determine how product A compared with product B. Of the one hundred people given both products, fifteen said A was better. Identify the type of study.
   A) Experimental
   B) Observational
   C) Neither experimental nor observational
   D) The study has both observational and experimental components.
15) A nutritionist wants to conduct a study to determine the efficacy of an herb as an aid in weight loss. She has her nurse confidentially and randomly assign half of a group of overweight persons to a treatment group who are given the herb with instructions as to use and a planned diet for six weeks. The other half of the group is given parsley with the same instructions and same diet. The nutritionist weighs each subject on Friday of each week. Select the potential source of confounding.
   A) Placebo effect
   B) Method of assignment to treatment and control groups
   C) Experimenter effect
   D) The study is essentially free of potential confounding.

16) A nutritionist wants to conduct a study to validate the efficacy of an herb as a aid in weight loss. She confidentially and randomly assigns half of a group of overweight persons to a treatment group who are given the herb with instructions as to use and a planned diet for six weeks. The other half of the group is given the same diet. A nurse at the nutrition center weighs each subject on Friday of each week. Select the potential source of confounding.
   A) Placebo effect
   B) The study is essentially free of potential confounding
   C) Method of assignment to treatment and control groups
   D) Experimenter effect

17) What is the relation between years of schooling and income? Identify the type of study most appropriate to the question.
   A) Double blind experiment  B) Observational
   C) Case-control observational  D) Single blind experiment

18) Analysis of the raw data of a statistical study showed that of 100 college graduates, 5 were millionaires by age 35. Select the question that most probably represents the purpose of the study.
   A) What percent of millionaires, by age 30, are likely to be college graduates?
   B) What percent of college graduates are likely to become millionaires by age 30?
   C) Neither question represents the purpose of the study.
   D) Either question is correct. They are asking the same thing.
19) Analysis of the raw data of a statistical study showed that of 100 persons who became millionaires by age 30, 2 had advanced degrees. Select the question that most probably represents the purpose of the study.

A) What percent of millionaires, by age 30, attained advanced degrees?
B) What percent of persons attaining advanced degrees become millionaires by age 30?
C) Neither question is appropriate to the purpose of the study.
D) Either question is correct. They ask the same thing.

20) A parent of a junior high student wanted to find out what book is most popular among junior high students. He surveyed 126 junior high students in a video game arcade opposite the sporting goods store in the mall that he managed. Identify the weakness, if any, in the study.

A) Researcher bias
B) The type of study
C) Confounding variables
D) The sample with respect to the population
1) After taking the first exam in a statistics class, 7 students from one of eleven sections dropped the class. Identify the students in the class.
   A) The group of students is a population in this study.
   B) The group of students is a sample in this study.
   C) The group of students is a parameter in this study.
   D) The group of students is a statistic in this study.

2) After taking the first exam in a statistics class, 7 students from one of eleven sections dropped the class. Classify the value '7 students.'
   A) The value '7 students' is a statistic.
   B) The value '7 students' is both a statistic and a parameter.
   C) The value '7 students' is a parameter.
   D) The value '7 students' is neither a statistic nor a parameter.

3) In a survey of 80 football players committed to play in the Division III CCIW conference, 64 said that they would work out in their high school weight rooms in the summer before college. The margin of error for the survey was 6%. A census of CCIW football players showed that 59% worked out at their high schools in the summer before college. Identify the proper conclusion.
   A) There must have been an error in the determination of the margin of error.
   B) The census results are consistent with the confidence interval of the study.
   C) The sample was an unlikely sample.
   D) The members of the sample were than forthcoming in their responses to the survey.

4) Based on a poll, a newspaper reported that between 40% and 46% of voters would be likely to vote for a school bond issue. Find the margin of error of the poll.
   A) 6%  B) 12%  C) 3%  D) 4%
5) Data has been collected from a representative sample from a well-defined population to answer the question: "How much money does the average senior boy at Normal Community High School have in his pockets at the end of school on Friday." Identify the next step in the study.

A) Summarize the data with a sample parameter.
B) Use the collected data to make inferences about the population.
C) Summarize the data with a sample statistic.
D) Determine the margin of error.

6) A U.S. government study reported that "With bank interest rates at 3.0%, 21% of wage earners believe it worthwhile to keep money in a savings account. However, at 5.0% interest, 27% of wage earners believe it worthwhile to keep money in a savings account. The margin of error of both studies was 4 percentage points." Identify the goal of the study.

A) To determine the effect of an interest rate increase from 3% to 5% on the percentage of persons saving money.
B) To prove that higher interest rates encourage more people to save money.
C) To determine the effect of interest rates on the percentage of persons saving money.
D) The goal is not clear from the report of the study.

7) A researcher, after examining all the voting records in the town of Normal, reported that 43% of Normal voters are Democrats. Determine if the data is census data or sample data.

A) The data is from a census.
B) The data is sample data.
C) The data is both census and sample data.
D) The data is neither census nor sample data.

8) A local TV station wanted to report average gasoline prices in the early summer of 2000 in Illinois. Identify a representative sample.

A) Prices reported by the first 30 callers to respond to a request for the last price paid for gasoline
B) Prices reported by 30 gasoline stations uniformly distributed throughout the state
C) Prices reported by the station employees
D) Prices reported by 30 gasoline stations uniformly distributed throughout the viewing area
9) A researcher wants to determine the relative merits of oak and maple as firewood. Which process is most likely to bias the results of the study?

A) The judgments of the quality of a maple fire and an oak fire by 30 friends, 20 of which burn only oak, 10 of which burn only maple.
B) Comparison of the reports of wood burners on the internet.
C) Personal judgement of the fires of 15 pieces of each type of wood picked up from the floor of a hardwood forest.
D) Comparisons by 5 friends, none of which have a wood burning fireplace, of the fires of fifteen pieces of each type of wood obtained from friends with woodpiles.

10) The Director of Food Operations on a small college campus wants to determine student concerns about cafeteria food. Select the sample most likely to evidence bias.

A) A randomly selected group of 30 students who signed a petition to investigate the quality of food served in the college dining halls.
B) A randomly selected group of 30 students entering the dining hall before dinner.
C) A randomly selected group of 30 registered students.
D) A randomly selected group of 30 students who have signed food contracts.

11) A researcher wants to determine the status of the electorate one month before the presidential election. Identify the sample least likely to yield valid raw data for the study.

A) A random group of 30 persons in the phone book
B) A group of 30 persons on the voter registration list
C) A random sample of members of the MCRTA (McLean Country Retired Teachers Association)
D) A group of 30 persons contacted by phone with the numbers randomly chosen numbers

12) A worker, investigating employee concern with company benefits, polls the 11 fellow employees in adjacent work spaces. Identify the type of sampling.

A) Simple random
B) Cluster
C) Stratified
D) Convenience

13) A college has 1,865 students. The dean uses a random number generator to obtain 30 random numbers from 1 to 1,865. An alphabetical list of students is used to identify those students with the numbered rankings in the list. These 30 students are polled. Identify the type of sampling.

A) Simple random
B) Cluster
C) Systematic
D) Convenience
14) A sample of fish is taken from the cooling lake of a nuclear power plant. The fish are studied to determine the effect of the abnormal heating of the lake. Identify the type of study.
   A) Experimental
   B) Observational
   C) Neither experimental nor observational
   D) The study has both observational and experimental components.

15) A district administrator wants to determine the effect of truancy on academic achievement. In an effort to 'blind' the experiment she asks the dean at one high school to randomly select the records of 50 truant students and asks the dean at another high school to randomly select the records of 50 non-truant students. A potential source of confounding of this case-control study is
   A) None. This is a well designed case-control study.
   B) The use of two different deans as selectors.
   C) Analysis by the district administrator.
   D) The use of cases from two different schools.

16) A nutritionist wants to conduct a study to validate the efficacy of an herb as an aid in weight loss. She randomly assigns half of a group of overweight persons to a treatment group who are given the herb with instructions as to use and a planned diet for six weeks. The other half of the group is given the same diet. She weighs each subject on Friday of each week. The experiment may be described as
   A) double blind          B) single blind          C) unblinded

17) Which of two home/work routes will result in the lower mean commute time?
   A) Case controlled observational
   B) Single blind experimental
   C) Experimental
   D) Observational

18) Of the 192 classes I attended last semester, the professor was late 11 times. State the question that most probably represents the purpose of the study.
   A) For what percent of classes is a professor tardy?
   B) What percent of classes will not start on time?
   C) What percent of professors are late to class?
19) Fifty one of 132 computer users reported that they can touch-type. State the question that most probably represents the purpose of the study.

A) What percent of touch-typers are computer users?
B) What percent of computer users can touch-type?

20) A teacher wanted to know the attitudes of faculty on early dismissal for Homecoming. She randomly selected 20 of the 114 faculty and asked them to verbally respond to the question: "Agree/Disagree: Afternoon classes should be dismissed for Homecoming." Sixteen of the 20 members of the sample responded 'Disagree'. She reported to the administration that 80% of the faculty was against dismissing classes for homecoming. Identify the guideline(s), if any, that are violated in this study.

A) There is no reason to question the report of the study
B) Method of response
C) Wording of the question
D) Sample selection
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Identify each of the following variables as either qualitative or quantitative.

1) The number of people on a jury.
   A) Qualitative  B) Quantitative

2) A monthly electric bill (in dollars).
   A) Quantitative  B) Qualitative

Classify the data as either discrete or continuous.

3) The number of freshmen entering college in a certain year is 621.
   A) Discrete  B) Continuous

4) The average height of all freshmen entering college in a certain year is 68.4 inches.
   A) Discrete  B) Continuous

5) Identify the level of measurement: the letter grades of the members of fraternities at a large midwestern university.
   A) Interval  B) Ordinal  C) Ratio  D) Nominal

6) Identify the level of measurement: the amount of fat in burgers from various fast food chains.
   A) Nominal  B) Ordinal  C) Interval  D) Ratio

7) Select that statement for which a ratio of the measurements is meaningful.
   A) Juan gets out of school at 2:45 PM, Aito gets out of school at 3:15 PM.
   B) Kasheta ran the race in 22.3 sec, Louisa ran the same race in 26.4 sec.
   C) Both are meaningful.
   D) Neither are meaningful.

8) Select the statement that most completely classifies the given variable.
   The number of inches of rain in a month.
   A) Quantitative, discrete, ratio
   B) Quantitative, continuous, interval
   C) Quantitative, continuous, ratio
   D) Qualitative, continuous, ratio

9) Select the combination that gives a measurement and its relative error.
   A) 100 plus or minus 10% lb  B) 100 lb plus or minus 10
   C) 100 lb plus or minus 10%  D) 100 plus or minus 10 lb
10) A poll was taken of a random sample of 1189 college students. 789 reported that they had a drinking binge (more than 10 drinks in an evening) in the past month. Select the most believable conclusion.

A) About 70% of college students indulged in binge drinking last month.
B) About 70% of college students indulge in binge drinking.
C) About 66.358% of college students indulged in binge drinking last month.
D) Of the 23,456,321 college students in the country, 15,565,212 indulged in binge drinking last month.

11) The approximate value of e, the base of the natural logarithms, is approximately 2.718281. The most accurate representation of this value is

A) 2.7  B) 2.718  C) 2.71828  D) 2.71

12) A digital scale reads 0.01 g when empty. Identify the potential error as random or systematic.

A) Neither random nor systematic
B) Random
C) Systematic
D) Both random and systematic

13) The results of a poll are given as: "Based on a survey of 156 randomly selected students, 89% of the student body of 2870 students, plus or minus 4%, agree with the statement 'No student should have to take two final examinations consecutively.'" The absolute error in the result is

A) 4%  B) 4% of 156  C) 4% of 89%  D) 4% of 2870

14) A manufactured part is designed to be 5.4523 cm long. Quality control randomly selects parts and each is measured by 4 quality control technicians. Identify the most precise measurement of a particular part.

A) 5.351  B) 5.3234  C) 5.45  D) 5.11259

15) Identify the most believable statistical conclusion.

A) About 40% of the voters in Normal are Democrat.
B) The poll shows that if the election were held today, the Republican candidate would get 24,675,300 votes.
C) There were 22,543 flying insects at the picnic.
D) 37821 drivers in our city believe that speeding laws are enforced too strictly.
16) Convert \( \frac{3}{5} \) to a decimal.

A) 60.00  
B) .06  
C) .6  
D) 6.0

17) Write \( \frac{1}{8} \) as a percent.

A) 12.5%  
B) .125%  
C) 125%  
D) .0125%  
E) None of the numerical values is correct.

18) The enrollment of the district was 1120 last year and is 1412 this year. Calculate the relative percentage change to the nearest percentage point.

A) 79%  
B) 26%  
C) 21%  
D) 1266%

19) Write 7.5% as a fraction.

A) \( \frac{3}{4} \)  
B) \( \frac{3}{40} \)  
C) \( \frac{30}{4} \)  
D) \( \frac{3}{400} \)  
E) None of the numerical values is correct.

20) Suppose the cost of a statistics text was $50.00 in 1985 and is $125.00 in 2000. What is the 'Statistics Text Index' number, rounded to the nearest tenth, for the 2000 edition with the 1985 price as the reference value?

A) 250.0  
B) 2.5  
C) 40.0  
D) 25.0
1) The average income of college graduates with various majors.  
A) Qualitative  
B) Quantitative

2) The favorite colors of male and female elementary students.  
A) Quantitative  
B) Qualitative

3) Elapsed time as recorded by a digital clock.  
A) Discrete  
B) Continuous

4) Temperature as measured by a mercury thermometer.  
A) Discrete  
B) Continuous

5) Identify the level of measurement: the reading groups in the third grade of a local elementary school are the wrens, robins, blue jays, and the humming birds.  
A) Interval  
B) Ordinal  
C) Ratio  
D) Nominal

6) Identify the level of measurement: the amount of ozone in the air on various days.  
A) Nominal  
B) Ordinal  
C) Interval  
D) Ratio

7) Select that statement for which a difference of the measurements is meaningful.  
A) Juan gets out of school at 2:45 PM, Aito gets out of school at 3:15 PM.  
B) Kasheta ran the race in 22.3 sec, Louisa ran the same race in 26.4 sec.  
C) Both are meaningful.  
D) Neither are meaningful.

8) Select the statement that most completely classifies the given variable.  
The temperature as recorded every hour over a 24 hour period.  
A) Quantitative, discrete, ratio  
B) Quantitative, continuous, interval  
C) Quantitative, continuous, ratio  
D) Qualitative, continuous, ratio

9) Select the combination that gives a measurement and its absolute error.  
A) 100 plus or minus 10% lb  
B) 100 lb plus or minus 10 lb  
C) 100 lb plus or minus 10%  
D) 100 plus or minus 10 lb
10) A poll was taken of a random sample of 1189 college students. 789 reported that they had a drinking binge (more than 10 drinks in an evening) in the past month. Select the least believable conclusion.

A) About 70 % of college students indulged in binge drinking last month.
B) About 70 % of college students indulge in binge drinking.
C) About 66.358% of college students indulged in binge drinking last month.
D) Of the 23, 456, 321 college students in the country, 15, 565, 212 indulged in binge drinking last month.

11) The approximate value of $\pi$, the ratio of the circumference to the diameter of a circle, is approximately 3.14159265. The most accurate representation of this value is

A) 3.231456   B) 3.1
C) 3.0         D) 3.035467876

12) The pendulum of an antique clock has stretched over time. Identify the potential error as random or systematic.

A) Neither random nor systematic
B) Random
C) Systematic
D) Both random and systematic

13) The results of a poll are given as: “Based on a survey of 156 randomly selected students, 89% of the student body of 2870 students, plus or minus 4%, agree with the statement: ‘No student should have to take two final examinations consecutively.’” The relative error in the result is

A) 4%       B) 4% of 156
C) 4% of 89% D) 4% of 2870

14) A manufactured part is designed to be 5.4523 cm long. Quality control randomly selects parts and each is measured by 4 quality control technicians. Identify the least precise measurement of a particular part.

A) 5.351 B) 5.3234 C) 5.45 D) 5.11259

15) Identify the least believable statistical conclusion.

A) About 40% of the voters in Normal are Democrat.
B) The poll shows that if the election were held today, the Republican candidate would get 24, 675, 000 votes.
C) There were 22, 543 flying insects at the picnic.
D) 37820 drivers in our city believe that speeding laws are enforced too strictly.
16) Convert \( \frac{2}{5} \) to a decimal.

A) 40.00  B) .04  C) .4  D) 4.0

17) Write \( \frac{5}{8} \) as a percent.

A) 6.25\%  B) .625\%  C) 625\%  D) .00625\%
E) None of the numerical values is correct.

18) The enrollment of the district was 1120 last year and is 1012 this year. Calculate the relative percentage change to the nearest percentage point.

A) −10\%  B) 10\%  C) 11\%  D) −11\%

19) Write 4% as a fraction.

A) \( \frac{40}{10} \)  B) \( \frac{10}{25} \)  C) \( \frac{1}{25} \)
D) \( \frac{4}{1} \)
E) None of the numerical values is correct.

20) Suppose the index number of a statistics text was 83 in 1985 and 213 in 2000, both based on the price in 1975. If the text cost $50 in 1985, find the cost, to the nearest dollar, of the text in 2000.

A) $180  B) $128  C) $160.50
D) None of the given dollar values are correct.
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Identify each of the following variables as either qualitative or quantitative.

1) The ratings on a survey: strongly agree, agree, disagree, strongly disagree.
   A) Qualitative          B) Quantitative
   1)

2) The number of persons watching various networks on election night.
   A) Quantitative          B) Qualitative
   2)

Classify the data as either discrete or continuous.

3) The number of cars passing through an intersection at the same time on various days of the week.
   A) Discrete          B) Continuous
   3)

4) The number of words per minute of various word processor users.
   A) Discrete          B) Continuous
   4)

5) Identify the level of measurement: the letter grades of the members of fraternities at a large midwestern university.
   A) Interval          B) Ordinal          C) Ratio          D) Nominal
   5)

6) Identify the level of measurement: the states represented at a family reunion.
   A) Nominal          B) Ordinal          C) Interval          D) Ratio
   6)

7) Select that statement for which a ratio of the measurements is meaningful.
   A) Juan gets out of school at 2:45 PM, Aito gets out of school at 3:15 PM.
   B) Kasheta finished first in the race, Louisa ran finished fourth.
   C) Both are meaningful.
   D) Neither are meaningful.
   7)

8) Select the statement that most completely classifies the given variable.
   The number of grubs per square yard of turf.
   A) Quantitative, discrete, ratio.
   B) Quantitative, continuous, interval.
   C) Quantitative, continuous, ratio.
   D) Qualitative, continuous, ratio.
   8)
9) Select the combination that does not correctly give a measurement and its error.
   A) 100 lb plus or minus 10%
   B) Both of the numerical answers correctly gives a measurement and its error.
   C) 100 lb plus or minus 10 lb
   D) Neither of the numerical answers correctly gives a measurement and its error.

10) A national poll of a random sample of voters was taken the day after the 2000 presidential election. Select the most believable conclusion.
   A) 42,342,121 votes were cast for Governor Bush.
   B) 50.000132% of the voters were cast for Vice President Gore.
   C) Mr. Gore received .001254% more votes that Mr. Bush.
   D) Any one of the numerical conclusions would be believable.
   E) None of the numerical conclusions would be believable.

11) The approximate value of the square root of 2 is 1.41421356. Select the most precise representation of this value.
   A) 1.4
   B) 1.56321
   C) 1.42
   D) 1.41

12) A local butcher always weighs the various wrappings of the meat. Identify the potential error as random or systematic.
   A) Neither random nor systematic
   B) Random
   C) Systematic
   D) Both random and systematic

13) The results of a poll after the 2000 presidential election are given as: Based on a survey of 196 randomly selected voters in McLean County (total number of voters is 32,541), 62%, plus or minus 4%, voted for Vice President Gore. The absolute error in the result is
   A) 4%
   B) 1,302
   C) 8
   D) None of the values given is the absolute error.

14) A manufactured part is designed to be 5.4523 cm long. Quality control randomly selects parts and each is measured by 4 quality control technicians. Identify the least accurate measurement of a particular part.
   A) 5.351
   B) 5.3234
   C) 5.45
   D) 5.11259
15) Identify the most believable statistical conclusion based on a poll the day following the 2000 presidential election.
   A) Gore wins the popular vote by 103,455 votes.
   B) Gore has a slight edge in the popular vote.
   C) Gore wins popular vote by 0.0112% 
   D) Gore: 42,123,455; Bush 42,020,000.

16) Convert \( \frac{1}{5} \) to a decimal.
   A) 20.00   B) .02   C) .2   D) 2.0

17) Write \( \frac{5}{4} \) as a percent.
   A) 1250% 
   B) 125% 
   C) 125% 
   D) 12.25% 
   E) None of the numerical values is correct.

18) The enrollment of the district was 1120 ten years ago and is 14,125 this year. Calculate the relative percentage change to the nearest percentage point.
   A) 1161% 
   B) 12% 
   C) 1.261% 
   D) 13%

19) Write .075% as a fraction.
   A) \( \frac{3}{4} \)
   B) \( \frac{3}{400} \)
   C) \( \frac{30}{4} \)
   D) \( \frac{3}{4000} \)
   E) None of the numerical values is correct.

20) Suppose the cost of a statistics text was $50.00 in 1985 and is $125.00 in 2000. What is the 'Statistics Text Index' number, rounded to the nearest tenth, for the 1985 edition with the 2000 price as the reference value?
   A) 250.0 
   B) 2.5 
   C) 40.0 
   D) 25.0
1) A car insurance company conducted a survey to find out how many car accidents people had been involved in. They selected a sample of 32 adults between the ages of 30 and 70 and asked each person how many accidents they had been involved in in the past ten years. The following data were obtained:

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>0</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Construct an unbinned frequency table for the number of car accidents.

<table>
<thead>
<tr>
<th>Number of accidents</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>

B) 1 5 3 4 2 1

<table>
<thead>
<tr>
<th>Number of accidents</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>

Frequency: 0 0 0 0 0 0 0 0 0 0

1 1 1 1 1 1 1 1 1

2 2 2 2 2

3 3 3

4

5

1) (A)
Use the stem-and-leaf diagram to solve the problem.

2) The stem-and-leaf diagram below shows the highest wind velocity ever recorded in 30 different U.S. cities. The velocities are given in miles per hour. The leaf unit is 1.0.

6 4
7 2 3
7 5 8 9
8 0 1 1 1 3 4 4
8 5 5 6 8 8 9 9
9 0 0 1 2 2 3 4
9 5 5 9

What is the highest wind velocity recorded in these cities?
A) 9.9 miles per hour  
B) 99 miles per hour  
C) 95 miles per hour  
D) 9.5 miles per hour

3) The frequency table below shows the distribution of students' scores on an exam. Construct the relative frequency table.

<table>
<thead>
<tr>
<th>Scores</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>91-100</td>
<td>6</td>
</tr>
<tr>
<td>81-90</td>
<td>5</td>
</tr>
<tr>
<td>71-80</td>
<td>14</td>
</tr>
<tr>
<td>61-70</td>
<td>5</td>
</tr>
<tr>
<td>&lt;61</td>
<td>4</td>
</tr>
</tbody>
</table>

A) | Scores | Relative Frequency |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>91-100</td>
<td>12.5%</td>
<td></td>
</tr>
<tr>
<td>81-90</td>
<td>20.1%</td>
<td></td>
</tr>
<tr>
<td>71-80</td>
<td>37.3%</td>
<td></td>
</tr>
<tr>
<td>61-70</td>
<td>15.2%</td>
<td></td>
</tr>
<tr>
<td>&lt;61</td>
<td>14.9%</td>
<td></td>
</tr>
</tbody>
</table>

B) | Scores | Relative Frequency |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>91-100</td>
<td>17.65%</td>
<td></td>
</tr>
<tr>
<td>81-90</td>
<td>14.71%</td>
<td></td>
</tr>
<tr>
<td>71-80</td>
<td>41.18%</td>
<td></td>
</tr>
<tr>
<td>61-70</td>
<td>14.71%</td>
<td></td>
</tr>
<tr>
<td>&lt;61</td>
<td>11.76%</td>
<td></td>
</tr>
</tbody>
</table>

C) | Scores | Relative Frequency |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>91-100</td>
<td>0.26%</td>
<td></td>
</tr>
<tr>
<td>81-90</td>
<td>0.06%</td>
<td></td>
</tr>
<tr>
<td>71-80</td>
<td>0.56%</td>
<td></td>
</tr>
<tr>
<td>61-70</td>
<td>0.06%</td>
<td></td>
</tr>
<tr>
<td>&lt;61</td>
<td>0.06%</td>
<td></td>
</tr>
</tbody>
</table>

D) | Scores | Relative Frequency |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>91-100</td>
<td>15.5%</td>
<td></td>
</tr>
<tr>
<td>81-90</td>
<td>22.1%</td>
<td></td>
</tr>
<tr>
<td>71-80</td>
<td>31.3%</td>
<td></td>
</tr>
<tr>
<td>61-70</td>
<td>16.2%</td>
<td></td>
</tr>
<tr>
<td>&lt;61</td>
<td>14.9%</td>
<td></td>
</tr>
</tbody>
</table>
A nurse measured the blood pressure of each person who visited her clinic. Following is a relative-frequency histogram for the systolic blood pressure readings for those people aged between 25 and 40. Use the histogram to answer the question. The blood pressure readings were given to the nearest whole number.

![Histogram of Systolic Blood Pressure](image)

4) Approximately what percentage of the people aged 25–40 had a systolic blood pressure reading between 110 and 119 inclusive?
   A) 30%  
   B) 3.5%  
   C) 0.35%  
   D) 35%

4) ______

Construct the dot plot for the given data.

5) A store manager counts the number of customers who make a purchase in his store each day. The data are as follows:
   5 6 3 9 2 5 5 6 3 2

5) ______

Options for the dot plot:

A) 

B) 

C) 

D)
6) 240 casino patrons were interviewed as they left the casino. 72 of them said they spent most of the time playing the slots, 72 of them said they played blackjack, 36 said they played craps, 12 said roulette, 12 said poker. The rest were not sure what they played the most. Construct a Pareto chart to depict the gaming practices of the group of casino goers. Choose the vertical scale so that the relative frequencies are represented.

A)
Construct a pie chart representing the given data set.

7) The following data give the distribution of the types of houses in a town containing 43,000 houses.

<table>
<thead>
<tr>
<th>Capes</th>
<th>Garrisons</th>
<th>Splits</th>
</tr>
</thead>
<tbody>
<tr>
<td>10,750</td>
<td>15,050</td>
<td>17,200</td>
</tr>
</tbody>
</table>

A)

B)

8) The number of french fries taken as a serving by 20 6th graders is 10, 13, 16, 19, 22, 24, 12, 19, 16, 13, 17, 14, 18, 20, 20, 18, 21, 18, 21, 21.

Construct a frequency table with five bins, with 10 as the lowest value of the first bin.

<table>
<thead>
<tr>
<th>A) No. of fries</th>
<th>Frequency</th>
<th>B) No. of fries</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-12</td>
<td>2</td>
<td>10-12</td>
<td>1</td>
</tr>
<tr>
<td>13-15</td>
<td>3</td>
<td>12-15</td>
<td>4</td>
</tr>
<tr>
<td>16-18</td>
<td>6</td>
<td>15-18</td>
<td>3</td>
</tr>
<tr>
<td>19-21</td>
<td>7</td>
<td>18-21</td>
<td>7</td>
</tr>
<tr>
<td>22-24</td>
<td>2</td>
<td>21-24</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C) No. of fries</th>
<th>Frequency</th>
<th>D) No. of fries</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-12</td>
<td>2</td>
<td>10-13</td>
<td>4</td>
</tr>
<tr>
<td>12-15</td>
<td>3</td>
<td>14-17</td>
<td>4</td>
</tr>
<tr>
<td>15-18</td>
<td>6</td>
<td>18-21</td>
<td>10</td>
</tr>
<tr>
<td>18-21</td>
<td>7</td>
<td>22-25</td>
<td>2</td>
</tr>
<tr>
<td>21-24</td>
<td>2</td>
<td>26-29</td>
<td>0</td>
</tr>
</tbody>
</table>
9) The amount of money in the pockets of the 18 students in a statistics class is: ($).77, 1.12, 2.56, 9.11, 4.78, 2.49, 1.01, 5.63, 3.65, 8.50, 3.00, 1.05, 3.49, 6.00, 6.50, 8.32, 4.95, 5.67, 4.50, 8.11. The bins for a frequency table beginning at $.50 for the lowest value of the first bin and with bin width two dollars are:

A) .50 – 2.49; 2.49 – 4.49; 4.49 – 6.49; 6.49 – 8.49; 8.49 – 10.49
B) .50 – 2.50; 2.50 – 4.50; 4.50 – 6.50; 6.50 – 8.50; 8.50 – 10.50
C) .50 – 2.50; 2.50 – 4.50; 4.50 – 6.50; 6.50 – 8.50; 8.50 – 10.50
D) .50 – 2.49; 2.50 – 4.49; 4.50 – 6.49; 6.50 – 8.49; 8.50 – 10.49

10) Homework data is summarized in the frequency table:

<table>
<thead>
<tr>
<th>Homework Time (minutes)</th>
<th>Number of Students</th>
<th>Relative Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 15</td>
<td>4</td>
<td>10 %</td>
</tr>
<tr>
<td>16 – 30</td>
<td>6</td>
<td>15 %</td>
</tr>
<tr>
<td>31 – 45</td>
<td>11</td>
<td>27.5 %</td>
</tr>
<tr>
<td>46 – 60</td>
<td></td>
<td>25 %</td>
</tr>
<tr>
<td>61 – 75</td>
<td>6</td>
<td>15 %</td>
</tr>
<tr>
<td>76 – 90</td>
<td>3</td>
<td>7.5%</td>
</tr>
</tbody>
</table>

What value goes into the number of students column in the row 46 – 60 ?
A) 17  B) 10  C) 31  D) 15
11) A medical research team studies the ages of patients who had strokes caused by stress. The results of 34 patients are:

<table>
<thead>
<tr>
<th>age</th>
<th>freq</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-29</td>
<td>3</td>
</tr>
<tr>
<td>30-34</td>
<td>3</td>
</tr>
<tr>
<td>35-39</td>
<td>6</td>
</tr>
<tr>
<td>40-44</td>
<td>4</td>
</tr>
<tr>
<td>45-49</td>
<td>5</td>
</tr>
<tr>
<td>50-54</td>
<td>3</td>
</tr>
<tr>
<td>55-59</td>
<td>5</td>
</tr>
<tr>
<td>60-65</td>
<td>5</td>
</tr>
</tbody>
</table>

Construct the frequency histogram.

D) None of the histograms are correct.
12) **Weight (lb) | Frequency**

| 5-7  | 2  |
| 8-10 | 9  |
| 11-13| 18 |
| 14-16| 13 |
| 17-19| 4  |
| 20-22| 1  |

Construct the line chart for the data above.

A) None are correct.

B) [Diagram of a line chart with weights ranging from 0 to 20 and numbers ranging from 0 to 25, labeled as Weights of Cats.]

C) [Diagram of a line chart with weights ranging from 0 to 20 and numbers ranging from 0 to 25, labeled as Weights of Cats.]

D) [Diagram of a line chart with weights ranging from 0 to 20 and numbers ranging from 0 to 25, labeled as Weights of Cats.]

13) Between which two consecutive months did the price of the stock drop by the greatest percentage? January = 1 ... December = 12

A) May - June
B) August - September
C) None of the consecutive months given.
D) June - July
14) Identify the class that has the greatest increase in 2.5 or better GPAs over the five decades.

14) _______

A) So  B) Jr  C) Fr  D) Sr
1) The amount of money in the pockets of the 18 students in a statistics class is: ($) .77, 1.12, 2.56, 9.11, 4.78, 2.49, 1.01, 5.63, 3.65, 8.50, 3.00, 1.05, 3.49, 6.00, 6.50, 8.32, 4.95, 5.67, 4.50, 8.11. The bins for a frequency table beginning at $.50 for the lowest value of the first bin and with bin width two dollars are:
   A) .50 - 2.49; 2.50 - 4.49; 4.50 - 6.49; 6.50 - 8.49; 8.50 - 10:49
   B) .50 - 2.50; 2.51 - 4.50; 4.51 - 6.50; 6.51 - 8:50; 8:51 - 10:50
   C) .50 - 2.49; 2.49 - 4.49; 4.49 - 6.49; 6.49 - 8:49; 8:49 - 10:49
   D) .50 - 2.50; 2.50 - 4:50; 4.50 - 6.50; 6.50 - 8:50; 8:50 - 10:50

2) Homework data is summarized in the frequency table:

<table>
<thead>
<tr>
<th>Homework Time (minutes)</th>
<th>Number of Students</th>
<th>Relative Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 15</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>16 - 30</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>31 - 45</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>46 - 60</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>61 - 75</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>76 - 90</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

What value goes into the relative frequency column in the row 46 - 60? 10
A) 28.6%  B) .771  C) 77.1%  D) 27
3) The ages of employees of a company are summarized in the frequency table.

<table>
<thead>
<tr>
<th>Quiz Scores</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>18–24</td>
<td>11</td>
</tr>
<tr>
<td>25–31</td>
<td>38</td>
</tr>
<tr>
<td>32–38</td>
<td>35</td>
</tr>
<tr>
<td>39–45</td>
<td>27</td>
</tr>
<tr>
<td>46–52</td>
<td>22</td>
</tr>
<tr>
<td>53–59</td>
<td>14</td>
</tr>
<tr>
<td>60–66</td>
<td>5</td>
</tr>
</tbody>
</table>

Construct the line chart for the data above.

A) 

B) 

C) 

D) None of the graphs are correct.
4) The table shows the end-of-the-month checking account balance of a statistics teacher for the months January 1999 through December 1999 as determined by the closing balance on the last banking day of the month. The balance is rounded to the nearest dollar.

<table>
<thead>
<tr>
<th>Jan(1)</th>
<th>Feb(2)</th>
<th>Mar(3)</th>
<th>Apr(4)</th>
<th>May(5)</th>
<th>Jun(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1112</td>
<td>1356</td>
<td>1627</td>
<td>1936</td>
<td>1743</td>
<td>1481</td>
</tr>
<tr>
<td>1490</td>
<td>1340</td>
<td>1139</td>
<td>910</td>
<td>700</td>
<td>500</td>
</tr>
</tbody>
</table>

Construct a time series diagram for the data.

A)

B)

C)

D) None of the graphs are correctly constructed.

5) Answer the question using the graphical display

Determine the percentage increase in sophomore 2.5 or better GPAs over the five decades.

A) 66%  
B) 50%  
C) 33%  
D) 100%
6) The data below is the number of hours of homework done as reported by 24 high school juniors for the last week in September, 1996. 6, 5, 6, 4, 6, 6, 9, 7, 6, 3, 8, 5, 8, 6, 5, 8, 6, 5, 7, 5, 8, 7, 4. Using bins of 2 hours width beginning at 3, construct the frequency histogram.

A)

B) None of the histograms are correct.

C)

D)
A nurse measured the blood pressure of each person who visited her clinic. Following is a relative-frequency histogram for the systolic blood pressure readings for those people aged between 25 and 40. Use the histogram to answer the question. The blood pressure readings were given to the nearest whole number.

Relative Frequency

Systolic Blood Pressure (mm Hg)

7) Given that 900 people were aged between 25 and 40, approximately how many had a systolic blood pressure reading between 140 and 149 inclusive?
A) 72  B) 720  C) 8  D) 7

Find the original data from the stem-and-leaf plot.

8)

<table>
<thead>
<tr>
<th>Stem</th>
<th>Leaves</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>17</td>
</tr>
<tr>
<td>9</td>
<td>1 4 7</td>
</tr>
<tr>
<td>10</td>
<td>1 4 7 9</td>
</tr>
<tr>
<td>11</td>
<td>4 5</td>
</tr>
</tbody>
</table>
A) 81, 87, 91, 94, 97, 101, 104, 104, 107, 109, 114, 115
B) 81, 87, 94, 97, 104, 105, 107, 109, 114, 115
C) 9, 15, 9, 9, 12, 15, 11, 11, 14, 17, 19, 15, 16, 19
D) 84, 85, 91, 94, 97, 101, 101, 114, 115

Use the data to plot a stem-and-leaf diagram.

9) The attendance counts for this season's basketball games are listed below.
227 239 215 219
221 233 229 233
235 228 245 231
A)  21 5 9  
   22 1 7 8 9 
   23 1 3 3 5 9 
   24 5
B)  21 5 7 9  
    22 1 8 9 
    23 1 3 3 5 9 
    24 5

39
Construct a pie chart representing the given data set.

10) The following figures give the distribution of land (in acres) for a county containing 98,000 acres.

<table>
<thead>
<tr>
<th>Forest</th>
<th>Farm</th>
<th>Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>14,700</td>
<td>9,800</td>
<td>73,500</td>
</tr>
</tbody>
</table>

A)

B)
11) The following data represent the total number of years of formal education for 40 employees of a bank.

<table>
<thead>
<tr>
<th>Number of years of education</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td>15</td>
<td>4</td>
</tr>
<tr>
<td>16</td>
<td>3</td>
</tr>
<tr>
<td>17</td>
<td>8</td>
</tr>
<tr>
<td>18</td>
<td>2</td>
</tr>
<tr>
<td>19</td>
<td>2</td>
</tr>
</tbody>
</table>

Construct a grouped-data table for the number of years of education.

<table>
<thead>
<tr>
<th>Number of years of education</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>13</td>
<td>11</td>
</tr>
<tr>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td>15</td>
<td>4</td>
</tr>
<tr>
<td>16</td>
<td>3</td>
</tr>
<tr>
<td>17</td>
<td>8</td>
</tr>
<tr>
<td>18</td>
<td>2</td>
</tr>
<tr>
<td>19</td>
<td>3</td>
</tr>
</tbody>
</table>

12) The following dotplot represents the ages of the people in a sample selected from a group of environmentalists.

How many people in the sample were aged between 20 and 28 inclusive?

A) 6  B) 10  C) 13  D) 9
13) A machine is supposed to fill juice bottles with 16 fluid ounces of juice. The manufacturer picks a sample of bottles which have been filled by the machine and determines the volume of juice in each bottle. The results are shown in the stem-and-leaf diagram below. The leaf unit is 0.1.

| 15 | 1 |
| 15 | 3 |
| 15 | 4 5 |
| 15 | 6 6 7 7 7 7 |
| 15 | 8 8 8 9 9 9 9 9 |
| 16 | 0 0 0 0 0 1 1 1 1 |
| 16 | 2 2 2 2 3 3 3 |
| 16 | 5 5 5 |
| 16 | 6 6 |
| 16 | 8 |

Find the number of bottles sampled contained 15.7 fluid ounces of juice or less.
A) 4           B) 10           C) 6           D) 17

14) A large group of nickels have masses from 4.90 to 5.14. If they were to be placed in a five bin frequency table with the lowest value equal to the mass of the lightest coin, the bins would be:
A) 4.90 - 4.95, 4.96 - 5.00, 5.01 - 5.05, 5.06 - 5.10, 5.11 - 5.15
B) 4.90 - 4.94, 4.95 - 4.99, 5.00 - 5.04, 5.05 - 5.09, 5.10 - 5.14
C) 4.90 - 4.95, 4.95 - 5.00, 5.00 - 5.05, 5.05 - 5.10, 5.10 - 5.15
D) 4.90 - 4.95, 5.00 - 5.09, 5.00 - 5.99, 6.00 - 6.99, 7.00 - 7.99, 8.00 - 8.99

15) Homework data is summarized in the frequency table:

<table>
<thead>
<tr>
<th>Homework Time (minutes)</th>
<th>Number of Students</th>
<th>Relative Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 15</td>
<td>4</td>
<td>10 %</td>
</tr>
<tr>
<td>16 - 30</td>
<td>6</td>
<td>15 %</td>
</tr>
<tr>
<td>31 - 45</td>
<td>11</td>
<td>27.5 %</td>
</tr>
<tr>
<td>46 - 60</td>
<td></td>
<td>25 %</td>
</tr>
<tr>
<td>61 - 75</td>
<td>6</td>
<td>15 %</td>
</tr>
<tr>
<td>76 - 90</td>
<td>3</td>
<td>7.5 %</td>
</tr>
</tbody>
</table>

What value goes into the number of students column in the row 46 - 60?
A) 17           B) 15           C) 10           D) 31
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) The amount of money in the pockets of the 18 students in a statistics class is:
($), 77, 1.12, 2.56, 9.11, 4.78, 2.49, 1.01, 5.63, 3.65, 8.50, 3.00, 1.05, 3.49,
6.00, 6.50, 8.32, 4.95, 5.67, 4.50, 8.11. The frequencies for a frequency table beginning at $.50 for the lowest value of the first bin and with bin width two dollars are:
A) 4, 5, 7, 2, 2  
B) 4, 5, 6, 3, 2  
C) 5, 5, 6, 3, 1  
D) 5, 4, 6, 3, 2

2) A large group of nickels have masses from 4.90 to 5.14. If they were to be placed in a five bin frequency table with the lowest value the mass of the lightest coin, the bins would be:
A) 4.90 – 4.95, 5.00 – 5.09, 5.10 – 5.19, 5.00 – 5.09, 8.00 – 8.99
B) 4.90 – 4.95, 4.96 – 5.00, 5.01 – 5.05, 5.06 – 5.10, 5.11 – 5.15
C) 4.90 – 4.94, 4.95 – 4.99, 5.00 – 5.04, 5.05 – 5.09, 5.10 – 5.14
D) 4.90 – 4.95, 4.95 – 5.00, 5.00 – 5.05, 5.05 – 5.10, 5.11 – 5.15

3) Homework data is summarized in the frequency table:

<table>
<thead>
<tr>
<th>Homework Time (minutes)</th>
<th>Number of Students</th>
<th>Relative Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 15</td>
<td>4</td>
<td>10 %</td>
</tr>
<tr>
<td>16 – 30</td>
<td>6</td>
<td>15 %</td>
</tr>
<tr>
<td>31 – 45</td>
<td>11</td>
<td>27.5 %</td>
</tr>
<tr>
<td>46 – 60</td>
<td>6</td>
<td>25 %</td>
</tr>
<tr>
<td>61 – 75</td>
<td>3</td>
<td>7.5 %</td>
</tr>
</tbody>
</table>

What value goes into the number of students column in the row 46 – 60?
A) 17  B) 31  C) 10  D) 15

4) Homework data is summarized in the frequency table:

<table>
<thead>
<tr>
<th>Homework Time (minutes)</th>
<th>Number of Students</th>
<th>Relative Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 15</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>16 – 30</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>31 – 45</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>46 – 60</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>61 – 75</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>76 – 90</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

What value goes into the relative frequency column in the row 46 – 60?
A) 77.1%  B) 27  C) 28.6%  D) .771

43
A nurse measured the blood pressure of each person who visited her clinic. Following is a relative-frequency histogram for the systolic blood pressure readings for those people aged between 25 and 40. Use the histogram to answer the question. The blood pressure readings were given to the nearest whole number.

5) What common class width was used to construct the frequency distribution?

A) 100  B) 10  C) 11  D) 9
Construct a grouped-data table for the given data. Use classes based on a single value.

6) The following data represent the total number of years of formal education for 40 employees of a bank.

13  17  13  14  12  17  19  13  15  13  
16  18  13  14  11  19  19  12  14  13  13  
14  16  13  13  15  17  14  17  14  13  17 
12  17  11  14  16  16  17  15  13  13  14

Construct a grouped-data table for the number of years of education.

<table>
<thead>
<tr>
<th>Number of years of education</th>
<th>Frequency</th>
<th>Number of years of education</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>A) 11</td>
<td>1</td>
<td>B) 12</td>
<td>12</td>
</tr>
<tr>
<td>12</td>
<td>3</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>13</td>
<td>11</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>14</td>
<td>5</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>16</td>
<td>3</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>17</td>
<td>8</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>18</td>
<td>2</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>19</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Solve the problem.

7) The following dotplot represents the ages of the people in a sample selected from a group of political activists.

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>20</th>
<th>22</th>
<th>24</th>
<th>26</th>
<th>28</th>
<th>30</th>
<th>32</th>
<th>34</th>
<th>36</th>
<th>38</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

How many people in the sample were under 25?

A) 8        B) 6        C) 12        D) 7
Use the stem-and-leaf diagram to solve the problem.

8) The stem-and-leaf diagram below shows the highest wind velocity ever recorded in 30 different U.S. cities. The velocities are given in miles per hour. The leaf unit is 1.0.

```
6 4
7 2 3
8 5 8 9
8 0 1 1 3 4 4
8 5 5 6 8 8 9 9
9 0 0 1 2 2 3 4
9 5 5 9
```

What is the highest wind velocity recorded in these cities?

A) 95 miles per hour  B) 99 miles per hour  C) 9.9 miles per hour  D) 9.5 miles per hour
A medical research team studies the ages of patients who had strokes caused by stress. The results of 34 patients are:

<table>
<thead>
<tr>
<th>age</th>
<th>freq</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-29</td>
<td>3</td>
</tr>
<tr>
<td>30-34</td>
<td>3</td>
</tr>
<tr>
<td>35-39</td>
<td>6</td>
</tr>
<tr>
<td>40-44</td>
<td>4</td>
</tr>
<tr>
<td>45-49</td>
<td>5</td>
</tr>
<tr>
<td>50-54</td>
<td>3</td>
</tr>
<tr>
<td>55-59</td>
<td>5</td>
</tr>
<tr>
<td>60-65</td>
<td>5</td>
</tr>
</tbody>
</table>

Construct the relative frequency histogram.

A) 

B) 

C) None of the histograms are correct.

D)
The data below is the number of hours of homework done as reported by 24 high school juniors for the last week in September, 1996.

6, 5, 6, 4, 6, 6, 9, 7, 6, 3, 8, 5, 8, 6, 5, 8, 6, 5, 7, 5, 8, 7, 4.

Using bins of 2 hours width beginning at 3, construct the relative frequency histogram.

A)

B)

C)

D) None of the histograms are correct.
11) The ages of employees of a company are summarized in the frequency table.

<table>
<thead>
<tr>
<th>Quiz Scores</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>18–24</td>
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<td>38</td>
</tr>
<tr>
<td>32–38</td>
<td>35</td>
</tr>
<tr>
<td>39–45</td>
<td>27</td>
</tr>
<tr>
<td>46–52</td>
<td>22</td>
</tr>
<tr>
<td>53–59</td>
<td>14</td>
</tr>
<tr>
<td>60–66</td>
<td>5</td>
</tr>
</tbody>
</table>

Construct the line chart for the data above.

**A)**

**B)** None of the graphs are correct.

**C)**

**D)**
12) A medical research team studies the ages of patients who had strokes caused by stress. The results of 34 patients are:

<table>
<thead>
<tr>
<th>age</th>
<th>freq</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-29</td>
<td>3</td>
</tr>
<tr>
<td>30-34</td>
<td>3</td>
</tr>
<tr>
<td>35-39</td>
<td>6</td>
</tr>
<tr>
<td>40-44</td>
<td>4</td>
</tr>
<tr>
<td>45-49</td>
<td>5</td>
</tr>
<tr>
<td>50-54</td>
<td>3</td>
</tr>
<tr>
<td>55-59</td>
<td>5</td>
</tr>
<tr>
<td>60-65</td>
<td>5</td>
</tr>
</tbody>
</table>

Construct the line chart for the data.

A) 

B) None are correct.

C) 

D)
13) Between which two consecutive months did the balance rise by the greatest percentage? January = 1...December = 12
   A) Feb – Mar
   B) None of the selections is correct
   C) Jan – Feb
   D) Mar – Apr

14) Identify the class that had more than half 2.5 or better GPAs for the five decades.
   A) Jr
   B) Fr
   C) So
   D) None of the classes has had more than half 2.5 or better GPAs for the five decades.
   E) Sr
1) Find the mean of the data set below.
   16, 16, 16, 16, 10
   A) 18.5     B) 14     C) 16     D) 14.8

2) The distances traveled (in miles) to 7 different swim meets are given below:
   20, 27, 33, 56, 64, 65, 89
   Find the median distance traveled.
   A) 33 miles     B) 51 miles     C) 64 miles     D) 56 miles

3) Find the mode(s) of the sample data below.
   -20, -29, -46, -29, -49, -29, -49
   A) -46     B) -49     C) -29     D) -35.9

4) The test scores of 15 students are listed below. Find the first quartile, $Q_1$.
   40 45 54 57 58
   64 65 68 73 78
   85 87 90 94 95
   A) 56.25     B) 4     C) 57     D) 55.5

5) The test scores of 15 students are listed below. Obtain the five-number summary.
   40 46 48 55 56
   61 65 68 74 80
   85 87 90 94 95
   A) 40, 55, 68, 87, 95     B) 40, 53.25, 68, 85.5, 95
   C) 40, 53.25, 71.0, 85.5, 95     D) 40, 55, 71.0, 87, 95
6) The weights (in pounds) of 30 newborn babies are listed below. Construct a boxplot for the data set.

5.5 5.7 5.8 5.9 6.1 6.1 6.3 6.4 6.5 6.6
6.7 6.7 6.7 6.9 7.0 7.0 7.0 7.1 7.2 7.2
7.4 7.5 7.7 7.7 7.8 8.0 8.1 8.1 8.3 8.7

A) 

B) 

C) 

D) 

7) Jeanne is currently taking college economics. The instructor often gives quizzes. On the past five quizzes, Jeanne got the following scores: 7 19 4 13 10
Compute the range.
A) 3  B) 4  C) 15  D) 19

8) Find the standard deviation of the data below.
2, 6, 15, 9, 11, 22, 1, 4, 8, 19
A) 2.1  B) 6.3  C) 6.8  D) 7.1

9) The mathematics SAT scores of the seven students in a mathematics seminar are 520, 541, 572, 581, 613, 627, 635, 775. Suppose the student with the score 520 drops the seminar and is replaced by a student with a score of 762. What will happen to the mean and the median scores of the class?
A) Both the median and the mean will increase.
B) Neither mean nor median will change.
C) The median will increase; the mean will be unchanged.
D) The mean will increase; the median will be unchanged.
10) **The federal government requires a car manufacturer to have a minimum miles per gallon (mpg) average over the cars it makes.** Suppose that the models and mpgs for a manufacturer are Corsair (8 mpg), Futura (11 mpg), Retro (17 mpg), and Envy (23). Twenty percent of the cars sold are Corsairs, 30% are Futuras, 40% are retros, and 10% are envys. Find the average mpg for this manufacturer.

A) 14.8 mpg  
B) 14.0 mpg  
C) None of the values given is the average.  
D) 15.5 mpg

11) Which of the distributions has the greatest variation?

A)  
B)  
C)  

12) Consider the distribution of mathematics SAT scores of students in honors calculus at a liberal arts college. What would you expect the shape and variation of the distribution to be?  
A) Skewed right with considerable variation  
B) Symmetric with large variation  
C) Skewed left with little variation  
D) Symmetric with little variation
13) Suppose that there are 400 students in your school class. What class rank is the 20th percentile?
   A) 80  B) None of the values is correct.
   C) 40  D) 20

14) The mean of a distribution is greater than the median which is, in turn, greater than the mode. Identify the shape of the distribution.
   A) Bimodal  B) Skewed right
   C) Symmetric  D) Skewed left

15) Consider the distribution of weights of all the students at Bloomington High School. How many modes would you expect in the distribution?
   A) 0  B) 1  C) 2
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) The course grade in a statistics class is the average of the scores on five examinations, 100 points each. Suppose the scores of the first four examinations (out of 100) are 65, 75, 90, and 80. What is the highest course average possible after the last examination?
   A) 62  B) 100  C) 82  D) 77.5

2) The grocery expenses for six families were $58.95, $59.55, $84.07, $48.87, $49.86, and $73.05. Compute the mean grocery bill. Find the mean. Round your answer to the nearest cent.
   A) $74.87  B) $62.87  C) $62.39  D) $93.59

3) In ten trips to Las Vegas, a person had the following net gains:
   $1082  $1225  $4377  $6774  $2185
   $2298  $6182  $8694  $6674  $4142

   Find the median net gain.
   A) $4377  B) $4849.17  C) $4363.80  D) $3220.00

4) Find the mode(s) of the data set.
   7.05, 7.41, 7.56, 7.05, 7.88, 7.99, 7.62
   A) 7.41  B) 7.05  C) 7.509  D) 7.56

5) Suppose that the mathematics SAT scores of the mathematics students at a university are normally distributed. How are the mean (μ), median (y), and mode (z) of the distribution related?
   A) x = y, both < z  B) x = y = z
   C) y = z, both greater than x.  D) x < y < z

6) A frequent dinner party giver purchases wine based on the weighted average of: clarity (7%), bouquet (5%), friendliness to the palate (8%), shelf life of opened jugs (40%), and price (40%). Suppose Bone Ranch Wave has an overall rating of 7.57. Another possibility is Just a Jug of Wine which has, respectively scores of 5, 6, 3, and 8, in the first four categories. What would its Price rating have to be to make it as attractive as the Wave?

   A) None of the values are correct for the rating that would make Just
      A Jug as attractive a purchase as the Wave.
   B) 6
   C) 15.85
   D) 8.7
7) Which of the distributions is skewed to the left?

A) 

B) 

C) 

8) To get the best deal on a microwave oven, Jeremy called six appliance stores and asked the cost of a specific model. The prices he was quoted are listed below:

$119 $488 $227 $644 $344 $266

Compute the range.

A) $39  B) $488  C) $119  D) $525

9) Consider the distribution of weights of all the students at Bloomington High School. How many modes would you expect in the distribution?

A) 0  B) 2  C) 1

10) Select the correct statement about the mode of a distribution with a single mode.

A) The mode may be to the left, right or middle of the distribution.
B) The mode is always in the middle of the distribution.
C) The mode is always to the right of the distribution.
D) The mode is always to the left of the distribution.
11) Suppose that 35% of the wage earners in the United States make more than you do. Your income is at what percentile?
A) 35th percentile
B) Some percentile other than the 35th or 65th but there is insufficient information to calculate it.
C) 65th percentile

12) The weekly salaries (in dollars) of sixteen government workers are listed below. Find the first quartile, $Q_1$.
690 595 813 656
728 562 478 608
527 670 685 464
543 787 492 826
A) 4.25 B) 531.00 C) 335.00 D) 527.00

13) The normal annual precipitation (in inches) is given below for 21 different U.S. cities. Obtain the five-number summary.
39.1 30.4 18.5 32.6 27.1 27.8 8.6
22.7 42.6 31.2 21.1 12.0 5.1 12.8
21.6 10.9 15.3 25.4 17.2 14.2 51.7
A) 5.1, 13.150, 21.35, 29.750, 51.7 B) 5.1, 13.150, 21.6, 29.750, 51.7
C) 5.1, 13.5, 21.35, 30.80, 51.7 D) 5.1, 13.5, 21.6, 30.80, 51.7

14) The test scores of 40 students are listed below. Construct a boxplot for the data set.
25 35 43 44 47 48 54 55 56 57
59 62 63 65 66 68 69 71 72
72 73 74 76 77 77 78 79 80 81
81 82 83 85 89 92 93 94 97 98
A)

B)

C)

D) None of the boxplots are correct.
15) Find the standard deviation, $s$, of the data set.
196, 205, 215, 185, 229, 278, 165

A) 33.1     B) 36.2     C) 12.7     D) 30.2
1) The manager of an electrical supply store measured the diameters of the rolls of wire in the inventory. The diameters of the rolls (in m) are listed below.
0.206  0.114  0.535  0.402  0.639  0.28
Compute the range.
A) 0.074  B) 0.535  C) 0.525  D) 0.114

2) The local Tupperware dealers earned these commissions last month:

$3063.10  $2887.57  $4946.38  $2298.59
$3323.87  $3484.09  $3511.96
$2996.15  $2519.79  $2974.40

What was the mean commission earned? Round your answer to the nearest cent.
A) $3200.59  B) $3194.59  C) $4000.74  D) $3556.21

3) The weights (in ounces) of 21 cookies are shown. Find the median weight.

<table>
<thead>
<tr>
<th>Weight (oz)</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.68</td>
<td>1</td>
</tr>
<tr>
<td>1.19</td>
<td>1</td>
</tr>
<tr>
<td>0.67</td>
<td>1</td>
</tr>
<tr>
<td>1.62</td>
<td>1</td>
</tr>
<tr>
<td>0.61</td>
<td>1</td>
</tr>
<tr>
<td>0.71</td>
<td>1</td>
</tr>
<tr>
<td>1.40</td>
<td>1</td>
</tr>
<tr>
<td>1.91</td>
<td>1</td>
</tr>
<tr>
<td>0.94</td>
<td>1</td>
</tr>
<tr>
<td>0.68</td>
<td>1</td>
</tr>
<tr>
<td>1.10</td>
<td>1</td>
</tr>
<tr>
<td>1.41</td>
<td>1</td>
</tr>
<tr>
<td>0.82</td>
<td>1</td>
</tr>
<tr>
<td>0.47</td>
<td>1</td>
</tr>
<tr>
<td>1.10</td>
<td>1</td>
</tr>
<tr>
<td>0.71</td>
<td>1</td>
</tr>
<tr>
<td>1.41</td>
<td>1</td>
</tr>
<tr>
<td>0.61</td>
<td>1</td>
</tr>
<tr>
<td>0.56</td>
<td>1</td>
</tr>
<tr>
<td>A) 0.94 ounces</td>
<td>B) 0.88 ounces</td>
</tr>
<tr>
<td>C) 1.19 ounces</td>
<td>D) 0.82 ounces</td>
</tr>
</tbody>
</table>

4) The speeds (in mi/h) of the cars passing a certain checkpoint are measured by radar. The results are shown below. Find the mode(s) of the data below.

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>43.8</td>
<td>1</td>
</tr>
<tr>
<td>43.5</td>
<td>1</td>
</tr>
<tr>
<td>40.4</td>
<td>1</td>
</tr>
<tr>
<td>43.2</td>
<td>1</td>
</tr>
<tr>
<td>42.2</td>
<td>1</td>
</tr>
<tr>
<td>42.3</td>
<td>1</td>
</tr>
<tr>
<td>40.8</td>
<td>1</td>
</tr>
<tr>
<td>41.8</td>
<td>1</td>
</tr>
<tr>
<td>40.2</td>
<td>1</td>
</tr>
<tr>
<td>43.8</td>
<td>1</td>
</tr>
</tbody>
</table>
A) 42.13  B) 40.4  C) 43.8  D) 43.8, 42.2, 40.4

5) The manager of a small dry cleaner employs six people. As part of their personnel file, she asked each one to record to the nearest one-tenth of a mile the distance they travel one way from home to work. The six distances are listed below:

12.6  10.5  27.7  27.4  16.5  21.8

Compute the standard deviation, s.
A) 7.38  B) 27.5  C) 2262.0  D) 2534.6
6) The table below provides a frequency distribution for the winner of the Davis Cup during the period 1977-1994.

<table>
<thead>
<tr>
<th>Winner of Davis Cup</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>6</td>
</tr>
<tr>
<td>Germany</td>
<td>3</td>
</tr>
<tr>
<td>Czechoslovakia</td>
<td>1</td>
</tr>
<tr>
<td>Australia</td>
<td>3</td>
</tr>
<tr>
<td>France</td>
<td>1</td>
</tr>
<tr>
<td>Sweden</td>
<td>4</td>
</tr>
</tbody>
</table>

Which measure of center, the mean, the median, or the mode is most appropriate here?
A) mode  
B) mean  
C) median

7) The federal government requires a car manufacturer to have a minimum miles per gallon (mpg) average over the models it makes. Suppose that the average mpg for the five models of a manufacturer is 26 mpg. A state of the art gas/electric hybrid model with an mpg of 60 mpg is added to the line. Find the mpg for the manufacturer.
A) None of the values represent the manufacturer's mpg with the new model.
B) 38.0 mpg
C) 43 mpg
D) 31.7 mpg

8) Suppose that the mathematics SAT scores of the mathematics students at a university are normally distributed. Fourteen students in the lower 25 percent leave the university and are replaced by 14 new mathematics students with scores that make them high end outliers. How are the mean (\(\bar{x}\)), median (\(\tilde{x}\)), and mode (\(z\)) of the distribution affected?
A) \(\bar{x}\), \(\tilde{x}\), and \(z\) will remain unchanged.
B) \(\bar{x}\) will increase, \(\tilde{x}\) and \(z\) will remain unchanged.
C) \(\bar{x}\), \(\tilde{x}\), and \(z\) will increase.
D) \(\bar{x}\) and \(\tilde{x}\) will increase, \(z\) will remain unchanged.

9) The batting averages of the first three batters in the Eureka College Women's Softball Team line up are 322, 295, and 282. If the first three batters are considered as the "Lead-off Group," what is the batting average of the group?
A) 299
B) None of the other choices are correct.
C) 295
D) Cannot be determined from the given data
10) The normal annual precipitation (in inches) is given below for 21 different U.S. cities. Find the third quartile, \( Q_3 \):

\[
19.1 \ 35.6 \ 10.2 \ 38.4 \ 22.4 \ 9.1 \ 12.6 \\
33.3 \ 20.6 \ 37.3 \ 30.6 \ 39.6 \ 17.3 \ 24.2 \\
31.0 \ 13.6 \ 27.5 \ 15.0 \ 22.3 \ 26.4 \ 11.7
\]

A) 31.0  
B) 32.15  
C) 16.5  
D) 30.900

11) Which of the distributions is skewed to the right?

[A)  
B)  
C)  

12) Consider the distribution of heights of all the NBA players. What would you expect the shape of the distribution to be?

A) Skewed left  
B) Symmetric  
C) Skewed right

13) Suppose that your income is at the 85th percentile of wage earners in the United States. What percent of wage earners make more than you?

A) 85%  
B) Some value other than 15% or 85%. There is insufficient information to calculate it.  
C) 15%
14) The National Education Association collects data on the number of years of teaching experience of high-school teachers. A sample taken this year of 19 high-school teachers yielded the following data on number of years of teaching experience.

<table>
<thead>
<tr>
<th>Number of Years</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>33</td>
<td>1</td>
</tr>
<tr>
<td>31</td>
<td>1</td>
</tr>
<tr>
<td>28</td>
<td>2</td>
</tr>
<tr>
<td>23</td>
<td>1</td>
</tr>
<tr>
<td>22</td>
<td>1</td>
</tr>
<tr>
<td>21</td>
<td>2</td>
</tr>
<tr>
<td>17</td>
<td>2</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>31</td>
<td>1</td>
</tr>
<tr>
<td>28</td>
<td>2</td>
</tr>
<tr>
<td>23</td>
<td>1</td>
</tr>
</tbody>
</table>

Obtain the five-number summary.

A) 1, 3.75, 17, 18.75, 33  
B) 1, 3.75, 13.0, 18.75, 33  
C) 1, 4, 19.0, 28, 33  
D) 1, 4, 21, 28, 33

15) The highest temperatures ever recorded (in °F) in 32 different U.S. states are shown below. Construct a boxplot for the data set.

100 100 105 105 106 106 107 107  
109 110 110 112 112 112 114 114  
114 115 116 117 118 118 118 118  
118 119 120 121 122 125 128 134

A) ![Boxplot A]

B) ![Boxplot B]

C) ![Boxplot C]

D) ![Boxplot D]
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) Select that variable most likely to have a normal or near-normal distribution over the given population.
   
   A) The amount of property taxes paid by homeowners in a new "affordable housing" subdivision.
   
   B) The amount of pocket money of each of the students at a mid-sized liberal arts college at a given time.
   
   C) The amount of pocket change remaining at the end of the day for a teacher over a year.
   
   D) None of the variables is likely to have a normal or near-normal distribution.

2) Select the distribution that appears to be the most normal distribution.
   
   A) None of the distributions appears normal or near-normal.

   B) [Graph Image]

   C) [Graph Image]

   D) [Graph Image]
3) What percentage of lightbulbs have a life between 2000 hours and 2500 hours?

A) About 15%  
B) About 35%  
C) About 50%  
D) About 85%

4) The heights of a large population of students have a mean of 66" with a standard deviation of 4". What is the mean of the distribution of sample means for samples of 16 students?

A) 32"  
B) 66"  
C) 132"  
D) 16"

5) Which of the following statements concerning the standard normal curve is/are true (if any)?

a. The area under the standard normal curve to the left of -3 is zero.
b. The area under the standard normal curve between any two z-scores is greater than zero.
c. The area under the standard normal curve between two z-scores will be negative if both z-scores are negative.
d. The area under the standard normal curve to the left of any z-score is less than 1.

A) a, c  
B) a, b  
C) b, d  
D) a

6) The variable X is normally distributed. The mean is \( \mu = 60.0 \) and the standard deviation is \( \sigma = 4.0 \). Find the probability of obtaining a value of the variable less than 53.0.

A) 0.9599  
B) 0.5589  
C) 0.0401  
D) 0.0802

7) The diameters of bolts produced by a certain machine are normally distributed with a mean of 0.30 inches and a standard deviation of 0.01 inches. What percentage of bolts will have a diameter greater than 0.32 inches?

A) 2.28%  
B) 47.72%  
C) 97.72%  
D) 37.45%

8) The lifetimes of lightbulbs of a particular type are normally distributed with a mean of 400 hours and a standard deviation of 11 hours. What percentage of the bulbs have lifetimes that lie within 1 standard deviation to either side of the mean?

A) 31%  
B) 95%  
C) 68%  
D) 84%
9) Scores on an English test are normally distributed with a mean of 38.8 and a standard deviation of 7.2. Find the 41st percentile.

A) 40.5  B) 43.0  C) 34.6  D) 37.1

Determine if the outcome is unusual. Consider as unusual any result that differs from the mean by more than 2 standard deviations. That is, unusual values are either less than \( \mu - 2\sigma \) or greater than \( \mu + 2\sigma \).

10) According to AccuData Media Research, 36% of televisions within the Chicago city limits are tuned to "Eyewitness News" at 5:00 pm on Sunday nights. At 5:00 pm on a given Sunday, 2500 such televisions are randomly selected and checked to determine what is being watched. Would it be unusual to find that 873 of the 2500 televisions are tuned to "Eyewitness News?"

A) No  B) Yes
1) Select that variable most likely to have a normal or near-normal distribution over the given population.

A) Both of the variables can be expected to be normally or near-normally distributed.
B) The incomes of viewers of PBS on winter Sunday afternoons.
C) Neither of the variables can be expected to be normally or near-normally distributed.
D) The heights of the fans at a highly anticipated basketball game.

2) Select the distribution that appears to be the most normal distribution.

A) ![Graph A]
B) ![Graph B]
C) ![Graph C]
D) None of the distributions appear normal or near-normal.
3) What percentage of lightbulbs have a life between 1000 hours and 2000 hours?

A) About 15%  
B) About 50%  
C) About 35%  
D) About 65%

4) The heights of a large population of students have a mean of 66" with a standard deviation of 4". What is the standard deviation of the distribution of sample means for samples of 16 students?

A) 64"  
B) 1"  
C) 4"  
D) 16"

5) The area under the standard normal curve between 1 and 2 is equal to 0.1359. Scores on a particular aptitude test are normally distributed with a mean of 100 and a standard deviation of 10. Which of the following are equal to 13.59%?

a. The percentage of scores between 120 and 130  
b. The percentage of scores between 110 and 120  
c. The percentage of scores between 80 and 90  
d. The percentage of scores between 90 and 120  
e. The percentage of scores between 90 and 110

A) d  
B) b  
C) b, c  
D) e  
E) a, b

6) The variable X is normally distributed. The mean is μ = 15.2 and the standard deviation is σ = 0.9. Find the probability that a randomly measured value of X will be greater than 16.1.

A) 0.1357  
B) 0.1550  
C) 0.8413  
D) 0.1587

7) The incomes of trainees at a local mill are normally distributed with a mean of $1,100 and a standard deviation of $150. What percentage of trainees earn less than $900 a month?

A) 91%  
B) 35%  
C) 41%  
D) 9%

8) The lifetimes of lightbulbs of a particular type are normally distributed with a mean of 280 hours and a standard deviation of 7 hours. What percentage of the bulbs have lifetimes that lie within 2 standard deviations to either side of the mean?

A) 95%  
B) 98%  
C) 99%  
D) 68%
9) Suppose that replacement times for washing machines are normally distributed with a mean of 9.7 years and a standard deviation of 1.1 years. Find the replacement time that separates the top 18% from the bottom 82%.
   A) 9.9 years   B) 10.0 years   C) 10.7 years   D) 8.7 years

10) Suppose that replacement times for washing machines are normally distributed with a mean of 8.8 years and a standard deviation of 1.7 years. Find the 82nd percentile.
   A) 10.4 years   B) 7.2 years   C) 9.1 years   D) 9.8 years
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) Select that variable most likely to have a normal or near-normal distribution over the given population.
   A) Neither can be expected to be normally or near-normally distributed.
   B) The number of persons viewing a highly contested basketball game over the time of the game.
   C) The number of persons viewing a contested basketball game that has turned into a blowout over the time of the game.
   D) Both can be expected to be normally or near-normally distributed.

2) Select the distribution that appears to the most normal distribution.
3) What percentage of lightbulbs have a life between 3000 hours and 4000 hours?

![Hours of 'life' of light bulbs](image)

A) About 85%  
B) About 15%  
C) About 50%  
D) About 35%

4) The mean score of the exit examination for an urban high school is 63 with a standard deviation of 8. What is the mean of the distribution of sample means with a sample size of 9?

A) 7  
B) 21  
C) 54  
D) 63

5) Dave drives to work each morning at about the same time. His commute time is normally distributed with a mean of 54 minutes and a standard deviation of 4 minutes. Fill in the blanks in the following sentence.
The percentage of time that his commute time lies between 46 and 58 minutes is equal to the area under the standard normal curve between __ and __.

A) -1.5, 1.5  
B) -2.5, 0.5  
C) 0, 1  
D) -2, 1

6) Which of the following statements concerning areas under the standard normal curve is/are true?

a. If a z-score is negative, the area to its right is greater than 0.5.
b. If the area to the right of a z-score is less than 0.5, the z-score is negative.
c. If a z-score is positive, the area to its left is less than 0.5.

A) a, b  
B) a  
C) a, c  
D) b, c

7) The lengths of human pregnancies are normally distributed with a mean of 268 days and a standard deviation of 15 days. What is the probability that a pregnancy lasts at least 300 days?

A) 0.9834  
B) 0.0179  
C) 0.0166  
D) 0.4834
8) The systolic blood pressure of 18-year-old women is normally distributed with a mean of 120 mmHg and a standard deviation of 12 mmHg. What percentage of 18-year-old women have a systolic blood pressure that lies within 3 standard deviations to either side of the mean?
   A) 99.74%   B) 95.44%   C) 68.26%   D) 99.99%

9) The weights of certain machine components are normally distributed with a mean of 8.96 g and a standard deviation of 0.07 g. Find the 97th percentile.
   A) 9.15 g   B) 8.97 g   C) 8.99 g   D) 9.09 g

10) For a standard normal distribution, find the percentage of data that are more than 2 standard deviations below the mean or more than 3 standard deviations above the mean.
    A) 0.26%   B) 2.41%   C) 97.59%   D) 4.56%
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) Is it statistically significant to get a 12 when a pair of dice is rolled?  
   A) Yes     
   B) No

2) From the information provided, create the sample space of possible outcomes.  
   A) HT TH     
   B) HH HT TH TT     
   C) HH TT HT HT     
   D) HH HT TT

3) A sample space consists of 184 separate events that are equally likely. 
   What is the probability of each?  
   A) 0     
   B) \( \frac{1}{184} \)     
   C) 1     
   D) 184

4) A polling firm, hired to estimate the likelihood of the passage of an upcoming referendum, obtained the set of survey responses to make its estimate. The encoding system for the data is: 0 = FOR, 1 = AGAINST. If the referendum were held today, estimate the probability that it would pass.  
   0, 1, 1, 0, 0, 1, 1, 0, 0, 0, 1, 0, 1, 0, 0, 0, 1, 0   
   A) .4     
   B) .5     
   C) .65     
   D) .6

5) If \( P(A) = \frac{13}{19} \), find \( P(\overline{A}) \).  
   A) \( \frac{6}{19} \)     
   B) \( \frac{19}{13} \)     
   C) 0     
   D) \( \frac{13}{32} \)

Is Event B dependent or independent of Event A?

6) A: A mosquito lands on your arm.  
   B: You get a mosquito bite.  
   A) Dependent     
   B) Independent

7) In one town, 51% of all voters are Democrats. If two voters are randomly selected for a survey, find the probability that they are both Democrats.  
   A) 0.510     
   B) 1.020     
   C) 0.260     
   D) 0.255

8) You are dealt two cards successively (without replacement) from a shuffled deck of 52 playing cards. Find the probability that both cards are black.  
   A) \( \frac{25}{102} \)     
   B) \( \frac{13}{51} \)     
   C) \( \frac{1}{2,652} \)     
   D) \( \frac{25}{51} \)
9) An unprepared student makes random guesses for the ten true–false questions on a quiz. Find the probability that there is at least one correct answer.

A) \( \frac{1,023}{1,024} \)  
B) \( \frac{1}{10} \)  
C) \( \frac{9}{10} \)  
D) \( \frac{1}{1,024} \)

10) The table below shows the soft drink preferences of people in three age groups.

<table>
<thead>
<tr>
<th></th>
<th>cola</th>
<th>root beer</th>
<th>lemon-lime</th>
</tr>
</thead>
<tbody>
<tr>
<td>under 21 years of age</td>
<td>40</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td>between 21 and 40</td>
<td>35</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>over 40 years of age</td>
<td>20</td>
<td>30</td>
<td>35</td>
</tr>
</tbody>
</table>

If one of the 255 subjects is randomly selected, find the probability that the person is over 40 years of age.

A) \( \frac{2}{5} \)  
B) \( \frac{1}{3} \)  
C) \( \frac{1}{2} \)  
D) \( \frac{3}{5} \)

11) If you flip a coin three times, the possible outcomes are HHH, HHT, HTH, HTT, THH, THT, TTH, TTT. What is the probability of getting at least one head?

A) \( \frac{1}{2} \)  
B) \( \frac{7}{8} \)  
C) \( \frac{1}{4} \)  
D) \( \frac{3}{4} \)

12) When a quarter is tossed four times, 16 outcomes are possible.

HHHH, HHHT, HHTH, HHTT, HTHH, HTHT, HTHT, HTTH, THHH, THHT, THTH, THTT, TTHH, TTHT, TTHT, TTTT

Here, for example, HTTH represents the outcome that the first toss is heads, the next two tosses are tails, and the fourth toss is heads. The events A and B are defined as follows.

Event A = the first two tosses are heads  
Event B = the first and last tosses are the same

Are the events A and B mutually exclusive?

A) Yes  
B) No
13) The age distribution of students at a community college is given below.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Number of students (f)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 21</td>
<td>409</td>
</tr>
<tr>
<td>21–25</td>
<td>407</td>
</tr>
<tr>
<td>26–30</td>
<td>220</td>
</tr>
<tr>
<td>31–35</td>
<td>55</td>
</tr>
<tr>
<td>Over 35</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>1114</td>
</tr>
</tbody>
</table>

A student from the community college is selected at random. Find the probability that the student is between 26 and 35 inclusive. Round approximations to three decimal places.
A) 275  B) 0.197  C) 0.247  D) 0.049

14) When two balanced dice are rolled, there are 36 possible outcomes. Find the probability that either doubles are rolled or the sum of the dice is 10.
A) $\frac{1}{36}$  B) $\frac{1}{4}$  C) $\frac{7}{36}$  D) $\frac{2}{9}$

15) When a coin is tossed four times, sixteen equally likely outcomes are possible as shown below:

HHHH  HHTT  HHTH  HHTT
HHTH  HTHT  HTHH  HTTH
HTHH  HTHT  THHT  THHT
TTHT  TTHT  TTTH  THTT

Let X denote the total number of tails obtained in the four tosses. Find the probability distribution of the variable X. Leave your probabilities in fraction form.
A)  x | P(X=x)  B) x | P(X=x)  C) x | P(X=x)  D) x | P(X=x)
     0   | $\frac{1}{16}$ | 0 | $\frac{1}{16}$ | 1 | $\frac{1}{4}$ | 2 | $\frac{7}{16}$ | 3 | $\frac{1}{4}$ | 4 | $\frac{1}{16}$
    1   | $\frac{3}{16}$ | 1 | $\frac{1}{4}$ | 2 | $\frac{3}{8}$ | 3 | $\frac{1}{4}$ | 4 | $\frac{1}{16}$ | 5 | $\frac{1}{16}$
   2    | $\frac{1}{2}$  | 2 | $\frac{3}{8}$ | 3 | $\frac{1}{4}$ | 4 | $\frac{1}{16}$ | 5 | $\frac{1}{4}$ | 6 | $\frac{1}{16}$
   3    | $\frac{3}{16}$ | 3 | $\frac{1}{4}$ | 4 | $\frac{1}{16}$ | 5 | $\frac{1}{4}$ | 6 | $\frac{1}{4}$ | 7 | $\frac{1}{16}$
   4    | $\frac{1}{16}$ | 4 | $\frac{1}{16}$ | 5 | $\frac{1}{16}$ | 6 | $\frac{1}{16}$ | 7 | $\frac{1}{16}$ | 8 | $\frac{1}{16}$

16) In a game, you have a 1/44 probability of winning $84 and a 43/44 probability of losing $6. What is your expected value?
A) -$5.86  B) $1.91  C) $7.77  D) -$3.95
17) A study of 600 college students taking Statistics 101 revealed that 54 students received the grade of A. My roommate received an A in the course. Determine the level at which his achievement is statistically significant.

A) Any level less than .09
B) Any level greater than .91
C) Any level less than .91
D) Any level greater than .09
E) Only at the .09 level

18) The distribution of grades in a statistics class is:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Number</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

To determine the probability distribution, the table is extended to include the Probability column. Determine the entries in this column in order.

A) 12, 28, 40, 12, 80
B) .03, .07, .10, .03, .02
C) .12, .40, .80, .92, .00
D) .12, .28, .40, .12, .08

19) The graph shows the fraction of heads for the total number of flips for the first 140 flips of a large number of flips of a fair coin.

Identify the graph of the long term behavior of this event. The x-axis of the answer graphs is x's 200.
20) At an intersection in Normal, Illinois, there were 89 vehicle accidents over 167,245 vehicles passing through the intersection. Determine the accident rate per 100 vehicles.

A) 1672.45  
B) .053 
C) 18.8  
D) None of the values is correct.
21) Biology students investigated the density of mosquitoes at various distances from standing water at dusk nine days after a rain. The data is in the graph below:

```
<table>
<thead>
<tr>
<th>Distance (m) from standing water</th>
<th>Mosquitoes per cubic</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>25</td>
</tr>
<tr>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>15</td>
<td>10</td>
</tr>
</tbody>
</table>
```

Determine the density of mosquitoes at a distance of 2 m from the standing water.

A) 22  
B) None of the values is correct.  
C) 21  
D) 20

22) The graph shows the rate of mosquito infestation at various distances from standing water:

```
<table>
<thead>
<tr>
<th>Distance (m) from standing water</th>
<th>Mosquitoes per cubic</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>25</td>
</tr>
<tr>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>15</td>
<td>10</td>
</tr>
</tbody>
</table>
```

Determine the number of mosquitoes that might be contained in a tent of volume 12 cubic meters erected at a location at which the rate is 15 mosquitoes per cubic meter.

A) 180  
B) 1.25  
C) None of the values are correct  
D) 27  
E) 3
23) At an intersection in Normal, Illinois there were 116 vehicle/vehicle accidents for 72,000 vehicles entering the intersection. At the same intersection there were 13 vehicle/pedestrian accidents for 7100 vehicles entering the intersection. Determine which has the greater risk: walking or driving through the intersection.

A) Driving is more dangerous because the v/v rate of 116 is greater than the v/p rate of 13 per 1000.

B) None of the explanations are correct.

C) Driving is more dangerous because the v/v rate of 72,000 is greater than the v/p rate of 7100.

D) Driving is more dangerous because there are more vehicles in the intersection than there are pedestrians.

E) Walking is more dangerous because the v/v rate of 1.6 per 10000 is less than the v/p rate of 1.8 per 1000.
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) On a multiple choice test, each question has 7 possible answers. If you make a random guess on the first question, what is the probability that you are correct?
   A) 7         B) \( \frac{1}{7} \)         C) 1         D) 0

Answer the question, considering an event to be "unusual" if its probability is less than or equal to 0.05.

2) Is it "unusual" to get 5 when a pair of dice is rolled?
   A) Yes         B) No

3) The data set represents the income levels of the members of a country club. Estimate the probability that a randomly selected member earns at least $92,000.
   108,000 124,000 90,000 132,000 91,000 108,000 92,000 88,000 148,000 188,000 89,000 100,000 140,000 91,000 124,000 116,000 92,000 156,000 87,000 116,000
   A) .4         B) .8         C) .7         D) .6

4) Find \( P(\overline{A}) \), given that \( P(A) = 0.223 \).
   A) 1.223         B) 0.777         C) 4.484         D) 0

Is Event B dependent or independent of Event A?

5) A: A green ball is drawn from a box with five balls and placed next to the box.
   B: A red ball is drawn next and placed next to the green one.
   A) Dependent         B) Independent

6) Find the probability of correctly answering the first 2 questions on a multiple choice test if random guesses are made and each question has 6 possible answers.
   A) \( \frac{1}{36} \)         B) 3         C) \( \frac{1}{3} \)         D) \( \frac{1}{64} \)

7) A study conducted at a certain college shows that 53% of the school’s graduates find a job in their chosen field within a year after graduation. Find the probability that among 5 randomly selected graduates, at least one finds a job in his or her chosen field within a year of graduating.
   A) 0.530         B) 0.977         C) 0.200         D) 0.958
8) The table below shows the soft drink preferences of people in three age groups.

<table>
<thead>
<tr>
<th></th>
<th>cola</th>
<th>root beer</th>
<th>lemon-lime</th>
</tr>
</thead>
<tbody>
<tr>
<td>under 21 years of age</td>
<td>40</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td>between 21 and 40</td>
<td>35</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>40 years of age and over</td>
<td>20</td>
<td>30</td>
<td>35</td>
</tr>
</tbody>
</table>

If one of the 255 subjects is randomly selected, find the probability that the person is over 40 and drinks cola.

A) \( \frac{4}{17} \)  
B) \( \frac{4}{19} \)  
C) \( \frac{4}{51} \)  
D) None of the above are correct

9) If you flip a coin three times, the possible outcomes are HHH HHT

HTH HHT TTH TTT TTH TTT. What is the probability of getting at least two tails?

A) \( \frac{3}{8} \)  
B) \( \frac{1}{8} \)  
C) \( \frac{5}{8} \)  
D) \( \frac{1}{2} \)

10) When a quarter is tossed four times, 16 outcomes are possible.

<table>
<thead>
<tr>
<th>HHHH</th>
<th>HHHT</th>
<th>HHTH</th>
<th>HHTT</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTHH</td>
<td>HTHT</td>
<td>HTHH</td>
<td>HTTT</td>
</tr>
<tr>
<td>THHH</td>
<td>THHT</td>
<td>THHT</td>
<td>THTT</td>
</tr>
<tr>
<td>TTHH</td>
<td>THTH</td>
<td>THTH</td>
<td>TTTT</td>
</tr>
</tbody>
</table>

Here, for example, HHTT represents the outcome that the first toss is heads, the next two tosses are tails, and the fourth toss is heads. List the outcomes that comprise the following event.

A = event the first three tosses come up the same

A) HHHH, TTTH, HTHT, HTTH  
B) HHH, TTT  
C) HHHH, HHHT, TTHH, TTTT  
D) HHHT, TTTH
11) When a quarter is tossed four times, 16 outcomes are possible.

HHHH  HHHT  HHTH  HHTT
HHTH  HHTT  HTHT  HTTT
THHH  THHT  THTH  THTT
TTHH  THTT  TTHT  TTHT

Here, for example, HTTH represents the outcome that the first toss is heads, the next two tosses are tails, and the fourth toss is heads. The events A and B are defined as follows.

A = event exactly two tails are tossed
B = event the last two tosses are heads

Describe the event (A & B) in words.
A) The event that the first two tosses come up the same and the last two tosses come up the same
B) The event that exactly two tails are tossed or the last two tosses are heads or both
C) The event the first two tosses are tails and the last two tosses are heads
D) The event that two of the tosses come up tails and two tosses come up heads

12) When a quarter is tossed four times, 16 outcomes are possible.

HHHH  HHHT  HHTH  HHTT
HHTH  HHTT  HTHT  HTTT
TTHH  THHT  THTH  THTT
TTHH  THTT  TTHT  TTHT

Here, for example, HTTH represents the outcome that the first toss is heads, the next two tosses are tails, and the fourth toss is heads. The events A and B are defined as follows.

A = event exactly two heads are tossed
B = event all four tosses come up the same

Are the events A and B mutually exclusive?
A) Yes                       B) No
13) The age distribution of students at a community college is given below.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Number of students (f)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 21</td>
<td>404</td>
</tr>
<tr>
<td>21–25</td>
<td>401</td>
</tr>
<tr>
<td>26–30</td>
<td>202</td>
</tr>
<tr>
<td>31–35</td>
<td>53</td>
</tr>
<tr>
<td>Over 35</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>1081</td>
</tr>
</tbody>
</table>

A student from the community college is selected at random. Find the probability that the student is at least 31. Round approximations to three decimal places.

A) 0.74  B) 0.068  C) 0.049  D) 0.932

14) For a person selected randomly from a certain population, events A and B are defined as follows.

A = event that the person is male
B = event that the person is a smoker

For this particular population, it is found that \( P(A) = 0.47 \), \( P(B) = 0.20 \), and \( P(A \& B) = 0.12 \). Find \( P(A \text{ or } B) \). Round approximations to two decimal places.

A) 0.44  B) 0.55  C) 0.79  D) 0.67
15) When two balanced dice are rolled, 36 equally likely outcomes are possible as shown below.

\[(1, 1) (1, 2) (1, 3) (1, 4) (1, 5) (1, 6)\]
\[(2, 1) (2, 2) (2, 3) (2, 4) (2, 5) (2, 6)\]
\[(3, 1) (3, 2) (3, 3) (3, 4) (3, 5) (3, 6)\]
\[(4, 1) (4, 2) (4, 3) (4, 4) (4, 5) (4, 6)\]
\[(5, 1) (5, 2) (5, 3) (5, 4) (5, 5) (5, 6)\]
\[(6, 1) (6, 2) (6, 3) (6, 4) (6, 5) (6, 6)\]

Let \(X\) denote the absolute value of the difference of the two numbers. Find the probability distribution of \(X\). Give the probabilities as decimals rounded to three decimal places.

<table>
<thead>
<tr>
<th>(x)</th>
<th>(P(X=x))</th>
<th>(x)</th>
<th>(P(X=x))</th>
<th>(x)</th>
<th>(P(X=x))</th>
<th>(x)</th>
<th>(P(X=x))</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.167</td>
<td>0</td>
<td>0.167</td>
<td>1</td>
<td>0.278</td>
<td>0</td>
<td>0.167</td>
</tr>
<tr>
<td>1</td>
<td>0.167</td>
<td>1</td>
<td>0.251</td>
<td>2</td>
<td>0.222</td>
<td>1</td>
<td>0.278</td>
</tr>
<tr>
<td>2</td>
<td>0.167</td>
<td>2</td>
<td>0.222</td>
<td>3</td>
<td>0.167</td>
<td>2</td>
<td>0.222</td>
</tr>
<tr>
<td>3</td>
<td>0.167</td>
<td>3</td>
<td>0.167</td>
<td>4</td>
<td>0.111</td>
<td>3</td>
<td>0.167</td>
</tr>
<tr>
<td>4</td>
<td>0.167</td>
<td>4</td>
<td>0.111</td>
<td>5</td>
<td>0.056</td>
<td>4</td>
<td>0.111</td>
</tr>
<tr>
<td>5</td>
<td>0.167</td>
<td>5</td>
<td>0.056</td>
<td>6</td>
<td>0.027</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

16) A contractor is considering a sale that promises a profit of $29,000 with a probability of 0.7 or a loss (due to bad weather, strikes, and such) of $11,000 with a probability of 0.3. What is the expected profit?

A) $17,000  B) $20,300  C) $28,000  D) $18,000

17) Chips numbered consecutively 1, 2, 3, ... are placed in a bowl. Find the minimum number of chips in the bowl such that my picking a number 15 or less is a statistically significant event.

A) 150  B) 100  C) 30  D) 300
18) The distribution of grades in a statistics class is:

<table>
<thead>
<tr>
<th>Height</th>
<th>Number</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>5'2&quot;--5'2&quot;</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>5'2&quot;--5'4&quot;</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>5'4&quot;--5'8&quot;</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>5'8&quot;--5'10&quot;</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>5'10&quot;--6'</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>6'--</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

To determine the probability distribution, the table is extended to include the Probability column. Determine the entries in this column in order.

A) .05, .06, .15, .15, .06, .03        B) .10, .12, .30, .30, .12, .06
C) 5, 6, 15, 15, 6, 3                  D) 10, 12, 30, 30, 12, 6

19) The graph shows the fraction of even winning lottery numbers for a 'Choose 6' lottery game for the first 140 days of the game.

Identify the graph of the long term behavior of this event. The x-axis of the answer graphs is x's 200.

A) [First graph]

B) None of the graphs are correct.
20) At an intersection in Normal, Illinois, there were 89 vehicle accidents for 167,245 vehicles passing through the intersection. Determine the accident rate per 1000 vehicles at this intersection.

A) 167.25  
B) 0.53  
C) 1.88  
D) None of the values is correct.

21) Biology students investigated the density of mosquitoes at various distances from standing water at dusk nine days after a rain. The data is in the graph below:

Determine the density of mosquitoes (mosquitoes/cubic meter) at a distance of 6 m from the standing water.

A) 15  
B) 16  
C) 14  
D) None of the values is correct.
22) The graph shows the rate of mosquito infestation at various distances from standing water:

![Graph showing mosquito infestation rate vs distance from standing water]

Determine the number of mosquitoes that might be contained in a tent of volume 15 cubic meters erected at a location at which the rate is 20 mosquitoes per cubic meter.

A) 1.3
B) 35
C) None of the values is correct.
D) 5
E) 300

23) At an intersection in Normal, Illinois there were 78 vehicle/vehicle accidents for 68,000 vehicles entering the intersection. At the same intersection there were 18 vehicle/pedestrian accidents for 19,200 vehicles entering the intersection. Determine which has the greater risk: walking or driving through the intersection.

A) Driving is more dangerous because the v/v rate of 1.15 per 1000 is greater than the v/p rate of .94 per 1000.
B) Driving is more dangerous because more vehicles were involved in accidents than were pedestrians.
C) Driving is less dangerous because the v/v rate of 1.15 per 1000 is greater than the v/p rate of .94 per 1000.
D) None of the reasons given are correct.
E) Driving is less dangerous because there were about three and a half times more vehicles in the intersection for v/v accidents than there were for v/p accidents.
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) A die with 6 sides is rolled. What is the probability of rolling a number less than 5?
   A) \( \frac{2}{3} \)  
   B) 4  
   C) \( \frac{1}{6} \)  
   D) \( \frac{5}{6} \)  
   1) ________

2) A multiple choice question has 19 possible answers, only one of which is correct. Is it "unusual" to answer a question correctly if a random guess is made?
   A) Yes  
   B) No
   2) ________

3) The data set represents the income levels of the members of a country club. Estimate the probability that a randomly selected member earns at least $92,000.
   108,000  124,000  90,000  132,000  91,000  108,000  92,000  88,000  148,000  188,000  89,000  100,000  140,000  91,000  124,000  116,000  92,000  156,000  87,000  116,000
   A) .8  
   B) .7  
   C) .4  
   D) .6
   3) ________

4) Based on meteorological records, the probability that it will snow in a certain town on January 1st is 0.342. Find the probability that in a given year it will not snow on January 1st in that town.
   A) 0.520  
   B) 2.924  
   C) 1.342  
   D) 0.658
   4) ________

   B: He visits Central Park.
   Find the relation between the events.
   A) Dependent  
   B) Independent
   5) ________

6) A manufacturing process has a 70% yield, meaning that 70% of the products are acceptable and 30% are defective. If three of the products are randomly selected, find the probability that all of them are acceptable.
   A) 0.343  
   B) 0.027  
   C) 0.429  
   D) 2.1
   6) ________

7) A sample of 4 different calculators is randomly selected from a group containing 18 that are defective and 35 that have no defects. What is the probability that at least one of the calculators is defective?
   A) 0.810  
   B) 0.180  
   C) 0.821  
   D) 0.179
   7) ________
8) The table below shows the soft drink preferences of people in three age groups.

<table>
<thead>
<tr>
<th></th>
<th>cola</th>
<th>root beer</th>
<th>lemon-lime</th>
</tr>
</thead>
<tbody>
<tr>
<td>under 21 years of age</td>
<td>40</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td>between 21 and 40</td>
<td>35</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>over 40 years of age</td>
<td>20</td>
<td>30</td>
<td>35</td>
</tr>
</tbody>
</table>

If one of the 255 subjects is randomly selected, find the probability that the person is over 40 years of age given that they drink root beer.

A) \( \frac{2}{5} \)  
B) \( \frac{6}{17} \)  
C) \( \frac{5}{17} \)  
D) None of the above is correct.

9) If you flip a coin three times, the possible outcomes are HHH, HHT, HTH, HTT, THH, THT, TTH, TTT. What is the probability that the first two tosses come up the same?

A) \( \frac{1}{2} \)  
B) \( \frac{1}{8} \)  
C) \( \frac{3}{8} \)  
D) \( \frac{1}{4} \)

10) When a quarter is tossed four times, 16 outcomes are possible.

HHHH  HHTH  HHHT  HHTT  HTTH  HHTH  HTHH  HTHT
HTHH  HTHT  HTTH  HTTT  THHH  THHT  THHT  THTT
TTHH  THTH  THTH  TTTT

Here, for example, HTHH represents the outcome that the first toss is heads, the next two tosses are tails, and the fourth toss is heads. List the outcomes that comprise the following event.

A = event the last toss is heads

A) HHHH, HHTH, HTTH, THHH, THHT, TTHH, THTH
B) HHHH, HHHT, HHTH, HTTH, THHH, THHT, TTHH, TTTT
C) HHHH, HHHT, HHTH, THHH, TTHH, THTH
D) HHHH, HHHT, HHTH, HTTH, THHH, TTHH, TTTT, HHHT
11) Three board members for a nonprofit organization will be selected from a group of five people. The board members will be selected by drawing names from a hat. The names of the five possible board members are Alison, Betty, Charlie, Dave, and Emily. The possible outcomes can be represented as follows.

ABC  ABD  ABE  ACD  ACE
ADE  BCD  BCE  BDE  CDE

Here, for example, ABC represents the outcome that Alison, Betty, and Charlie are selected to be on the board. The events A and B are defined as follows.

A = event that Betty and Alison are both selected  
B = event that more than one man is selected

Are the events A and B mutually exclusive?
A) Yes  B) No

12) A relative frequency distribution is given below for the size of families in one U.S. city.

<table>
<thead>
<tr>
<th>Size</th>
<th>Relative frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0.455</td>
</tr>
<tr>
<td>3</td>
<td>0.214</td>
</tr>
<tr>
<td>4</td>
<td>0.201</td>
</tr>
<tr>
<td>5</td>
<td>0.082</td>
</tr>
<tr>
<td>6</td>
<td>0.028</td>
</tr>
<tr>
<td>7+</td>
<td>0.020</td>
</tr>
</tbody>
</table>

A family is selected at random. Find the probability that the size of the family is less than 5. Round approximations to three decimal places.
A) 0.870  B) 0.082  C) 0.497  D) 0.415

13) In one city, 51.5% of adults are female, 9.7% of adults are left handed, and 5.2% are left-handed females. For an adult selected at random from the city, let

F = event the person is female  
L = event the person is left-handed

Find P(F or L). Round approximations to three decimal places.
A) 0.709  B) 0.612  C) 0.509  D) 0.560
14) When two balanced dice are rolled, 36 equally likely outcomes are possible as shown below:

(1, 1) (1, 2) (1, 3) (1, 4) (1, 5) (1, 6)
(2, 1) (2, 2) (2, 3) (2, 4) (2, 5) (2, 6)
(3, 1) (3, 2) (3, 3) (3, 4) (3, 5) (3, 6)
(4, 1) (4, 2) (4, 3) (4, 4) (4, 5) (4, 6)
(5, 1) (5, 2) (5, 3) (5, 4) (5, 5) (5, 6)
(6, 1) (6, 2) (6, 3) (6, 4) (6, 5) (6, 6)

Let $X$ denote the smaller of the two numbers. If both dice come up the same number, then $X$ equals that common value. Find the probability distribution of $X$. Leave your probabilities in fraction form.

| $x$ | $P(X=x)$ | $x|P(X=x)$ | $x|P(X=x)$ | $x|P(X=x)$ |
|-----|----------|------------|------------|------------|
| 1   | 5/18     | 1/6        | 11/36      | 5/18       |
| 2   | 2/9      | 2/6        | 1/4        | 1/4        |
| 3   | 1/6      | 1/6        | 7/36       | 7/36       |
| 4   | 1/9      | 4/6        | 5/36       | 5/36       |
| 5   | 1/18     | 5/6        | 1/12       | 1/9        |
| 6   | 0        | 6/6        | 1/36       | 1/36       |

15) Suppose you pay $1.00 to roll a fair die with the understanding that you will get back $3.00 for rolling a 2 or a 4, nothing otherwise. What is your expected value?

A) $1.00  
B) $3.00  
C) -$1.00  
D) $0.00

16) What is the probability that 4 randomly selected people all have different birthdays?

A) 0.9918  
B) 0.9836  
C) 0.9729  
D) 0.9891

17) Thirty five of 1423 speeding vehicles on I-55 received citations. I was one of them. Determine the level at which my receiving a citation is a statistically significant event.

A) Any level less than .975

B) Only at the .025 level

C) Any level greater than .975

D) Any level less than .025

E) Any level greater than .025
18) The probability distribution of heights in a statistics course is:

<table>
<thead>
<tr>
<th>Height</th>
<th>Probability</th>
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<tbody>
<tr>
<td>5'-&lt;5'2&quot;</td>
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<td>5'4&quot;-&lt;5'8&quot;</td>
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<td>.22</td>
</tr>
<tr>
<td>6'2&quot;-</td>
<td>.10</td>
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</tbody>
</table>

Determine the missing entry.
A) .10     B) .0010     C) 1     D) 10

19) Groups of ten persons were asked for their favorite numbers. The fraction of even favorite numbers was determined as more and more groups were asked. The graph shows the results for the first 14 groups.

Identify the graph of the expected long term behavior of this event. The x-axis of the answer graphs is x’s 200.

A)  

B)
20) At an intersection in Normal, Illinois, there were 89 vehicle accidents for 167,245 vehicles passing through the intersection. Determine the accident rate per 10,000 vehicles passing through this intersection.
   A) None of the values are correct  
   B) 5.3  
   C) 16.72  
   D) .188

21) Biology students investigated the density of mosquitoes at various distances from standing water at dusk nine days after a rain. There data is in the graph below:

Determine the density of mosquitoes (mosquitoes/cubic meter) at a distance of 12 m from the standing water.
   A) 4  
   B) 2  
   C) 1  
   D) None of the values is correct.
22) The graph shows the rate of mosquito infestation at various distances from standing water.

![Graph showing mosquito infestation rate vs distance from standing water]

Determine the number of mosquitoes that might be contained in a tent of volume 18 cubic meters erected at a location at which the rate is 2 mosquitoes per cubic meter.

A) 9
B) None of the values is correct.
C) 20
D) 36
E) 16

23) At an intersection in Normal, Illinois there were 78 vehicle/vehicle accidents for 68,000 vehicles entering the intersection. At the same intersection there were 18 vehicle/pedestrian accidents for 19,200 vehicles entering the intersection. Determine which has the greater risk: walking or driving through the intersection.

A) Driving is more risky because 78 vehicles were involved in accidents compared to only 18 pedestrians.
B) Walking is less risky than driving because the accident rate per 1000 for v/p is less than the accident rate per 1000 for v/v.
C) Walking is less risky because there were fewer vehicles entering the intersection during the v/p accidents than during the v/v accidents.
D) None of the reasons given are correct.
1) Construct a scatter diagram that most likely represents Grade Point Average (y-axis) as related to hours of study (x-axis) for a reasonable number of hours. Quantities are measured in arbitrary units.

A) A  B) E  C) D  D) C  E) B

2) Describe the correlation coefficient.

A) Negative, weak  
B) Positive, moderate  
C) Negative, moderate  
D) Positive, strong  
E) Positive, weak
3) Estimate the value of the correlation coefficient.

A) 0.20  B) −0.65  C) 0.65  D) −0.90  E) 0.95

4) Num. of data pts  sig. r .05 level  sig. r .01 level  Num. of data pts  sig. r .05 level  sig. r .01 level
   4    .950  .999    5    .878  .959
   6    .811  .917    7    .754  .875
   8    .707  .834    9    .666  .798
  10    .632  .765   15    .514  .641
  20    .444  .561   30    .361  .463
  40    .312  .402   50    .279  .361
 100    .196  .256

Find a correlation coefficient significant at the .05 level but not at the .01 level for a data set of ten points.

A) .611

B) None of the values are significant at the .05 level but not at the .01 level.

C) .824

D) All the values are significant at the .05 level but not at the .01 level.

E) .703
5) Sketch a graph with a strong correlation and one outlier.

5) _______

A) C
B) A
C) None of the graphs have a strong correlation and one outlier.
D) B
E) D

6) Sketch a graph with two groups of data that has no correlation within either group but shows a moderate correlation among all the data.

6) _______

A) C
B) A
C) None of the graphs show no correlation within either group but do show a moderate correlation among all the data.
D) D
E) B
7) The scatter diagram shows test scores (y) and loose pocket change (x). Identify the probable cause of the correlation.
   A) Coincidence
   B) There is no correlation between the variables.
   C) There is a common underlying cause of the variations.
   D) Amount of loose pocket change is a direct cause of test score.

8) Select the best fit line on the scatter diagram below.

   A) C
   B) B
   C) None of the lines is the line of best fit.
   D) All three lines are equally good.
   E) A

9) The scatter plot and best-fit line show the relation among the data for the price of a stock (y) and employment (x) in arbitrary units. The correlation coefficient is .8. Estimate the amount of variation in the price of the stock explained by the variation in employment.

   A) 20%
   B) 50%
   C) 26%
   D) 64%
   E) None of the values is correct.
10) The scatter plot and best-fit line show the relation among the data for the price of a stock \((y)\) and employment \((x)\) in arbitrary units. Suppose that the correlation coefficient is .8. Predict the stock price for an employment value of 5.

- A) 5.5
- B) 5
- C) None of the values is correct.
- D) 6.1
- E) 5.9
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) Sketch a scatter diagram that most likely represents the amount of mold on a piece of bread (y-axis) as related to time (x-axis) over several days.

A) A  B) E  C) C  D) B  E) D

2) Describe the correlation coefficient.

A) Positive, strong  
B) Negative, strong  
C) Negative, moderate  
D) Negative, weak  
E) Positive, weak
3) Estimate the value of the correlation coefficient.

A) 0.5  B) -0.1  C) -0.9  D) 0.1  E) 0.9

4) Find a correlation coefficient significant at the .05 level but not at the .01 level for a data set of twenty points.

<table>
<thead>
<tr>
<th>Num. of data pts</th>
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<th>01 level</th>
<th>Num. of data pts</th>
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</table>

A) None of the values are significant at the .05 level but not at the .01 level.

B) .413

C) .522

D) .684

E) All the values are significant at the .05 level but not at the .01 level.
5) Sketch a graph with a strong correlation and no outliers.

A) A
B) D
C) B
D) There is no graph with a strong correlation and no outliers.
E) C

6) Sketch a graph that has two groups of data, correlations within each group, but no correlation among all the data.

A) A
B) B
C) C
D) There is no such graph possible.
E) D
7) The scatter diagram shows college GPA (y) and month of birth (x) for students in a statistics class. Identify the probable cause of the correlation.

A) Variation in month of birth is a direct cause of the variation in college GPA.
B) The correlation is coincidental.
C) There is no correlation between the variables.
D) The correlation is due to a common underlying cause of the variation in both variables.

8) Select the best fit line on the scatter diagram below.

A) C
B) All of the lines are equally good.
C) B
D) None of the lines is the line of best-fit.
E) A

9) The scatter plot and best-fit line show the relation among the data for the price of a stock (y) and employment (x) in arbitrary units. Suppose that the correlation coefficient is .8. Determine the amount of variation in the price of the stock not explained by the variation in employment.

A) 36%  B) 64%  C) 40%  D) 80%  E) 20%
10) The scatter plot and best-fit line show the relation among the data for the price of a stock (y) and employment (x) in arbitrary units. The correlation coefficient is .8. Predict the stock price for an employment value of 9.

A) 7.7
B) None of the values is correct.
C) 7.0
D) 8.8
E) 8.2
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) Sketch a scatter diagram that most likely represents the amount of leftover pizza remaining (y-axis) with respect to the number of nibbles (x-axes) of someone who will always "Leave a little for someone else."

A) A  B) B  C) D  D) C  E) E

2) Describe the correlation coefficient.

A) No correlation  B) Negative, strong  C) Positive, strong  D) Positive, weak  E) Negative, weak.
3) Estimate the value of the correlation coefficient.  

![Graph](image)

\begin{tabular}{cccc}
A) & B) & C) & D) & E) \\
0.1 & -0.5 & -0.1 & 0.9 & -0.9 \\
\end{tabular}

4) Find a correlation coefficient that is significant at the .05 level for 15 points but not for 10 points.

<table>
<thead>
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<th>sig. r .05 level</th>
<th>sig. r .01 level</th>
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<th>sig. r .01 level</th>
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</table>

A) .623  

B) All the values are correct.  

C) .486  

D) None of the values are correct.  

E) .650
5) Estimate the coordinates of the outlier on the graph with a single outlier.

A) None of values is correct.
B) (8, 16)
C) (16, 8)
D) (17, 4)
E) (4, 17)

6) Sketch a scatter diagram with several groups of uncorrelated data but a moderate correlation among all the data.

A) C
B) B
C) A
D) None of the graphs have the required characteristics.
E) D
7) The scatter diagram shows average grade on a 0-4 scale (y) and course level (100-400) at a midwestern university (x). Identify the probable cause of the correlation.

A) Variation in course level is a direct cause of variation in average grade.
B) The correlation between course level and average grade is coincidental.
C) There is no correlation between the variables.
D) There is a common underlying cause for the correlation between course level and average grade.

8) Select the best fit line on the scatter diagram below.

A) All of the lines are equally good.
B) A
C) C
D) B
E) There is no line of best fit.
9) The scatter plot and best-fit line show the relation among the data for crop yield \((y)\) and amount of fertilizer \((x)\) in arbitrary units. The correlation coefficient is .9. Determine the amount of variation in the yield not explained by the variation in amount of fertilizer.

A) None of the values is correct.
B) 90%
C) 10%
D) 81%
E) 19%

10) The scatter plot and best-fit line show the relation between the price per item \((y)\) and the availability of that item \((x)\) in arbitrary units. Suppose the correlation coefficient is \(-.95\). Predict the price for an availability of 3.

A) 7.1
B) 8.2
C) 7.9
D) 7.6
E) None of the values is correct.
1) A sample of nine students reported that they skipped the following number of classes the past semester: 0, 6, 9, 10, 12, 15, 17, 21, 27. Estimate the mean number of classes skipped by the student body.
   A) 13.5  B) 12  C) None of the values is correct  D) 13

2) Hakeem got a score of 86 on a test for which the mean score was 80. The scores were normally distributed with a standard deviation of 10. How many standard deviations was Hakeem's score from the mean?
   A) 8.6  B) .6  C) 8  D) None of the values is correct.

3) The standard score of a sample mean is -1.5. What is the probability of getting a second sample with a mean no larger than the mean of the first?
   A) None of the values is correct  B) .9332  C) .68  D) .0668

4) Of the 2450 students at a liberal arts college, 245 are fifth year students. Twenty of a group of 120 students are fifth year students. Find the sample proportion of fifth year students.
   A) 20  B) .08  C) 120  D) .17  E) None of the values is correct.

5) Of the 2,138 students in a school district, 527 cannot read up to grade level. Eleven of a class of 27 students in the district cannot read up to grade level. Find the population proportion of below grade readers.
   A) 527  B) None of the values is correct  C) .41  D) .25  E) 11

6) There are 322 teachers at a college. Fifty two of a sample of 72 teachers at the college have doctorates. Estimate the proportion of teachers at the college with doctorates.
   A) None of the values is correct  B) .72  C) 52  D) .52
7) Thirty% of the fifth grade students in a larger school district read below grade level. The distribution of sample means for n = 100 from this population is normal with a mean proportion of .30 and a standard deviation of .05. Of one sample of 100 fifth grade students from this district, 35% read below grade level. The proportion for this sample is one standard deviation above the mean of the sampling distribution. Of another sample of 100 students 37.5% read below grade level. This is 1.5 standard deviations above the mean for the district fifth graders. What is the probability of a third sample of 100 students having a proportion between these two samples?
   A) .1587  
   B) .0919  
   C) .8413  
   D) .9932  
   E) None of these values is correct.

8) The mean value determined from a sample of size 9 is .81 with a standard deviation of .27. What is the margin of error?
   A) .54  
   B) None of these values is correct.  
   C) .09  
   D) .18  
   E) .06

9) A random sample of 25 8th grade students in the Unit 5 School District reported that the number of siblings each had was: 3, 4, 6, 0, 5, 2, 7, 0, 1, 3, 2, 4, 2, 3, 1, 3, 4, 1, 2, 2, 3, 4, 3, 4, 5. Give the 95% confidence interval for the average number of siblings for the 8th grade population. An estimate of the population standard deviation is .70.
   A) 2.30 to 3.70  
   B) None of the intervals is correct.  
   C) 2.26 to 2.96  
   D) 2.96 to 3.66  
   E) 2.68 to 3.24

10) A random sample of 25 8th grade students in the Unit 5 School District reported that the number of siblings each had was: 3, 4, 6, 0, 5, 2, 7, 0, 1, 3, 2, 4, 2, 3, 1, 3, 4, 1, 2, 2, 3, 4, 3, 4, 5. What is the best estimate of the average number of siblings for the 8th grade population?
    A) 3.5  
    B) 2.5  
    C) 3  
    D) None of the values is correct.  
    E) 2.56
11) A researcher wants to conduct a study involving study time of students. The researcher is to have a 95% confidence interval. The margin of error of the study is to be 1.5 hours with a sample standard deviation of 2 hours. How large should the sample be?
   A) 3
   B) None of these values is correct.
   C) 5
   D) 7
   E) 6

12) Find the margin of error for a sample size of 100 with a sample proportion of .5.
    Sample size = <a>, sample proportion = <b>.
    A) .10
    B) .05
    C) None of the values is correct.
    D) .005
    E) .0025

13) Of 400 college students polled, 60 reported that they would use Spring break to prepare for final exams. What is the confidence interval for this study?
    A) .15 to .185
    B) .1497 to .1503
    C) 14.97% v 15% 15.03%
    D) None of the intervals is correct.
    E) 11.5% 15% 18.5%

14) What is the sample size required to conduct a population proportion study with a margin of error of .05?
    A) None of the values is correct.
    B) 20
    C) 400
    D) 800
    E) 40

15) An election is closely contested. What sample size would be appropriate if a poll that reported that 49% of potential voters favored one candidate were to suggest the winner?
    A) 10,000
    B) 12,346
    C) None of the values is correct.
    D) 5,000
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) A sample of five professors reported that they spent the following number of minutes preparing for a class: 60, 90, 105, 125, 140. Estimate the mean time spent preparing for a class by the faculty.
   A) 104 minutes    B) 100 minutes    C) 105 minutes    D) None of the values is correct.

2) The mean city gas mileage for a car of my year, make, and model is 28 mpg with a standard deviation of 5 mpg. My car averages 24 mpg. What is the z-score of the gas mileage for my car?
   A) 5.6    B) None of the values is correct.    C) .8    D) -.8    E) 4.8

3) Use the table to help answer the question.

<table>
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<th>z-score</th>
<th>percentile</th>
<th>x-score</th>
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</table>

The standard score of a sample mean is 2.0. What is the probability of getting a second sample with a mean no larger than the mean of the first?
   A) None of the values is correct.    B) .0228    C) .9772    D) 97.72

4) Of the 22,500 students at a midwestern university, 5277 reported that they binged on alcohol in the past week. Twenty-eight of a group of 136 students reported that they binged on alcohol in the past week. Find the sample proportion of binge drinkers.
   A) .23    B) .21    C) .005    D) .006
5) Of the 6,456,812 tires of a particular type sold, 4,324,445 were replaced on a recall. There were 60 tires of this type in a neighborhood and 12 were replaced. Find the population proportion of non-replaced tires.
   A) .67
   B) .33
   C) 4,424,445
   D) None of the values is correct.
   E) 2,132,367

6) There are 322 teachers at a college. Fifty two of a sample of 72 teachers at the college have doctorates. Estimate the number of teachers at the college with doctorates.
   A) 302
   B) 52
   C) None of the values is correct.
   D) 233

7) Thirty% of the fifth grade students in a larger school district read below grade level. The distribution of sample means for n = 100 from this population is normal with a mean proportion of .30 and a standard deviation of .05. Of a sample of 100 fifth grade students from this district, 35% read below grade level. The proportion for this sample is one standard deviation above the mean of the sampling distribution. What is the probability of a second sample of 100 students having a proportion less than this sample?
   A) .8571
   B) None of the values is correct.
   C) .1871
   D) .8413

8) The mean value determined from a sample of size 400 is 72 with a margin of error of 5.8. What is the 95% confidence interval?
   A) 60.4 to 83.6
   B) None of the values is correct.
   C) 66.2 to 77.8
   D) 72 to 77.8
   E) 66.2 to 72

9) A random sample of 25 8th grade students in the Unit 5 School District reported that the number of siblings each had was: 3, 4, 6, 0, 5, 2, 7, 0, 1, 3, 2, 4, 2, 3, 1, 3, 4, 1, 2, 2, 3, 4, 3, 4, 5. Estimate the average number of siblings for the 8th grade population.
   A) 2.96
   B) 7.00
   C) 3.00
   D) None of these values is correct.
10) A random sample of 20 8th grade students in the Unit 5 School District reported that the number of siblings each had was: 3, 6, 5, 2, 0, 1, 3, 4, 2, 3, 1, 3, 4, 2, 2, 3, 4, 3, 4, 5. Give the 95% confidence interval for the average number of siblings for the 8th grade population.
   A) None of the intervals is correct.
   B) about 2.33 to 3.67
   C) about 2.67 to 3.33
   D) about 2.85 to 3.15

11) A researcher wants to conduct a study involving GPAs of students. The study is to have a 95% confidence interval. The margin of error of the study is to be .2 with a sample standard deviation of .65. How large should the sample be?
   A) 34
   B) 43
   C) None of these values is correct.
   D) 13
   E) 42

12) Find the margin of error.
    Sample size = 225, sample proportion = .8.
    A) None of the values is correct.
    B) .001
    C) .025
    D) .0014
    E) .05

13) The sample proportion for a study is .62 with a margin of error of .05. Find the confidence interval.
    A) 57% to 67%
    B) .57 to .62
    C) None of the values is correct.
    D) 52% to 72%
    E) 62% to 67%

14) What is the sample size required to conduct a population proportion study with a margin of error of 10%?
    A) 20
    B) 100
    C) None of the values is correct.
    D) 200
    E) 10
The college daily reported: "Two hundred ninety five students living in university housing were polled. One hundred sixty said that they were satisfied with their living conditions. Based on this survey we conclude that 55% of students living in dormitories are satisfied. The margin of error of the study is ± 5%. Which statement is correct?

A) To attain a 5% margin of error a larger sample must be polled.

B) A smaller sample could have been used to attain the 5% margin of error.

C) The margin of error is consistent with the sample size.
1) A sample of five professors reported that they spent the following number of minutes correcting examinations for one class: 70, 100, 115, 135, 150. Estimate the mean time spent grading examinations for a class by the faculty.
   A) 110 minutes  B) 114 minutes
   C) None of the values is correct.  D) 115 minutes

2) The mean city gas mileage for a car of my year, make, and model is 28 mpg with a standard deviation of 5 mpg. My car averages 24 mpg. What is the standard score for my car?
   A) -8  B) 5.6
   C) 4.8  D) None of the values is correct.
   E) .8

3) Use the table to help answer the question.

<table>
<thead>
<tr>
<th>z-score</th>
<th>percentile</th>
<th>x-score</th>
<th>percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3.0</td>
<td>.13</td>
<td>.5</td>
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</tr>
<tr>
<td>0.0</td>
<td>50.00</td>
<td></td>
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</tr>
</tbody>
</table>

The standard score of a sample mean is -1.5. What is the probability of getting a second sample with a mean at least as large as the mean of the first?
   A) 6.68  B) .0668
   C) None of the values is correct.  D) .9332

4) Of the 22,500 students at a midwestern university, 5277 report that they binged on alcohol in the past week. Twenty-eight of a group of 136 students reported that they binged on alcohol in the past week. Find the sample proportion of binge drinkers.
   A) 136  B) .03
   C) .21  D) None of the values is correct.

5) There are 322 teachers at a college. Fifty-two of a sample of 72 teachers at the college have doctorates. Estimate the number of teachers at the college without doctorates.
   A) 270  B) 20
   C) None of the values is correct.  D) 89
6) Thirty% of the fifth grade students in a larger school district read below grade level. The distribution of sample means for n = 100 from this population is normal with a mean proportion of .30 and a standard deviation of .05. Of one sample of 100 fifth grade students from this district, 35% read below grade level. The proportion for this sample is one standard deviation above the mean of the sampling distribution. Of another sample of 100 students 37% read below grade level. How many standard deviation above the mean is the second sample proportion?
A) 1.06  
B) 1.23
C) 1.4  
D) None of the values is correct.

7) Thirty% of the fifth grade students in a larger school district read below grade level. The distribution of sample means for n = 100 from this population is normal with a mean proportion of .30 and a standard deviation of .05. Of one sample of 100 fifth grade students from this district, 35% read below grade level. The proportion for this sample is one standard deviation above the mean of the sampling distribution. Of another sample of 100 students 37.5% read below grade level. This is 1.5 standard deviations above the mean for the district fifth graders. What is the probability of a third sample of 100 students having a proportion higher than either of these two samples?
A) 2.5  
B) .9332
C) None of these values is correct.
D) .0668

8) The mean value determined from a sample of size 9 is 65 with a margin of error of .08. What is the 95% confidence interval?
A) 65 to .73  
B) .57 to .73
C) 8.2 to 9.8  
D) .57 to .65
E) .49 to .81

9) The mean value determined from a sample of size 9 is 81 with a standard deviation of 12. Sketch the confidence interval.
A) 78.3  
B) 81  
C) 83.7
D) 77  
E) None of the intervals is correct.
10) A random sample of 25 eighth grade students in the Unit 5 School District reported that the number of siblings each had was: 3, 4, 6, 0, 5, 2, 7, 0, 1, 3, 2, 4, 2, 3, 1, 3, 4, 1, 2, 2, 3, 4, 3, 4, 5. Estimate the average number of siblings for the 8th grade population. Estimate the population standard deviation. The sample standard deviation is 1.74
   A) 1.74
   B) None of the values is correct.
   C) .696
   D) .348
   E) .1392

11) A researcher wants to conduct a study involving GPAs of students. The study is to have a 95% confidence interval. The margin of error of the study is to be .35 with a sample standard deviation of .65. How large should the sample be?
   A) None of these values.  
   B) 14
   C) 13
   D) 5

12) Find the margin of error.
   Sample size = 3600, sample proportion = .75.
   A) .0001
   B) .014
   C) .00005
   D) .007
   E) None of the values is correct.

13) Of 200 college students polled, 80 reported that they preferred statistics to psychology. What is the confidence interval for this study?
   A) .07
   B) None of the values is correct.
   C) 40%
   D) 40±7%
   E) 39.93% to 40.07%

14) What is the sample size required to conduct a population proportion study with a margin of error of 3%?
   A) 34
   B) None of the values is correct.
   C) 2224
   D) 68
   E) 1112
15) The college daily reported: "Two hundred ninety five students living in university housing were polled. One hundred sixty said that they were satisfied with their living conditions. Based on this survey we conclude that 55% of students living in dormitories are satisfied. The margin of error of this study is ± 10%. Which statement is correct?

A) A larger sample should be used to attain a 10% margin of error.
B) The sample is just large enough to state a 10% margin of error.
C) A smaller sample could have been used to attain the 10% margin of error.
1) The choices below are lists of measurements of repeated events. Identify which list, if any, contain a statistically significant event.

A) None of the lists contain any statistically significant events.
B) The price of gasoline for consecutive days in June, 2000 at the FS station in Towanda, IL: $1.43, $1.54, $1.49, $1.51, $1.48, $1.45.
C) A series of quiz scores (all out of 20) in a statistics class for a student was: 11, 9, 8, 12, 13, 11, 18, 10, 10
D) The number of people you have to ask before finding someone to lend you a dollar: 8, 14, 12, 13, 11, 9, 10

2) In the past, the mean running time for a certain type of flashlight battery has been 9.2 hours. The manufacturer has introduced a change in the production method and wants to perform a hypothesis test to determine whether the mean running time has increased as a result. Determine the null hypothesis, \( H_0 \), and the alternate hypothesis, \( H_a \), for the given situation.

A) \( H_0 \) : the mean running time is no greater than 9.2 hours.
   \( H_a \) : the mean running time is no less than 9.2 hours.
B) \( H_0 \) : the mean running time is at least 9.2 hours.
   \( H_a \) : the mean running time is at most 9.2 hours.
C) None of the selections of \( H_0 \) and \( H_a \) are correct.
D) \( H_0 \) : the mean running time is greater than 9.2 hours.
   \( H_a \) : the mean running time is less than 9.2 hours.

3) A study of Ballpark brand 'in the shell' peanuts give the following results:

<table>
<thead>
<tr>
<th>number of peanuts/bag</th>
<th>probability</th>
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<tbody>
<tr>
<td>25</td>
<td>.003</td>
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<tr>
<td>50</td>
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<tr>
<td>55</td>
<td>.07</td>
</tr>
</tbody>
</table>

Determine the level at which a fan getting a bag with 30 peanuts would be significant.

A) It is significant at all the levels given.
B) .05
C) .01
D) .025
4) Carter Motor Company claims that its new sedan, the Libra, will average better than 28 miles per gallon in the city. Assume that a hypothesis test of the claim has been conducted and that the conclusion was to reject the null hypothesis. Identify the population to which the conclusion applies.

A) All cars made by Carter Motor Company
B) All cars made by Carter Motor Company while driven in the city
C) All Libras while driven in the city
D) All Libras

5) In the past, the mean running time for a certain type of flashlight battery had been 9.2 hours. The manufacturer has introduced a change in the production method and wants to perform a hypothesis test to determine whether the mean running time has increased as a result. Identify the null hypothesis, $H_0$, and the alternative hypothesis, $H_A$.

A) $H_0$: $\mu = 9.2$ hours
   $H_A$: $\mu \neq 9.2$ hours
B) $H_0$: $\mu = 9.2$ hours
   $H_A$: $\mu > 9.2$ hours
C) $H_0$: $\mu \geq 9.2$ hours
   $H_A$: $\mu < 9.2$ hours
D) $H_0$: $\mu = 9.2$ hours
   $H_A$: $\mu < 9.2$ hours

6) A study of Ballpark brand 'in the shell' peanuts gives the following results:

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</tr>
<tr>
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<td>.07</td>
</tr>
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At what level of significance would the only significant events be getting a bag with either of the two counts 35 or 40 peanuts?

A) A level of .05.
B) There is no such level for this situation.
C) A level of .20
D) A level of .12.
7) Carter Motor Company claims that its new sedan, the Libra, will average better than 28 miles per gallon in the city. Assuming that a hypothesis test of the claim has been conducted and that the conclusion is to reject the null hypothesis, state the conclusion in nontechnical terms.

A) There is sufficient evidence to support the claim that the mean is less than 28 miles per gallon.
B) There is not sufficient evidence to support the claim that the mean is less than 28 miles per gallon.
C) There is not sufficient evidence to support the claim that the mean is greater than 28 miles per gallon.
D) There is sufficient evidence to support the claim that the mean is greater than 28 miles per gallon.

8) Use the partial table below to find the required P-value.

<table>
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Find the P-value for z = 1.5 and H0: < claimed value.

A) 93.32
B) 6.68
C) None of the values is the correct P-value.
D) .9332
E) .0668
9) In 1990, the average duration of long-distance telephone calls originating in one town was 9.4 minutes. A long-distance telephone company wants to perform a hypothesis test to determine whether the average duration of long-distance phone calls has changed from the 1990 mean of 9.4 minutes. The mean duration for a random sample of 50 calls originating in the town was 8.6 minutes. Do the data provide sufficient evidence to conclude that the mean call duration, \( \mu \), is less than the 1990 mean of 9.4 minutes? Perform the appropriate hypothesis test using a significance level of 0.01. Assume that \( \sigma = 4.8 \) minutes.

A) With a P-value of .119 there is sufficient evidence to conclude that the mean value is less than the 1990 mean of 9.4 minutes.

B) With a P-value of .119 there is not sufficient evidence to conclude that the mean value is less than the 1990 mean of 9.4 minutes.

C) With a z of \(-.1666\) there is insufficient evidence to conclude that the mean value has not changed from the 1990 mean of 9.4 minutes.

D) With a z of \(-.1666\) there is sufficient evidence to conclude that the mean value has not changed from the 1990 mean of 9.4 minutes.

10) A manufacturer claims that the mean amount of juice in its 16 ounce bottles is 16.1 ounces. A consumer advocacy group wants to perform a hypothesis test to determine whether the mean amount is not actually equal to 16 ounces. Identify the null and the alternative hypotheses.

A) \( H_0 : \mu < 16 \) ounces or \( \mu > 16 \) ounces

\( H_0 : \mu = 16 \) ounces

B) \( H_0 : \mu = 16 \) ounces

\( H_A : \mu < 16 \) ounces

C) \( H_0 : \mu = 16 \) ounces

\( H_0 : \mu < 16 \) ounces or \( \mu > 16 \) ounces

D) \( H_0 : \mu = 16 \) ounces

\( H_0 : \mu > 16 \) ounces

11) A two-tailed test is conducted at the .10 significance level. What is the P-value required to reject the null?

A) Greater than or equal to .10

B) Less than or equal to .20

C) Greater than or equal to .05

D) Less than or equal to .05

E) Less than or equal to .10
12) A researcher claims that the amounts of acetaminophen in a certain brand of cold tablets have a mean different from the 600 mg claimed by the manufacturer. Test this claim at the 0.02 level of significance. The mean acetaminophen content for a random sample of $n = 41$ tablets is 603.3 mg. Assume that the population standard deviation is 4.9 mg.

$H_0 : \mu = 600 \text{ mg}; \ H_a : \mu \neq 600 \text{ mg}$

Test statistic: $z = 4.31$; critical values: $z = \pm 2.33$.

A) Since the test statistic is greater than the critical $z$, there is sufficient evidence to reject the null and to support the claim that the mean content of acetaminophen is not 600 mg.

B) Since the test statistic is less than the critical $z$, there is sufficient evidence to accept the null and to support the claim that the mean content of acetaminophen is 600 mg.

C) Since the test statistic is less than the critical $z$, there is sufficient evidence to reject the null and to support the claim that the mean content of acetaminophen is not 600 mg.

D) Since the test statistic is greater than the critical $z$, there is insufficient evidence to reject the null and to support the claim that the mean content of acetaminophen is not 600 mg.

E) Since the test statistic is greater than the critical $z$, there is sufficient evidence to accept the null and to support the claim that the mean content of acetaminophen is 600 mg.

13) A researcher wants to check the claim that convicted burglars spend an average of 18.7 months in jail. She takes a random sample of 35 such cases from court files and finds that $\bar{x} = 16.7$ months. Assume that the population standard deviation is 7 months. Test the null hypothesis that $\mu = 18.7$ at the 0.05 significance level.

$H_0 : \mu = 18.7 \text{ months}; \ H_a : \mu \neq 18.7 \text{ months}$

Test statistic: $z = -1.69$; Critical values: $z = \pm 1.96$.

A) Reject the null and conclude that the claim that the mean is different from 18.7 months cannot be supported.

B) Do not reject the null and conclude that the claim that the mean is different from 18.7 months is supported.

C) Reject the null and conclude that the claim that the mean is different from 18.7 months is supported.

D) Do not reject the null and conclude that the claim that the mean is different from 18.7 months cannot be supported.
14) In the past, the mean running time for a certain type of flashlight battery has been 8.9 hours. The manufacturer has introduced a change in the production method and wants to perform a hypothesis test to determine whether the mean running time has increased as a result. The hypotheses are:

\[ H_0 : \mu = 8.9 \text{ hours} \]
\[ H_a : \mu > 8.9 \text{ hours} \]

Suppose that the results of the sampling lead to nonrejection of the null hypothesis. Classify that conclusion as a Type I error, a Type II error, or a correct decision, if in fact the mean running time has increased.

A) Type I error \hspace{1cm} B) Type II error \hspace{1cm} C) Correct decision

15) A manufacturer claims that the mean amount of juice in its 16 ounce bottles is 16.1 ounces. A consumer advocacy group wants to perform a hypothesis test to determine whether the mean amount is actually less than this. The hypotheses are:

\[ H_0 : \mu = 16.1 \text{ ounces} \]
\[ H_a : \mu < 16.1 \text{ ounces} \]

Suppose that the results of the sampling lead to rejection of the null hypothesis. Classify that conclusion as a Type I error, a Type II error, or a correct decision, if in fact the mean amount of juice, \( \mu \), is less than 16.1 ounces.

A) Type I error \hspace{1cm} B) Correct decision \hspace{1cm} C) Type II error

16) In the past, the mean running time for a certain type of flashlight battery has been 8.4 hours. The manufacturer has introduced a change in the production method and wants to perform a hypothesis test to determine whether the mean running time has increased as a result. The hypotheses are:

\[ H_0 : \mu = 8.4 \text{ hours} \]
\[ H_a : \mu > 8.4 \text{ hours} \]

Explain the meaning of a Type I error.

A) Concluding that \( \mu > 8.4 \) hours when in fact \( \mu > 8.4 \) hours
B) Concluding that \( \mu > 8.4 \) hours when in fact \( \mu = 8.4 \) hours
C) Concluding that \( \mu = 8.4 \) hours when in fact \( \mu > 8.4 \) hours
D) Concluding that \( \mu < 8.4 \) hours when in fact \( \mu > 8.4 \) hours

17) A medical school claims that more than 28% of its students plan to go into general practice. It is found that among a random sample of 130 of the school's students, 32% of them plan to go into general practice. Find the P-value for a test of the school's claim.

A) 0.1635 \hspace{1cm} B) 0.3461 \hspace{1cm} C) 0.3078 \hspace{1cm} D) 0.1539
18) A supplier of 3.5" disks claims that no more than 1% of the disks are defective. In a random sample of 600 disks, it is found that 3% are defective, but the supplier claims that this is only a sample fluctuation. At the 0.01 level of significance, test the supplier's claim that no more than 1% are defective.

H₀: p ≤ 0.01. H₁: p > 0.01. Test statistic: z = 4.92. Critical value: z = 2.33

A) Reject the null and conclude that there is insufficient evidence to support the claim that more than 1% of the disks are defective.

B) Do not reject the null and conclude that there is evidence to support the claim that more than 1% of the disks are defective.

C) Do not reject the null and conclude that there is insufficient evidence to support the claim that more than 1% of the disks are defective.

D) Reject the null and conclude that there is evidence to support the claim that more than 1% of the disks are defective.

19) Standard Score and percentiles for a Normal Distribution

<table>
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</tbody>
</table>

The above table may be useful in answering the question.

A two-tailed test is conducted at the 5% significance level. What is the P-value required to reject the null?

A) Less than or equal to .05

B) Greater than or equal to .10

C) Greater than or equal to .05

D) Less than or equal to .025

E) Less than or equal to .10.
20) According to a recent poll 53% of Americans would vote for the incumbent president. If a random sample of 100 people results in 43% who would vote for the incumbent, test the claim that the actual percentage is 53%. Use a 0.10 significance level.

\[ H_0: p = 0.53 \quad H_1: p \neq 0.53 \]

Test statistic: \( z = -1.60 \). Critical value: \( z = \pm 1.645 \).

A) Accept the null. There is sufficient evidence to support the claim that 53% of Americans would vote for the incumbent president.

B) Reject the null. There is sufficient evidence to support the claim that 53% of Americans would vote for the incumbent president.

C) Accept the null. There is insufficient evidence to support the claim that 53% of Americans would vote for the incumbent president.

D) Reject the null. There is insufficient evidence to support the claim that 53% of Americans would vote for the incumbent president.
1) The choices below are lists of measurements of repeated events. Identify which list, if any, contain a statistically significant event.

A) The number of peanuts in bags of 'Salted in the Shell' peanuts: 29, 50, 33, 35, 40, 42, 45, 47
B) None of the lists contain any statistically significant events.
C) The price of gasoline for consecutive days in June, 2000 at the FS station in Towanda, IL: $1.43, $1.54, $1.49, $1.51, 1.48, $1.45, $1.23
D) Monthly phone bills (nearest dollar): $102, $56, $65, $73, $82, $91, $98

2) The choices below are lists of measurements of repeated events. Identify which list, if any, contain a statistically significant event.

A) The number of minutes on hold: 5, 6, 9, 8, 10, 6, 7, 11, 4
B) The number of peanuts in bags of 'Salted in the Shell' peanuts: 29, 50, 33, 35, 40, 42, 45, 47
C) None of the lists contain any statistically significant events.
D) The cost of movie tickets: $3.75, $4.25, $4.75, $5.00, $3.60, $5.25

3) At one school, the average amount of time that tenth-graders spend watching television each week is 21.6 hours. The principal introduces a campaign to encourage the students to watch less television. One year later, the principal wants to perform a hypothesis test to determine whether the average amount of time spent watching television per week has decreased. Determine the null hypothesis, $H_0$, and the alternate hypothesis, $H_a$, for the given situation.

A) $H_0$: The mean amount of time spent watching TV is 21.6 hours.
   $H_a$: The mean amount of time spent watching TV is not 21.6 hours.
B) $H_0$: The mean amount of time spent watching TV is 21.6 hours.
   $H_a$: The mean amount of time spent watching TV is less than 21.6 hours.
C) None of the selections of $H_0$ and $H_a$ is correct.
D) $H_0$: The mean amount of time spent watching TV is less than 21.6 hours.
   $H_a$: The mean amount of time spent watching TV is 21.6 hours.
4) A study of Ballpark brand 'in the shell' peanuts give the following results:

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</tr>
<tr>
<td>50</td>
<td>.217</td>
</tr>
<tr>
<td>55</td>
<td>.07</td>
</tr>
</tbody>
</table>

Identify an event that is statistically significant at the .10 level but not at the .05 level.

A) A fan getting a bag with 25 peanuts.
B) A fan getting a bag with 50 peanuts.
C) A fan getting a bag with 35 peanuts.
D) None of the other selections are correct.

5) A skeptical paranormal researcher claims that the proportion of Americans that have seen a UFO, \( p \), is less than 1 in every ten thousand. Assume that a hypothesis test of the claim has been conducted and that the conclusion of the test was to reject the null. Identify the population to which the conclusion may be applied.

A) All Americans
B) Any sample of Americans claiming to have seen a UFO
C) Any sample of Americans
D) All American claiming to have seen a UFO

6) A manufacturer claims that the mean amount of juice in its 16 ounce bottles is 16.1 ounces. A consumer advocacy group wants to perform a hypothesis test to determine whether the mean amount is actually less than this. Identify the null and the alternative hypotheses.

A) \( H_0: \mu = 16.1 \) ounces \( H_1: \mu > 16.1 \) ounces
B) \( H_0: \mu < 16.1 \) ounces \( H_1: \mu < 16.1 \) ounces
C) \( H_0: \mu = 16.1 \) ounces \( H_1: \mu < 16.1 \) ounces
D) \( H_0: \mu = 16.1 \) ounces \( H_1: \mu > 16.1 \) ounces
7) The owner of a football team claims that the average attendance at games is over 642, and he is therefore justified in moving the team to a city with a larger stadium. Assuming that a hypothesis test of the claim has been conducted and that the conclusion is failure to reject the null hypothesis, state the conclusion in nontechnical terms.

A) There is sufficient evidence to support the claim that the mean attendance is less than 642.
B) There is not sufficient evidence to support the claim that the mean attendance is less than 642.
C) There is not sufficient evidence to support the claim that the mean attendance is greater than 642.
D) There is sufficient evidence to support the claim that the mean attendance is greater than 642.

8) Standard Score and percentiles for a Normal Distribution

<table>
<thead>
<tr>
<th>z</th>
<th>%ile</th>
<th>z</th>
<th>%ile</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3.5</td>
<td>0.03</td>
<td>0.5</td>
<td>69.15</td>
</tr>
<tr>
<td>-3.0</td>
<td>0.13</td>
<td>1.0</td>
<td>84.13</td>
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<tr>
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</tr>
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<td>-0.5</td>
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</tr>
<tr>
<td>-0.0</td>
<td>50.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Use the partial table above to find the required P-value for a $z = 0.5$ for $H_{10} >$ claimed value.

A) .6915
B) None of the values is the correct P-value.
C) .3085
D) 30.85
E) 69.15
9) A manufacturer claims that the mean amount of juice in its 16 ounce bottles is 16.1 ounces. A consumer advocacy group wants to perform a hypothesis test to determine whether the mean amount is actually less than this. The mean volume of juice for a random sample of 70 bottles was 15.94 ounces. Do the data provide sufficient evidence to conclude that the mean amount of juice for all 16-ounce bottles, \( \mu \), is less than 16.1 ounces? Perform the appropriate hypothesis test using a significance level of 0.10. Assume that \( \sigma = 0.9 \) ounces.

A) The \( z \) of \(-1.778\) does not provide sufficient evidence to conclude that the mean amount of juice is less than 16.1 oz.

B) The \( z \) of \(-1.778\) provides sufficient evidence to conclude that the mean amount of juice is less than 16.1 oz.

C) The \( z \) of \(-1.49\) does not provide sufficient evidence to conclude that the mean amount of juice is less than 16.1 oz.

D) The \( z \) of \(-1.49\) provides sufficient evidence to conclude that the mean amount of juice is less than 16.1 oz.

10) At one school the mean amount of time per week that 10th grade students spent watching TV was 21.6 hours. One year later the principal wants to perform a hypothesis test to determine whether the average amount of television time has changed. Identify the null and the alternative hypotheses.

A) \( H_0 \) : The mean time per week spent watching TV is no longer 21.6 hours.
   \( H_\alpha \) : The mean time per week spent watching TV is still 21.6 hours.

B) \( H_0 \) : The mean time per week spent watching TV is 21.6 hours.
   \( H_\alpha \) : The mean time per week spent watching TV is less than 21.6 hours.

C) \( H_0 \) : The mean time per week spent watching TV is 21.6 hours.
   \( H_\alpha \) : The mean time per week spent watching TV is not 21.6 hours.

D) \( H_0 \) : The mean time per week spent watching TV is 21.6 hours.
   \( H_\alpha \) : The mean time per week spent watching TV is more than 21.6 hours.
11) At one school, the average amount of time that tenth-graders spend watching television each week is 21.6 hours. The principal introduces a campaign to encourage the students to watch less television. One year later, the principal wants to perform a hypothesis test to determine whether the average amount of time spent watching television per week has changed. Identify the correct conclusion based on rejection of the null hypothesis.

A) Students, on average, watch less than 21.6 hours of television per week.
B) Students do not watch a mean of 21.6 hours of television per week.
C) Students, on average, watch more than 21.6 hours of television per week.
D) Students watch a mean of 21.6 hours of television per week.

12) A health insurer has determined that the “reasonable and customary” fee for a certain medical procedure is $1200. They suspect that the average fee charged by one particular clinic for this procedure is different than $1200. The insurer wants to perform a hypothesis test to determine whether their suspicion is correct. Identify the correct conclusion if the null were to be rejected.

A) The clinic does not, on average, charge $1200 for the procedure.
B) The clinic, on average, charges $1200 for the procedure.
C) The clinic, on average, charges more than $1200 for the procedure.
D) The clinic, on average, charges less than $1200 for the procedure.

13) A two-tailed test is conducted at the 5% significance level. What is the left tail percentile required to reject the null?

A) 5%  B) 2.5%  C) 10%  D) 97.5%  E) 95%
14) In 1990, the average duration of long-distance telephone calls originating in one town was 9.4 minutes. A long-distance telephone company wants to perform a hypothesis test to determine whether the average duration of long-distance phone calls has changed from the 1990 mean of 9.4 minutes. The mean duration for a random sample of 50 calls originating in the town was 8.6 minutes. Do the data provide sufficient evidence to conclude that the mean call duration, \( \mu \), has changed from the 1990 mean of 9.4 minutes? Perform the appropriate hypothesis test using a significance level of 0.01. Assume that \( \sigma = 4.8 \) minutes.

A) Since the P-value is less than the significance level, the data provide sufficient evidence to reject the null and conclude that the mean call duration has changed.

B) Since the P-value is greater than the significance level, the data provide insufficient evidence to reject the null and conclude that the mean call duration has changed.

C) Since the P-value is greater than the significance level, the data provide sufficient evidence to accept the null and conclude that the mean call duration has changed.

D) Since the P-value is greater than the significance level, the data provide sufficient evidence to reject the null and conclude that the mean call duration has changed.

15) At one school, the average amount of time that tenth-graders spend watching television each week is 21 hours. The principal introduces a campaign to encourage the students to watch less television. One year later, the principal wants to perform a hypothesis test to determine whether the average amount of time spent watching television per week has decreased. The hypotheses are:

\[ H_0 : \mu = 21 \text{ hours} \]
\[ H_a : \mu < 21 \text{ hours} \]

Suppose that the results of the sampling lead to nonrejection of the null hypothesis. Classify that conclusion as a Type I error, a Type II error, or a correct decision, if in fact the mean amount of time, \( \mu \), spent watching television has not decreased.

A) Type II error 
B) Correct decision 
C) Type I error
16) A health insurer has determined that the "reasonable and customary" fee for a certain medical procedure is $1200. They suspect that the average fee charged by one particular clinic for this procedure is higher than $1200. The insurer wants to perform a hypothesis test to determine whether their suspicion is correct. The hypotheses are:

\[ H_0 : \mu = 1200 \]
\[ H_a : \mu > 1200 \]

Suppose that the results of the sampling lead to rejection of the null hypothesis. Classify that conclusion as a Type I error, a Type II error, or a correct decision, if in fact the average fee charged by the clinic is $1200.

A) Type II error  B) Type I error  C) Correct decision

17) The average diastolic blood pressure of a group of men suffering from high blood pressure is 103 mmHg. During a clinical trial, the men receive a medication which it is hoped will lower their blood pressure. After three months, the researcher wants to perform a hypothesis test to determine whether the average diastolic blood pressure of the men has decreased. The hypotheses are:

\[ H_0 : \mu = 103 \text{ mmHg} \]
\[ H_a : \mu < 103 \text{ mmHg} \]

Explain the meaning of a Type II error.

A) Failing to reject the hypothesis that \( \mu = 103 \text{ mmHg} \) when in fact \( \mu < 103 \text{ mmHg} \)
B) Failing to reject the hypothesis that \( \mu = 103 \text{ mmHg} \) when in fact \( \mu = 103 \text{ mmHg} \)
C) Concluding that \( \mu < 103 \text{ mmHg} \) when in fact \( \mu = 103 \text{ mmHg} \)
D) Concluding that \( \mu > 103 \text{ mmHg} \) when in fact \( \mu < 103 \text{ mmHg} \)

18) A manufacturer claims that fewer than 6% of its fax machines are defective. In a random sample of 97 such fax machines, 5% are defective. Find the P-value for a test of the manufacturer's claim.

A) 0.1736  B) 0.3409  C) 0.3264  D) 0.1591

19) A poll of 1,068 adult Americans reveals that 48% of the voters surveyed prefer the Democrat candidate for the presidency. At the 0.05 level of significance, test the claim that at least half of all voters prefer the Democrat candidate.

A) Do not reject the null. Conclude that there is sufficient evidence that at least half of all voters prefer the Democrat candidate.
B) Reject the null. Conclude that there is sufficient evidence that at least half of all voters prefer the Democrat candidate.
C) Do not reject the null. Conclude that there is insufficient evidence that at least half of all voters prefer the Democrat candidate.
D) Reject the null. Conclude that there is insufficient evidence that at least half of all voters prefer the Democrat candidate.
According to a recent poll 53% of Americans would vote for the incumbent president. If a random sample of 100 people results in 45% who would vote for the incumbent, test the claim that the actual percentage is 53%. Use a 0.10 significance level.

A) Reject the null. There is sufficient evidence to support the claim that 53% of Americans would vote for the incumbent president.

B) Accept the null. There is sufficient evidence to support the claim that 53% of Americans would vote for the incumbent president.

C) Reject the null. There is insufficient evidence to support the claim that 53% of Americans would vote for the incumbent president.

D) Accept the null. There is insufficient evidence to support the claim that 53% of Americans would vote for the incumbent president.
1) The choices below are lists of measurements of repeated events. Identify which list, if any, contain a statistically significant event.
   A) None of the lists contain any statistically significant events.
   B) Number of grains in a smidgen: .13, .16, .17, .15, .18, .14.
   C) Weight of a pencil lead (grams): 1.8, 1.4, 1.6, 1.3, 1.5, 1.7.
   D) Number of hours of light bulb life: 1500, 1800, 1400, 1700, 1600, 1300.

2) In 1990, the average duration of long-distance telephone calls originating in one town was 9.4 minutes. A long-distance telephone company wants to perform a hypothesis test to determine whether the average duration of long-distance phone calls has changed from the 1990 mean of 9.4 minutes. Identify the null and the alternative hypotheses.
   A) \( H_0 \): The mean length of a long distance call is 9.4 minutes.
   \( H_a \): The mean length of a long distance call is greater than 9.4 minutes.
   B) None of the selections is correct.
   C) \( H_0 \): The mean length of a long distance call is 9.4 minutes.
   \( H_a \): The mean length of a long distance call is less than 9.4 minutes.
   D) \( H_0 \): The mean length of a long distance call is 9.4 minutes.
   \( H_a \): The mean length of a long distance call is not 9.4 minutes.

3) A study of Ballpark brand 'in the shell' peanuts give the following results:

<table>
<thead>
<tr>
<th>number of peanuts/bag</th>
<th>probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>.003</td>
</tr>
<tr>
<td>30</td>
<td>.02</td>
</tr>
<tr>
<td>35</td>
<td>.09</td>
</tr>
<tr>
<td>40</td>
<td>.15</td>
</tr>
<tr>
<td>45</td>
<td>.35</td>
</tr>
<tr>
<td>50</td>
<td>.217</td>
</tr>
<tr>
<td>55</td>
<td>.07</td>
</tr>
</tbody>
</table>

A significant event at the .01 level is a fan getting a bag with how many peanuts?
   A) 30 peanuts
   B) 25 peanuts or 55 peanuts
   C) 25 peanuts
   D) 25 peanuts or 30 peanuts
   E) 35 or 40 or 45 or 50 or 55 peanuts
4) The owner of a football team claims that the average attendance at games is over 642, and he is therefore justified in moving the team to a city with a larger stadium. Assume that a hypothesis test of the claim has been conducted and that the conclusion of the test was to reject the null. Identify the population to which the conclusion applies.
   A) All games played by the team in question in which the attendance is over 642.
   B) None of the populations given is appropriate.
   C) All games played by the team in question.
   D) All future games to be played by the team in question.

5) At one school, the average amount of time that tenth-graders spend watching television each week is 21.6 hours. The principal introduces a campaign to encourage the students to watch less television. One year later, the principal wants to perform a hypothesis test to determine whether the average amount of time spent watching television per week has decreased. Identify the null and the alternative hypotheses.
   A) \( H_0: \mu = 21.6 \) hours  
      \( H_a: \mu > 21.6 \) hours
   B) \( H_0: \mu = 21.6 \) hours  
      \( H_a: \mu < 21.6 \) hours
   C) \( H_0: \mu = 21.6 \) hours  
      \( H_a: \mu > 21.6 \) hours
   D) \( H_0: \mu = 21.6 \) hours  
      \( H_a: \mu < 21.6 \) hours

6) At one school, the average amount of time that tenth-graders spend watching television each week is 21.6 hours. The principal introduces a campaign to encourage the students to watch less television. One year later, the principal wants to perform a hypothesis test to determine whether the average amount of time spent watching television per week has decreased. The hypotheses are:
   \( H_0: \mu = 21.6 \) hours
   \( H_a: \mu < 21.6 \) hours
   Explain the meaning of a correct decision.
   A) Concluding that \( \mu > 21.6 \) hours when in fact \( \mu < 21.6 \) hours.
   B) Failing to reject the hypothesis that \( \mu = 21.6 \) hours when in fact \( \mu = 21.6 \) hours OR concluding that \( \mu < 21.6 \) hours when in fact \( \mu < 21.6 \) hours.
   C) Concluding that \( \mu < 21.6 \) hours when in fact \( \mu = 21.6 \) hours.
   D) Failing to reject the hypothesis that \( \mu = 21.6 \) hours when in fact \( \mu < 21.6 \) hours.
7) An entomologist writes an article in a scientific journal which claims that fewer than 7 in ten thousand male fireflies are unable to produce light due to a genetic mutation. Assuming that a hypothesis test of the claim has been conducted and that the conclusion is to reject the null hypothesis, state the conclusion with respect to the original claim.

A) There is not sufficient evidence to support the claim that the true proportion is greater than 7 in ten thousand.

B) There is sufficient evidence to support the claim that the true proportion is less than 7 in ten thousand.

C) There is sufficient evidence to support the claim that the true proportion is greater than 7 in ten thousand.

D) There is not sufficient evidence to support the claim that the true proportion is less than 7 in ten thousand.

8) Standard Score and Percentiles for a Normal Distribution

<table>
<thead>
<tr>
<th>z</th>
<th>%ile</th>
<th>z</th>
<th>%ile</th>
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<tr>
<td>-3.5</td>
<td>0.03</td>
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<td>69.15</td>
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<tr>
<td>-3.0</td>
<td>0.13</td>
<td>1.0</td>
<td>84.13</td>
</tr>
<tr>
<td>-2.5</td>
<td>0.65</td>
<td>1.5</td>
<td>93.32</td>
</tr>
<tr>
<td>-2.0</td>
<td>2.28</td>
<td>2.0</td>
<td>97.72</td>
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<td>-1.5</td>
<td>6.68</td>
<td>2.5</td>
<td>99.38</td>
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<tr>
<td>-1.0</td>
<td>15.87</td>
<td>3.0</td>
<td>99.87</td>
</tr>
<tr>
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</tr>
<tr>
<td>-0.0</td>
<td>50.00</td>
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<td></td>
</tr>
</tbody>
</table>

Find the P-value for z = 1.5 for H₀ < claimed value.

A) None of the values is the correct P-value.

B) .9323

C) .0677

D) 6.68

E) 93.32

9) A psychologist claims that more than 37 percent of the population suffers from professional problems due to extreme shyness. Assuming that a hypothesis test of the claim has been conducted and that the conclusion is failure to reject the null hypothesis, state the conclusion in nontechnical terms.

A) There is sufficient evidence to support the claim that the true proportion is greater than 37 percent.

B) There is not sufficient evidence to support the claim that the true proportion is less than 37 percent.

C) There is not sufficient evidence to support the claim that the true proportion is greater than 37 percent.

D) There is sufficient evidence to support the claim that the true proportion is less than 37 percent.
10) In one city, the average amount of time that tenth-graders spend watching television each week is 21.6 hours. The principal of Birchwood High School believes that at his school, tenth-graders watch less television. For a sample of 28 tenth-graders from Birchwood High School, the mean amount of time spent watching television per week was 19.4 hours. Do the data provide sufficient evidence to conclude that for all tenth-graders at Birchwood High School, the mean amount of time spent watching television per week is less than the city average of 21.6 hours? Perform the appropriate hypothesis test using a significance level of 0.05. Assume that $\sigma = 7.2$ hours.

A) The $z$ of $-0.05$ does not provide sufficient evidence to conclude that for 10th graders at Birchwood High School the mean amount of time spent watching TV is less than 21.6 hours.

B) The $z$ of $-1.62$ provides sufficient evidence to conclude that for 10th graders at Birchwood High School the mean amount of time spent watching TV is less than 21.6 hours.

C) The $z$ of $-1.62$ does not provide sufficient evidence to conclude that for 10th graders at Birchwood High School the mean amount of time spent watching TV is less than 21.6 hours.

D) The $z$ of $-0.05$ provides sufficient evidence to conclude that for 10th graders at Birchwood High School the mean amount of time spent watching TV is less than 21.6 hours.

11) A health insurer has determined that the "reasonable and customary" fee for a certain procedure is $1200. They suspect that the mean fee charged for this procedure by a particular clinic is different from $1200. Identify the null and the alternative hypotheses.

A) $H_0: \mu = 1200$ \hspace{1cm} B) $H_0: \mu \neq 1200$

$H_\alpha: \mu < 1200$ \hspace{1cm} $H_\alpha: \mu = 1200$

C) $H_0: \mu = 1200$ \hspace{1cm} D) $H_0: \mu = 1200$

$H_\alpha: \mu > 1200$ \hspace{1cm} $H_\alpha: \mu \neq 1200$
12) In 1990, the average duration of long-distance telephone calls originating in one town was 9.4 minutes. A long-distance telephone company wants to perform a hypothesis test to determine whether the average duration of long-distance phone calls has changed from the 1990 mean of 9.4 minutes. Identify the correct conclusion if the results of a hypothesis test were to reject the null.

A) The average long distance phone call is more than 9.4 minutes in length.
B) The average long distance phone call is less than 9.4 minutes in length.
C) The average long distance phone call is not 9.4 minutes in length.
D) The average long distance phone call is 9.4 minutes in length.

13) A two-tailed test is conducted at the 5% significance level. What is the left tail z-score required to reject the null?

A) Less than or equal to a value between -2 and -1.5.
B) Less than or equal to a value close to -2.
C) Greater than or equal to a value between 1.5 and 2.
D) Greater than or equal to a value close to 2.

14) In 1990, the average math SAT score for students at one school was 475. Five years later, a teacher wants to perform a hypothesis test to determine whether the average math SAT score of students at the school has changed. He picks a random sample of 40 students and obtains their the mean math SAT score, which is 469. Do the data provide sufficient evidence to conclude that the mean math SAT score for all students at the school has changed from the previous mean of 475? Perform the appropriate hypothesis test using a significance level of 0.10. Assume that \( \sigma = 73 \).

A) Since the P-value is greater than the significance level, there is sufficient evidence to support the claim that the mean SAT math score is not 475.
B) Since the P-value is greater than the significance level, there is insufficient evidence to support the claim that the mean SAT math score is not 475.
C) Since the P-value is less than the significance level, there is insufficient evidence to support the claim that the mean SAT math score is not 475.
D) Since the P-value is less than the significance level, there is sufficient evidence to support the claim that the mean SAT math score is not 475.
15) In 1990, the average duration of long-distance telephone calls originating in one town was 9.4 minutes. A long-distance telephone company wants to perform a hypothesis test to determine whether the average duration of long-distance phone calls has changed from the 1990 mean of 9.4 minutes. The hypotheses are:

\[ H_0 : \mu = 9.4 \text{ minutes} \]
\[ H_a : \mu \neq 9.4 \text{ minutes} \]

Suppose that the results of the sampling lead to nonrejection of the null hypothesis. Classify that conclusion as a Type I error, a Type II error, or a correct decision, if in fact the mean duration of long-distance phone calls has changed from the 1990 mean of 9.4 minutes.

A) Correct decision  B) Type II error  C) Type I error

16) A man is on trial accused of murder in the first degree. The prosecutor presents evidence that he hopes will convince the jury to reject the hypothesis that the man is innocent. This situation can be modeled as a hypothesis test with the following hypotheses:

\[ H_0 : \text{The defendant is innocent.} \]
\[ H_a : \text{The defendant is guilty.} \]

Suppose that the null hypothesis is rejected; i.e., the defendant is found guilty. Classify that conclusion as a Type I error, a Type II error, or a correct decision, if in fact the defendant is innocent.

A) Type II error  B) Correct decision  C) Type I error

17) In 1990, the average math SAT score for students at one school was 492. Five years later, a teacher wants to perform a hypothesis test to determine whether the average SAT score of students at the school has changed from the 1990 mean of 492. The hypotheses are:

\[ H_0 : \mu = 492 \]
\[ H_a : \mu \neq 492 \]

Explain the meaning of a Type II error.

A) Failing to reject the hypothesis that \( \mu = 492 \) when in fact \( \mu \neq 492 \)
B) Concluding that \( \mu > 492 \) when in fact \( \mu = 492 \)
C) Concluding that \( \mu \neq 492 \) minutes when in fact \( \mu = 492 \)
D) Failing to reject the hypothesis that \( \mu = 492 \) when in fact \( \mu = 492 \)

18) A nationwide study of American homeowners revealed that 65% have one or more lawn mowers. A lawn equipment manufacturer, located in Omaha, feels the estimate is too low for households in Omaha. Find the P-value for a test of the claim that the proportion with lawn mowers in Omaha is higher than 65%. Among 497 randomly selected homes in Omaha, 340 had one or more lawn mowers.

A) 0.1118  B) 0.0505  C) 0.0252  D) 0.0559
19) In a sample of 81 adults selected randomly from one town, it is found that 8 of them have been exposed to a particular strain of the flu. At the 0.01 significance level, test the claim that the proportion of all adults in the town that have been exposed to this strain of the flu is 8%.

A) Reject the null. There is insufficient evidence to support the claim that 8% of adults have been exposed to the flu strain.

B) Fail to reject the null. There is not sufficient evidence to warrant rejection of the claim that the proportion of all adults in the town that have been exposed to this strain of the flu is 8%.

C) Reject the null. There is sufficient evidence to support the claim that 8% of adults have been exposed to the flu strain.

D) Fail to reject the null. There is sufficient evidence to warrant rejection of the claim that the proportion of all adults in the town that have been exposed to this strain of the flu is 8%.

20) An article in a journal reports that 34% of American fathers take no responsibility for child care. A researcher claims that the figure is higher for fathers in the town of Littleton. A random sample of 237 fathers from Littleton yielded 104 who did not help with child care. Test the researcher’s claim at the 0.05 significance level.

A) Do not reject the null. There is sufficient evidence to support the claim that more than 34% of fathers in Littleton take no responsibility for child care.

B) Reject the null. There is insufficient evidence to support the claim that more than 34% of fathers in Littleton take no responsibility for child care.

C) Do not reject the null. There is insufficient evidence to support the claim that more than 34% of fathers in Littleton take no responsibility for child care.

D) Reject the null. There is sufficient evidence to support the claim that more than 34% of fathers in Littleton take no responsibility for child care.
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) The two way table summarizes data from a survey at a small liberal arts college:

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<thead>
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<th></th>
<th>Tenure</th>
<th>Adjunct</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Track</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>8</td>
<td></td>
<td>23</td>
</tr>
<tr>
<td>Women</td>
<td></td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td></td>
<td>E</td>
</tr>
</tbody>
</table>

Find the value for the lettered cell.
A) 25  B) 15  C) 22  D) 45  E) 12

2) The two way table summarizes data from a survey at a small liberal arts college:

<table>
<thead>
<tr>
<th></th>
<th>Tenure</th>
<th>Adjunct</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Track</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>17</td>
<td>23</td>
<td>40</td>
</tr>
<tr>
<td>Women</td>
<td>15</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>28</td>
<td>60</td>
</tr>
</tbody>
</table>

What is the probability that a male new hire is adjunct?
A) .575  B) .669  C) .179  D) .821

3) The two way table summarizes data from a survey at a small liberal arts college:

<table>
<thead>
<tr>
<th></th>
<th>Tenure</th>
<th>Adjunct</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Track</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>17</td>
<td>23</td>
<td>40</td>
</tr>
<tr>
<td>Women</td>
<td>15</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>28</td>
<td>60</td>
</tr>
</tbody>
</table>

Assuming that status and gender are independent, what is the expected frequency (to the nearest whole number) of adjunct men?
A) 23  B) 17  C) 21  D) 19
4) A car insurance company performed a study to determine whether an association exists between age and the frequency of car accidents. They obtained the following sample data.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Under 25</th>
<th>25-45</th>
<th>Over 45</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of accidents in past 3 years</td>
<td>0</td>
<td>74</td>
<td>90</td>
<td>84</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>19</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>&gt; 1</td>
<td>7</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>300</td>
</tr>
</tbody>
</table>

Identify the null, \( H_0 \), and alternative, \( H_a \) hypotheses.

A) \( H_0 \) : Age group and number of accidents are dependent.
\( H_a \) : Age group and number of accidents are independent.

B) \( H_0 \) : Age group and number of accidents are independent.
\( H_a \) : Age group and number of accidents are dependent.

C) \( H_0 \) : Age group and number of accidents are related.
\( H_a \) : Age group and number of accidents are not related.

D) \( H_0 \) : Age group and number of accidents are dependent.
\( H_a \) : Age group and number of accidents are not dependent.

Find the value of the chi-square test statistic for the goodness-of-fit test.

5) The following table is obtained from a random sample of 30 absences.

<table>
<thead>
<tr>
<th>Day</th>
<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thur</th>
<th>Fri</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number Absent</td>
<td>9</td>
<td>7</td>
<td>1</td>
<td>8</td>
<td>5</td>
</tr>
</tbody>
</table>

You wish to test the claim that the absences occur on the five days with equal frequency. What is the value of the \( \chi^2 \) test statistic? The observed frequencies and the expected frequencies are shown below.

<table>
<thead>
<tr>
<th>Observed Frequency (O)</th>
<th>Expected Frequency (E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

A) \( \chi^2 = 5 \)  \quad B) \( \chi^2 = 10 \)  \quad C) \( \chi^2 = 4 \)  \quad D) \( \chi^2 = 6.667 \)
6) A car insurance company performed a study to determine whether an association exists between age and the frequency of car accidents. They obtained the following sample data.

<table>
<thead>
<tr>
<th>Number of accidents in past 3 years</th>
<th>Under 25</th>
<th>25-45</th>
<th>Over 45</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>74</td>
<td>90</td>
<td>84</td>
<td>248</td>
</tr>
<tr>
<td>1</td>
<td>19</td>
<td>8</td>
<td>12</td>
<td>39</td>
</tr>
<tr>
<td>&gt; 1</td>
<td>7</td>
<td>2</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>300</td>
</tr>
</tbody>
</table>


A) Reject the null hypothesis. One can conclude that there is a relationship between age and number of accidents.
B) Do not reject the null hypothesis. One cannot conclude that there is a relationship between age and number of accidents.
C) Do not reject the null hypothesis. One can conclude that there is a relationship between age and number of accidents.
D) Reject the null hypothesis. One cannot conclude that there is a relationship between age and number of accidents.

7) The table presents the data from a study to relate the type of transportation of workers and the time of their arrival at work.

<table>
<thead>
<tr>
<th>Arrival</th>
<th>late</th>
<th>on time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive</td>
<td>35</td>
<td>25</td>
</tr>
<tr>
<td>Public transport</td>
<td>10</td>
<td>30</td>
</tr>
</tbody>
</table>

What is the risk of being late for work if an employee takes public transportation?

A) 10%  
B) 22.2%  
C) 25%  
D) 10%

8) The table presents the data from a study to relate the type of transportation of workers and the time of their arrival at work.

<table>
<thead>
<tr>
<th>Arrival</th>
<th>late</th>
<th>on time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive</td>
<td>35</td>
<td>25</td>
</tr>
<tr>
<td>Public transport</td>
<td>10</td>
<td>30</td>
</tr>
</tbody>
</table>

What is the relative risk of being on time for work of a driver with respect to a person taking public transportation?

A) .71  
B) .83  
C) None of the values is correct.  
D) .56
9) The table presents the data from a study to relate the type of transportation of workers and the time of their arrival at work.

<table>
<thead>
<tr>
<th>Arrival</th>
<th>late</th>
<th>on time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive</td>
<td>35</td>
<td>25</td>
</tr>
<tr>
<td>Public transportation</td>
<td>10</td>
<td>30</td>
</tr>
</tbody>
</table>

What is the increased risk of being on time for work of a driver with respect to a person taking public transportation?

A) -.29  
B) -.17  
C) -.44  
D) None of the values is correct.

10) The table presents the data from a study to relate the type of transportation of workers and the time of their arrival at work.

<table>
<thead>
<tr>
<th>Arrival</th>
<th>late</th>
<th>on time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive</td>
<td>35</td>
<td>25</td>
</tr>
<tr>
<td>Public transportation</td>
<td>10</td>
<td>30</td>
</tr>
</tbody>
</table>

Find P1, the probability of being late given that an employee takes public transportation, and P2 the probability that an employee takes public transportation given that the employee is late.

A) P1 = .10; P2 = .90  
B) P1 = .22; P2 = .25  
C) None of the values is correct.  
D) P1 = .25; P2 = .22
1) The two way table summarizes data from a survey at a small liberal arts college:

<table>
<thead>
<tr>
<th></th>
<th>Tenure</th>
<th>Adjunct</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>8</td>
<td>A</td>
<td>23</td>
</tr>
<tr>
<td>Women</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Find the value for the lettered cell.
A) 25  B) 15  C) 22  D) 12

2) The two way table summarizes data from a survey at a small liberal arts college:

<table>
<thead>
<tr>
<th></th>
<th>Tenure</th>
<th>Adjunct</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>17</td>
<td>23</td>
<td>40</td>
</tr>
<tr>
<td>Women</td>
<td>15</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>28</td>
<td>60</td>
</tr>
</tbody>
</table>

What is the probability that a female new hire is adjunct?
A) .250  B) .575  C) .179  D) .821

3) The two way table summarizes data from a survey at a small liberal arts college:

<table>
<thead>
<tr>
<th></th>
<th>Tenure</th>
<th>Adjunct</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>17</td>
<td>23</td>
<td>40</td>
</tr>
<tr>
<td>Women</td>
<td>15</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>28</td>
<td>60</td>
</tr>
</tbody>
</table>

Assuming that status and gender are independent, what is the expected frequency (to the nearest whole number) of adjunct women?
A) 5  B) 14  C) 20  D) 9
4) Tests for adverse reactions to a new drug yielded the results given in the table.

<table>
<thead>
<tr>
<th></th>
<th>Drug</th>
<th>Placebo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headaches</td>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td>No Headaches</td>
<td>73</td>
<td>91</td>
</tr>
</tbody>
</table>

Identify the null and the alternative hypotheses.

A) \( H_0 \) : The drug is related to the occurrence of headaches.

\( H_a \) : The drug is not related to the occurrence of headaches.

B) \( H_0 \) : There is a relationship between the drug and the occurrence of headaches.

\( H_a \) : There is no relationship between the drug and the occurrence of headaches.

C) \( H_0 \) : The drug is not related to the occurrence of headaches.

\( H_a \) : The drug is related to the occurrence of headaches.

D) \( H_0 \) : The occurrence of headaches is dependent on the drug.

\( H_a \) : The occurrence of headaches is independent of the drug.

Find the value of the chi-square test statistic for the goodness-of-fit test.

5) You wish to test the claim that a die is fair. You roll it 48 times with the following results:

<table>
<thead>
<tr>
<th>Number</th>
<th>1</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>11</td>
<td>12</td>
<td>15</td>
<td>16</td>
<td>6</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

What is the value of the \( \chi^2 \) test statistic? The observed frequencies and the expected frequencies are shown below.

<table>
<thead>
<tr>
<th>Observed</th>
<th>11</th>
<th>9</th>
<th>15</th>
<th>12</th>
<th>6</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

A) \( \chi^2 = 4.364 \)  
B) \( \chi^2 = 3.692 \)  
C) \( \chi^2 = 8 \)  
D) \( \chi^2 = 6 \)

6) The table below shows the age and favorite type of music of 668 randomly selected persons.

<table>
<thead>
<tr>
<th>Age</th>
<th>Rock</th>
<th>Pop</th>
<th>Classical</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 - 25</td>
<td>50</td>
<td>85</td>
<td>73</td>
</tr>
<tr>
<td>25 - 35</td>
<td>68</td>
<td>91</td>
<td>60</td>
</tr>
<tr>
<td>35 - 45</td>
<td>90</td>
<td>74</td>
<td>77</td>
</tr>
</tbody>
</table>

The critical \( X^2 = 9.488 \), test \( X^2 = 12.954 \).

Draw a conclusion based upon the statistics,

A) One cannot conclude that music type is dependent upon age because the null can be rejected.

B) One can conclude that music type is dependent upon age because the null can be rejected.

C) One cannot conclude that music type is dependent upon age because the null cannot be rejected.

D) One can conclude that music type is dependent upon age because the null cannot be rejected.
7) The table presents the data from a study to relate the type of transportation of workers and the time of their arrival at work.

<table>
<thead>
<tr>
<th></th>
<th>Late</th>
<th>On time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive</td>
<td>35</td>
<td>25</td>
</tr>
<tr>
<td>Public transportation</td>
<td>10</td>
<td>30</td>
</tr>
</tbody>
</table>

What is the risk of being on time for work if an employee takes public transportation?
A) 22.2%  B) 75%  C) 10  D) 10%

8) The table presents the data from a study to relate the type of transportation of workers and the time of their arrival at work.

<table>
<thead>
<tr>
<th></th>
<th>Late</th>
<th>On time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive</td>
<td>35</td>
<td>25</td>
</tr>
<tr>
<td>Public transportation</td>
<td>10</td>
<td>30</td>
</tr>
</tbody>
</table>

What is the relative risk of being on time for work of a person taking public transportation with respect to a driver?
A) 3.0  B) 1.8  C) 1.2  D) None of the values is correct

9) The table presents the data from a study to relate the type of transportation of workers and the time of their arrival at work.

<table>
<thead>
<tr>
<th></th>
<th>Late</th>
<th>On time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive</td>
<td>35</td>
<td>25</td>
</tr>
<tr>
<td>Public transportation</td>
<td>10</td>
<td>30</td>
</tr>
</tbody>
</table>

What is the increased risk of being on time for work of a person taking public transportation with respect to a driver?
A) None of the values is correct.  B) 200%  C) 20%  D) 80%

10) The table presents the data from a study to relate the scholarship status of students and their working at outside jobs.

<table>
<thead>
<tr>
<th>Scholarship Status</th>
<th>Maintains</th>
<th>Does not Maintain</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPA</td>
<td>GPA</td>
<td></td>
</tr>
<tr>
<td>Work &gt; 10 hr/week</td>
<td>16</td>
<td>29</td>
</tr>
<tr>
<td>Work &lt; 10 hr/week</td>
<td>33</td>
<td>6</td>
</tr>
</tbody>
</table>

Find P1, the probability that a student works less than 10 hours a week given that the student does maintain GPA and find P2, the probability that a student maintains GPA given that the student works less than 10 hours a week.
A) P1 = .67; P2 = .85  B) P1 = .85; P2 = .15  C) P1 = .85; P2 = .67  D) P1 = .67; P2 = .33
1) The two way table summarizes data from a survey at a small liberal arts college:

<table>
<thead>
<tr>
<th></th>
<th>Tenure</th>
<th>Adjunct</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>A</td>
<td>23</td>
<td>40</td>
</tr>
<tr>
<td>Women</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>60</td>
</tr>
</tbody>
</table>

Find the value for the lettered cell.
A) 5  B) 28  C) 20  D) 17  E) 32

2) The two way table summarizes data from a survey at a small liberal arts college:

<table>
<thead>
<tr>
<th></th>
<th>Tenure</th>
<th>Adjunct</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>17</td>
<td>23</td>
<td>40</td>
</tr>
<tr>
<td>Women</td>
<td>15</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>28</td>
<td>60</td>
</tr>
</tbody>
</table>

What is the probability that a new hire is female?
A) .425  B) .333  C) .575  D) .667

3) The two way table summarizes data from a survey at a small liberal arts college:

<table>
<thead>
<tr>
<th></th>
<th>Tenure</th>
<th>Adjunct</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>4</td>
<td>18</td>
<td>32</td>
</tr>
<tr>
<td>Women</td>
<td>12</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>22</td>
<td>38</td>
</tr>
</tbody>
</table>

Assuming that status and gender are independent, what is the expected frequency (to the nearest whole number) of adjunct men?
A) 18  B) 16  C) 13  D) 32
4) The Book Industry Study Group, Inc., performs sample surveys to obtain information on characteristics of book readers. A book reader is defined to be one who read one or more books in the six months prior to the survey; a non-book reader is defined to be one who read newspapers or magazines but no books in the six months prior to the survey; a nonreader is defined to be one who did not read a book, newspaper, or magazine in the six months prior to the survey. The following data were obtained from a random sample of 1429 persons 16 years old and over.

<table>
<thead>
<tr>
<th>Household Income</th>
<th>Book reader</th>
<th>Non-book reader</th>
<th>Non-reader</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than $15,000</td>
<td>173</td>
<td>267</td>
<td>55</td>
</tr>
<tr>
<td>$15,000 to $24,999</td>
<td>168</td>
<td>130</td>
<td>19</td>
</tr>
<tr>
<td>$25,000 to $39,999</td>
<td>160</td>
<td>144</td>
<td>9</td>
</tr>
<tr>
<td>$40,000 and over</td>
<td>213</td>
<td>88</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>714</td>
<td>629</td>
<td>86</td>
</tr>
</tbody>
</table>

Identify the null hypothesis, $H_0$, and the alternative hypothesis, $H_a$.

A) $H_0$: There is no relationship between household income and book readership.
   $H_a$: Household income and book readership are not related.

B) $H_0$: There is no relationship between household income and book readership.
   $H_a$: Household income and book readership are related.

C) $H_0$: There is a relationship between household income and book readership.
   $H_a$: Household income and book readership are not related.

D) $H_0$: Household income and book readership are independent.
   $H_a$: Household income and book readership are not dependent.
5) You wish to test the claim that workplace accidents are distributed on workdays as follows: Monday: 25%, Tuesday: 15%, Wednesday: 15%, Thursday: 15%, Friday: 30%. In a study of 100 workplace accidents, 24 occurred on a Monday, 14 occurred on a Tuesday, 17 occurred on a Wednesday, 17 occurred on a Thursday, and 28 occurred on a Friday. What is the value of the $\chi^2$ test statistic? The observed frequencies and the expected frequencies are shown below.

<table>
<thead>
<tr>
<th>Observed Frequency (O)</th>
<th>Expected Frequency (E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>25</td>
</tr>
<tr>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>17</td>
<td>15</td>
</tr>
<tr>
<td>17</td>
<td>15</td>
</tr>
<tr>
<td>28</td>
<td>30</td>
</tr>
</tbody>
</table>

A) $\chi^2 = 2$  
B) $\chi^2 = 4.667$  
C) $\chi^2 = 0.727$  
D) $\chi^2 = 0.773$

6) 160 students who were majoring in either math or English were asked a test question, and the researcher recorded whether they answered the question correctly. The sample results are given below. Identify the conclusion to report.

<table>
<thead>
<tr>
<th></th>
<th>Correct</th>
<th>Incorrect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math</td>
<td>27</td>
<td>53</td>
</tr>
<tr>
<td>English</td>
<td>43</td>
<td>37</td>
</tr>
</tbody>
</table>

Critical $X^2 = 2.706$; test $X^2 = 6.502$.

A) Report that response is not dependent on major because the null is rejected.
B) Report that response is dependent on major because the null is not rejected.
C) Report that response is dependent on major because the null is rejected.
D) Report that response is not dependent on major because the null is not rejected.

7) The table presents the data from a study to relate the scholarship status of students and their working at outside jobs.

<table>
<thead>
<tr>
<th>Scholarship Status of Students</th>
<th>Maintains</th>
<th>Does not Maintain</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPA</td>
<td>GPA</td>
<td></td>
</tr>
<tr>
<td>Work &gt; 10 hr/wk</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>Work &lt; 10 hr/wk</td>
<td>35</td>
<td>6</td>
</tr>
</tbody>
</table>

What is the risk of maintaining GPA if a scholarship student works more than 10 hours a week?

A) 14  
B) 28.6%  
C) 17.1%  
D) 34.1%
8) The table presents the data from a study to relate the scholarship status of students and their working at outside jobs.

<table>
<thead>
<tr>
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<th>Does not Maintain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work &gt; 10 hr/wk</td>
<td>GPA 16</td>
<td>GPA 29</td>
</tr>
<tr>
<td>Work &lt; 10 hr/wk</td>
<td>GPA 33</td>
<td>GPA 6</td>
</tr>
</tbody>
</table>

What is the relative risk of maintaining GPA of a student working more than ten hours a week with respect to a student working less than 10 hours a week?

A) .39  B) .55  C) None of the values is correct.  D) .42

9) The table presents the data from a study to relate the scholarship status of students and their working at outside jobs.

<table>
<thead>
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<td>GPA 6</td>
</tr>
</tbody>
</table>

What is the increased risk of maintaining GPA of a student working more than ten hours a week with respect to a student working less than 10 hours a week?

A) -45%  B) -.58  C) 61%  D) None of the values is correct.

10) The table presents the data from a study to relate the type of transportation of workers and the time of their arrival at work.

<table>
<thead>
<tr>
<th>Transportation</th>
<th>Late</th>
<th>On time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive</td>
<td>35</td>
<td>25</td>
</tr>
<tr>
<td>Public transportation</td>
<td>10</td>
<td>30</td>
</tr>
</tbody>
</table>

What are P1, the probability that an employee is on time given that the employee drives, and P2, the probability that an employee drives given that the employee is on time?

A) P1 = .42; P2 = .45  B) P1 = .42; P2 = .58
C) P1 = .45; P2 = .42  D) P1 = .45; P2 = .55
ANSWERS

Chapter 1 answers:

form 1:


form 2:


form 3:


Chapter 2 answers:

form 1:


form 2:


form 3:


Chapter 3 answers:

form 1:


form 2:


form 3

Chapter 4 answers:

form 1:


form 2:


form 3:


Chapter 5 answers:

form 1:


form 2:


form 3:


Chapter 6 answers:

form 1:


form 2:


form 3:

Chapter 7 answers:

form 1:


form 2:


form 3:


Chapter 8 answers:

form 1:


form 2:


form 3:


Chapter 9 answers:

form 1:


form 2:


form 3:

Chapter 10 answers:

form 1:

form 2:

form 3: