Name _____

1. You look at real estate ads for houses in Sarasota, Florida. There are many houses ranging from $200,000 to $400,000 in price. The few houses on the water, however, have prices up to $15 million. Which of the following statements best describes the distribution of home prices in Sarasota?

a. The distribution is most likely skewed to the left, and the mean is greater than the median.
b. The distribution is most likely skewed to the left, and the mean is less than the median.
c. The distribution is roughly symmetric with a few high outliers, and the mean is approximately equal to the median.
d. The distribution is most likely skewed to the right, and the mean is greater than the median.
e. The distribution is most likely skewed to the right, and the mean is less than the median.

2. The average yearly snowfall in Chillyville is Normally distributed with a mean of 55 inches. If the snowfall in Chillyville exceeds 60 inches in 15% of all years, what is the standard deviation of the average yearly snowfall distribution?

a. 4.82 inches   b. 5.18 inches   c. 6.04 inches   d. 8.93 inches
e. The standard deviation cannot be computed from the given information.

3. The National Survey of Adolescents Health interviewed several thousand teens (grades 7 to 12). One questions asked was "What do you think are the chances you will be married in the next ten years?" Here is a two-way table of the responses by sex:

	Female	Male	Total
Almost no chance	119	103	222
Some chance, but probable not	150	171	321
A 50-50 chance	447	512	459
A good chance	735	710	1445
Almost certain	1174	756	1930
Total	2625	2252	4877

Which of the following statements about these data is true?
a. The percent of females among the respondents is about 46%.
b. The marginal distributions of the variable "chance of marriage" is
Almost no chance: 4.5%; Some chance, but probable not: 5.7%; A 50-50 chance: 17.0%;
A good chance: 28.0%; Almost certain: 44.7%
c. About 61% of females thought that they were almost certain to be married in the next ten years.
d. Part of the conditional distribution of chance of marriage given sex is
Almost no chance   Female: 53.6%   Male: 46.4%
e. None of these.

4. For a biology project, you measure the weight in grams (g) and the tail length in millimeters (mm) of a group of mice. The equation of the least-squares line for predicting tail length from weight is

   predicted tail length = 20 + 3(weight)

Which of the following is **not** correct?

a. The slope is 3, which indicates that a mouse's weight should increase by about 3 grams for each additional millimeter of tail length.

b. The predicted tail length of a mouse that weighs 38 grams is 134 millimeters.

c. By looking at the equation of the least-squares line, you can see that the correlation between weight and tail length is positive.

d. If you had measured the tail length in centimeters instead of millimeters, the slope of the regression line would have been 3/10 = 0.3.

e. One mouse weighted 29 grams and had a tail length of 100 millimeters. The residual for this mouse is -7.

5. The figure below shows a Normal density curve. Which of the following gives the best estimates for the mean and standard deviation of this Normal distribution?
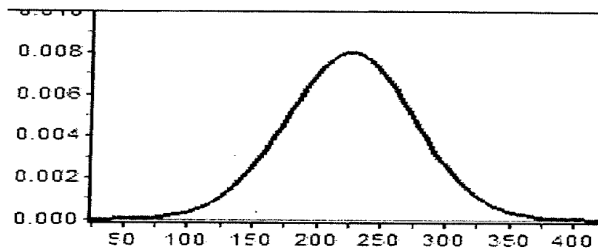
a. $\mu = 200$, $\sigma = 50$ b. $\mu = 200$, $\sigma = 25$ c. $\mu = 225$, $\sigma = 50$
d. $\mu = 225$, $\sigma = 25$ e. $\mu = 225$, $\sigma = 275$

6. Data on average daily maximum temperature in a small town were collected over a one-month period. Here is some summary information.

   n = 30 $\bar{x} = 64°F$ $s = 4°F$

Which of the following gives the correct mean and standard deviation of these temperature readings in degrees Celsius (C) if the equation for converting from Fahrenheit (F) to Celsius is $C = \dfrac{5}{9}(F - 32)$?

a. $\bar{x} = 17.78°C$, $s = 2.22°C$ b. $\bar{x} = 17.78°C$, $s = -15.56°C$ c. $\bar{x} = 17.78°C$, $s = 1.23°C$
d. $\bar{x} = 3.56°C$, $s = 2.22°C$ e. None of these

7. The owner of a chain of supermarkets notices that there is a positive correlation between the sales of beer and the sales of ice cream over the course of the previous year. Seasons when sales of beer were above average, sales of ice cream also tended to be above average. Likewise, during seasons when sales of beer were below average, sales of ice cream also tended to be below average. Which of the following would be a valid conclusion from these facts?

a. Sales records must be in error. There should be no association between beer and ice cream sales.
b. Evidently, for significant proportion of customers of these supermarkets, drinking beer causes a desire for ice cream and eating ice cream causes a thirst for beer.
c. A scatterplot of monthly ice cream sales versus monthly beer sales would show that a straight line describes the pattern in the plot, but it would have to be a horizontal line.
d. There is a clear, negative association between beer sales and ice cream sales
e. The positive correlation is most likely a result of the lurking variable temperature; that is, as temperature increase, so do both beer sales and ice cream sales.

8. Here are the IQ scores of 10 randomly chosen fifth-grade students:
     96   110   118   118   122   125   126   130   139   145

Which of the following statements about this data set is **not** true?

a. The student with and IQ of 96 is considered an outlier by the 1.5 x IQR rule.
b. The five-number summary of the 10 IQ scores is 96, 118, 123.5, 130, 145
c. If the value 96 was removed from the data set, the mean of the remaining 9 IQ scores would be higher than the mean of all 10 IQ scores.
d. If the value 96 was removed from the data set, the standard deviation of the remaining 9 IQ scores would be lower than the standard deviation of all 10 IQ scores.
e. If the value 96 was removed from the data set, the IQR of the remaining 9 IQ scores would be lower than the IQR of all 10 IQ scores.

9. Before he goes to bed each night, Mr. Kleen pours dishwasher powder into his dishwasher and turns it on. Each morning, Mrs. Kleen weighs the box of dishwasher powder. From examination of the data, she concludes that Mr. Kleen dispenses a rather consistent amount of powder each night. Which of the following statements is true?

I. There is a high positive correlation between the number of days that have passed since the box of dishwasher powder was opened and the amount left in the box.
II. A scatterplot with days since purchase as the explanatory variable and amount of dishwasher powder used as the response variable would display a strong positive association.
III. The correlation between the amount of powder left in the box and the amount of powder used should be -1.

a. I only   b. II only   c. III only   d. II and III only   e. I, II, and III

10. The General Social Survey (GSS), conducted by the National Opinion Research Center at the University of Chicago, is a major source of data on social attitudes in the U.S. Once each year 1500 adults are interviewed in their homes all across the country. The subjects are asked their opinions about sex and marriage, attitudes toward women, welfare, foreign policy and many other issues. The GSS begins by selecting a sample of counties from the 3000 counties in the country. The counties are divided into urban, rural and suburban, a separate sample is chosen at random from each group. This is a

a. cluster sample
b. simple random sample
c. stratified random
d. systematic random sample
e. voluntary response sample

11. Random assignment is part of a well-designed comparative experiment because

a. it is more fair to the subjects.
b. it allows researchers to generalize the results of their experiment to a larger population.
c. it helps create roughly equivalent groups before treatments are imposed on the subjects..
d   it helps eliminate any possibility of bias in the experiment.
e. it prevents the placebo effect from occurring.

12. You can find the Excite Poll online. You simple click on a response to become part of the sample. A recent poll question was, "Do you prefer to watching first-run movies at a movie theater, or waiting until they are available on DVD or Netflix?" In all, 8896 people responded, with only 12% (1118) people saying they preferred theaters. You can conclude that

a. American adults strongly prefer DVD or Netflix.
b. the poll uses voluntary response, so the results tell us little about all American adults.
c. the sample is too small to draw any conclusion.
d. the high nonresponse rate prevents us from drawing a conclusion.
e. American adults strongly prefer seeing movies at a movie theater.

13. You work for an advertising agency that is preparing a new television commercial to appeal to women. You have been asked to design an experiment to compare the effectiveness of three versions of the commercial. Each subject will be shown one of the three versions and then asked her attitude toward the product. You think there may be large difference between women who are employed and those who are not. Because of these difference, you should use

a. a block design   b. a completely randomized design   c. a matched pairs design
d. a simple random sample   e. a stratified random design

14. You want to take an SRS of 50 of the 816 students who live in a dormitory on a college campus. You label the students 001 to 816 in alphabetical order. In the table of random digits you read the entries

95592 94007 69769 33547 72450 16632 81194 14873

The first three students in your sample have labels
a. 955, 929, 400
b. 400, 769, 769
c. 559, 294, 007
d. 929, 400, 769
e. 400, 769, 335

15. Corn variety #1 yielded 140 bushels per acre last year at a research farm. This year, corn variety #2 planted in the same location, yielded only 110 bushels per acre. Unfortunately, we don't know whether the difference is due to the superiority of variety #1 or to the effect of this year's drought. This is an example of

a. bias due to voluntary response
b. confounding
c. lack of blinding
d. sampling variability
e. the placebo effect

16. Women who are severely overweight suffer enormous social and economic consequences, a new study has shown. They are 20 percent less likely to marry, had household incomes that were an average of $6,710 lower and were 10 percent more likely to live in poverty. The findings are from an eight-year study of 10,039 randomly selected people who were 16 to 24 years old when the research began.
Does this study give strong evidence that being fat causes lower income?

a. Yes. The study included both people who were fat and people who were not.
b. Yes. the subjects in the study were selected at random.
c. No. the study showed that there is no correlation between income and being fat.
d. No. People who are already poor may tend to overeat and/or get less exercise, which may make them more likely to be fat.
e. There is not enough information to answer this question.

17. For a certain experiment the available experimental units are 8 rats, of which 4 are female (F1, F2, F3, F4) and 4 are male (M1, M2, M3, M4). There are 4 treatment groups, A, B, C, and D. If a randomized complete block design is used, with the experimental units blocked by gender, which of the following assignments of treatments is impossible?

a. A → (F1, M1), B → (F2, M2), C → (F3, M3), D → (F4, M4)
b. A → (F1, M2), B → (F2, M3), C → (F3, M4), D → (F4, M1)
c. A → (F1, M2), B → (F3, M2), C → (F4, M1), D → (M3, M4)
d. A → (F4, M1), B → (F2, M3), C → (F3, M2), D → (F1, M4)
e. All of the above assignments are possible.

18. A simple random sample is

a. any sample selected by using chance
b. any sample that gives every individual the same chance of being selected
c. a sample that contains the same percent of each subgroup in the population
d. a sample that gives every possible sample of the same size the same chance to be selected
e. a sample that selects equal numbers of individuals from each stratum

19. You are planning an experiment to determine the effect of the brand of gasoline and the weight of a car on gas mileage measured in miles per gallon. You will use a single test car, adding weights so that its total weight is 3000, 3500, or 4000 pounds. The car will drive on a test track at each weight using each of Amoco, Marathon and Speedway gasoline. Which is the best way to organize the study?

a. Start with 3000 pounds and Amoco and run the car on the test track. Then do 3500 and 4000 pounds. Change to Marathon and go through the three weights in order. Then change to Speedway and do the three weights in order once more.
b. Start with 3000 pounds and Amoco and run the car on the test track. Then change to Marathon and Speedway without changing the weight. Then add weights to get 3500 pounds and go through the three gasolines in the same order. Then change to 4000 pounds and do the three gasolines in order again.
c. Choose a gasoline at random, and run the car with this gasoline at 3000, 3500, and 4000 pounds in order. Choose one to the two remaining gasolines at random and again run the car at 3000, then 3500, then 4000 pounds. Do the same with the last gasoline.
d. There are 9 combinations of weight and gasoline. Run the car several times using each of these combinations.   Make all these runs in random order.
e. Randomly select and amount of weight and a brand of gasoline, and run the car on the test track. Repeat this process a total of 30 times.

20. The probability distribution for the number of heads in four tosses of a coin is given by

Number of heads	0	1	2	3	4
Probability	0.0625	0.2500	0.3750	0.2500	0.0625

The probability of getting at least one tail in four tosses of a coin is:
a. 0.2500   b. 0.3125   c. 0.6875   d. 0.9375   e. none of these

21. In a certain large population of adults, the distribution of IQ scores is strongly left-skewed with a mean of 122 and a standard deviation of 5. Suppose 200 adults are randomly selected from this population for a market research study. The distribution of the sample mean IQ is

a. left-skewed, mean 122, standard deviation 0.35
b. exactly normal, mean 122, standard deviation 5
c. exactly normal, mean 122, standard deviation 0.35
d. approximately normal, mean 122, standard deviation 5
e. approximately normal, mean 122, standard deviation 0.35

22. Suppose you roll a red die and a green die simultaneously. Let A be the event that the number of spots on the red die is three or less and B be the event that the number of spots showing on the green die is more than three. The events A and B are

a. complementary   b. conditional   c. disjoint   d. independent   e. unlikely

23. A system has two components that operate in parallel, as shown in the diagram below. Because the components operate in parallel, at least one of the components must function properly if the system is to function properly. The probabilities of failures for the components 1 and 2 during one period of operation are .20 and .03, respectively. Let F denote the event that the component 1 fails during one period of operation and G denote the event that component 2 fails during one period of operation. The component failures are independent.
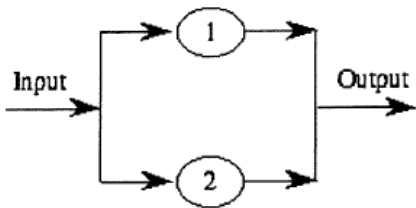
The probability that the system functions properly during one period of operation is closest to

a. 0.994   b. 0.970   c. 0.940   d. 0.770   e. 0.500

24. A survey firm wants to ask a random sample of adults in Ohio if they support an increase in the state sales tax from 5% to 6%, with additional revenue going to education. Let p denote the proportion in the sample that say they support the increase. Suppose that 40% of all adults in Ohio support the increase. How large a sample would be needed to guarantee that the standard deviation of $\hat{p}$ is no more than 0.01?

a. 49   b. 1500   c. 2400   d. 2410   e. 2500

25. A set of ten cards consists of five red cards and five black cards. The cards are shuffled thoroughly, and I choose one at random, observe its color, and replace it in the set. The cards are thoroughly reshuffled, and I again choose a card at random, observe its color, and replace it in the set. This is done a total of four times. Let X be the number of red cards observed in these four trials. The random variable X has which of the following probability distributions?

a. The Normal distribution with mean 2 and standard deviation 1
b. The binomial distribution with $n = 10$ and $p = 0.5$
c. The binomial distribution with $n = 5$ and $p = 0.5$
d. The binomial distribution with $n = 4$ and $p = 0.5$
e. The geometric distribution with $p = 0.5$

26. A 10 question multiple-choice exam offers 5 choices for each question. Jason just guesses the answers, so he has probability 1/5 of getting anyone answer correct. You want to perform a simulation to determine the number of correct answers that Jason gets. One correct way to use a table of random digits to do this is:

a. One digit from the random digit table simulates one answer, with 5 = right and all other digits = wrong. Ten digits from the table simulates 10 answers.
b. One digit from the random digit table simulates one answer, with 0 and 1 = right and all other digits = wrong. Ten digits from the table simulates 10 answers.
c. One digit from the random digit table simulates one answer, with odd = right and even = wrong. Ten digits from the table simulates 10 answers.
d. Two digits from the random digit table simulates one answer, with 00 to 20 = right and 21 to 99 = wrong. Ten pairs of digits from the table simulates 10 answers.
e. Two digits from the random digit table simulates one answer, with 00 to 05 = right and 06 to 99 = wrong. Ten pairs of digits from the table simulates 10 answers.

27. Suppose we roll a fair die four times. The probability that a six occurs on exactly one of the rolls is

a. $4\left(\dfrac{1}{6}\right)^3\left(\dfrac{5}{6}\right)^1$
b. $\left(\dfrac{1}{6}\right)^3\left(\dfrac{5}{6}\right)^1$
c. $4\left(\dfrac{1}{6}\right)^1\left(\dfrac{5}{6}\right)^3$
d. $\left(\dfrac{1}{6}\right)^1\left(\dfrac{5}{6}\right)^3$

e. none of these

28. A standard deck of playing cards contains 52 cards, of which 4 are aces and 13 are hearts. You are offered a choice of the following two wagers:
I: Draw one card at random from the deck. You win $10 if the card drawn is an ace. Otherwise you lose $1.
II. Draw one card at random from the deck. If the card drawn is a heart, you win $2. Otherwise, you lose $1.

Which of the two wagers should you prefer?
a. Wager 1, because it has a higher expected value
b. Wager 2, because it has a higher expected value
c. Wager 1, because it has a higher probability of winning
d. Wager 2, because it has a higher probability of winning
e. Both wagers are equally favorable.

29. A random sample of 25 birth weights (in ounces) is taken yielding the following summary statistics.

Variable	N	Mean	Median	TrMean	StDev	SE Mean
Birthst	25	129.40	129.00	128.35	17.41	3.48

Variable	Minimum	Maximum	Q1	Q3
Birthwt	96.00	187.00	119.50	135.50

What can be said about the number of outliers in this data set?

a. 0   b. At least 1   c. No more than 1   d. At least 2   e. No more than 2

30. Given two events, A and B, if P(A) = 0.43, P(B) = 0.26 and P(A ∪ B) = 0.68, then the two events are

a. mutually exclusive but not independent
b. independent but not mutually exclusive
c. mutually exclusive and independent
d. neither mutually exclusive nor independent
e. Not enough information is given to determine whether A and B are mutually exclusive or independent.

31. Consider the box plot shown. Which of the following best describes this distribution?
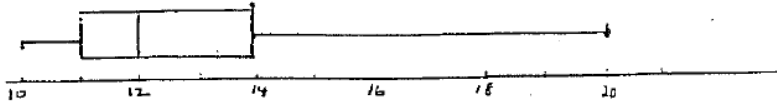
a. symmetric distribution, median is 12
b. symmetric distribution, outlier at the high value
c. skewed distribution, mean is greater than median
d. skewed distribution, mean less than the median
e. skewed distribution, no outlier

32. In a game of chance, three fair coins are tossed simultaneously. If all three coins show heads, then the player wins $15. If all three coins show tails, then the player wins $10. If it costs $5 to play the game, what is the player's expected net gain or loss at the end of two games?

a. The player can expect to win $15 after two games.
b. The player can expect to win $1.88 after two games.
c. The player can expect to win $3.75 after two games.
d. The player can expect to lose $1.88 after two games.
e. The player can expect to lose $3.75 after two games.

33. The boxplots below summarize two data sets, X and Y. Which of the following MUST be true?
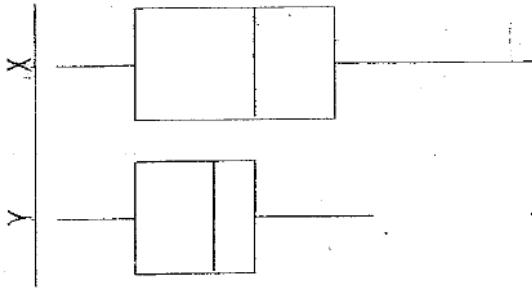
a. Set X and set Y have the same number of data points.
b. The box of set X contains more data points than the box of set Y.
c. The data in set X have a larger range than the data in set Y.
d. About 50% of the values in set X are greater than about 75% of the values in set Y.
e. The median of set X is less than the median of Set Y.

34. Which of the following is a true statement about experimental design?

a. Replication is a key component of experimental design. Thus, an experiment needs to be conducted on repeated *samples* before generalizing results.
b. Control is a key component in experimental design. Thus, a control group that receives a placebo is a *requirement* for experimentation.
c. Randomization is a key component of experimental design. Randomization is used to *reduce* bias.
d. Blocking eliminates the effects of *all* lurking variables.
e. The placebo effect is a concern for all experiments.

35. An experimenter believes that two new exercise programs are more effective than any current exercise routines and wishes to compare the effectiveness of these two new exercise programs on physical fitness. The experimenter is trying to determine whether or not a control group, which follows neither of these new programs but continues with regular exercise routines, would be beneficial. Which of the following can be said about the addition of a control group?

a. A control group would eliminate the placebo effect.
b. A control group would eliminate the need for blinding in the study.
c. A control group would allow the experimenter to determine which of the two exercise programs improves physical fitness the most.
d. A control group would allow the experimenter to determine if either of the exercise programs is more effective than current programs for physical fitness.
e. There would be no added benefit to having a control group.

36. The number of T-shirts a school store sells monthly has the following probability distribution:

# of T-Shirts, X	0	1	2	3	4	5	6	7	8	9	10
P(X)	0.02	0.15	0.18	0.21	0.14	0.08	0.08	0.04	0.03	0.02	0.05

If each t-shirt sells for $10 but costs the store $4 to purchase, what is the expected monthly T-shirt profit?

a. $3.75   b. $15.12   c. $22.68   d. $30.00   e. $37.80

37. A population has a distribution that is strongly skewed right. For the sampling distribution of sample means for samples of size 5, which of the following are true about the shape, center and spread of the sampling distribution?

	Shape	Mean	Standard Deviation
a.	Skewed right	Equal to that of the population	Less than that of the population
b.	Skewed right	Equal to that of the population	Equal to that of the population
c.	Skewed right	Equal to that of the population	Greater than that of the population
d.	Approximately Normal	Equal to that of the population	Less than that of the population
e.	Approximately Normal	Equal to that of the population	Equal to that of the population

38. A young woman works two jobs and receives tips for both jobs. As a hairdresser, her distribution of weekly tips is normally distributed with mean $65 and standard deviation $5.75. As a waitress, her distribution of weekly tips is normally distributed with mean $154 and standard deviation $8.02. What are the mean and standard deviation of her combined weekly tips? (Assume independence for the two jobs.)

a. Mean $167.16; Standard deviation $9.87
b. Mean $167.16; Standard deviation $13.77
c. Mean $219.00; Standard deviation $2.27
d. Mean $219.00; Standard deviation $9.87
e. Mean $219.00; Standard deviation $13.77

39. A cause-and-effect relationship between two variables can best be determined from which of the following?

a. A survey conducted using a simple random sample of individuals.
b. A survey conducted using a stratified random sample of individuals.
c. When the two variables have a correlation coefficient near 1 and -1.
d. An observational study where the observational units are chosen randomly.
e. A controlled experiment where the observational units are chosen randomly.

40. A random sample of moving times (in minutes) and weights (in pounds) were recorded for 20 moving jobs requiring three-man crews, and the results of the regression analysis are shown below.

Predictor	Coef	StDev	T	P
Constant	21.84	25.54	0.86	0.404
Weight	0.036538	0.002977	12.27	0.000
S = 30.32	R-Sq = 89.3%	R-Sq(adj) = 88.7%		

The equation of the least squares regression line is

a. Predicted Weight = 21.84 + 0.037(Time)

b. Predicted Time = 21.84 + 0.037(Weight)

c. Predicted Weight = 5.54 + 0.003(Time)

d. Predicted Time = 25.54 + 0.003(Weight)

e. Predicted Time = 0.037 + 21.84(Weight)

41. The following dotplots show the mean temperature (in degrees Fahrenheit) for a sample of cities from around the world. Both January and July temperatures are shown. What is one statement can be made with certainty from an analysis of the dotplots?

Dotplot for January-July
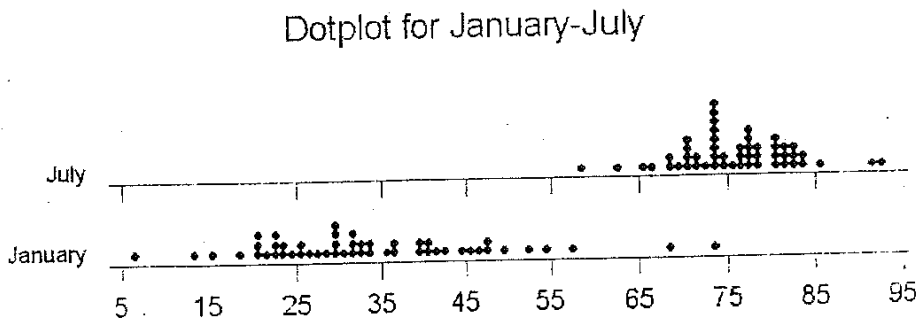
a. Every city has a higher average temperature in July than in January.
b. The distribution of temperatures in July is skewed right, while the distribution of temperature in January is skewed left.
c. There is more variability in average temperatures in January then in July.
d. The median average temperature for January is higher than the median average temperature for July.
e. There are no outliers in the average temperatures for January or July.

42. For a set of values, suppose the mean is 10 and the standard deviation is 2. If each value is multiplied by 9, what will be the mean and standard deviation for this new set of values?

a. Mean 10; Standard deviation 2
b. Mean 10; Standard deviation 18
c. Mean 90; Standard deviation 2
d. Mean 90; Standard deviation 6
e. Mean 90; Standard deviation 18

43. Suppose the probability of encountering an American who practices a particular religion is 0.014. What are the mean and standard deviation for the *number* of Americans in a random sample of 500 who practice this religion?

a. Mean 0.014; Standard deviation 0.0006
b. Mean 0.014; Standard deviation 0.0053
c. Mean 7; Standard deviation 0.0006
d. Mean 7; Standard deviation 0.0053
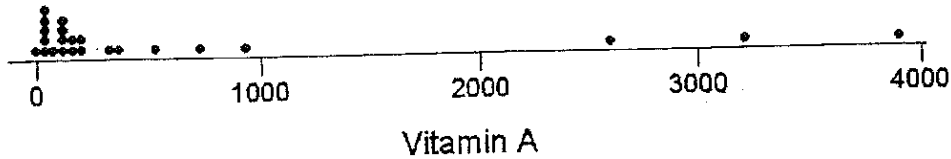e. Mean 7; Standard deviation 2.627

44. A drug company wishes to test a new drug. A researcher assembles a group of volunteers and randomly assigns them to one of two groups --- one to take the drug and one to take a placebo. In addition, the company wants the experiment to be double-blind. What is the meaning of double-blind in this situation?

a. The volunteers in both groups are blindfolded when they take the drug or placebo.
b. The volunteers in both groups do not know whether they are taking the drug of the placebo.
c. Neither the volunteers nor the drug company executives know which volunteers are taking the drug and which are taking the placebo.
d. Neither the volunteers nor the experimenter know which volunteers are taking the drug and which are taking the placebo.
e. As long as the subjects are randomly assigned to the two groups, there is no need to make the experiment double-blind.

45. A baseball recruiter visits a high school where a player has a batting average of 0.450. (This means that he gets a hit in 45% of his at-bats). What is the probability that the recruiter won't see the player get a hit until his third at-bat?

a. $(0.450)^2(0.550)$ b. $(0.550)^2(0.450)$ c. $\binom{3}{1}(0.450)(0.550)^2$

d. $\binom{3}{1}(0.550)(0.450)^2$ e. $\binom{3}{2}(0.450)(0.550)^2$

46. The following graph shows the Vitamin A content (in IU's, International Units) for 23 types of fruit.

Vitamin A

Which of the following would be the best measure to describe the center of this distribution?
a. Mean   b. Median   c. Standard Deviation   d. Interquartile Range   e. Range

47. Pearson High School students have cumulative grade point averages as shown in the table.

GPA \ Class	≥ 4.0	3.0 – 4.0	2.0 – 3.0	1.0 –2.0	< 1.0	Total
Sophomores	43	121	114	22	10	310
Juniors	26	102	84	16	5	233
Seniors	15	87	100	10	7	219
Total	84	310	298	48	22	762

Which of the following statements is *not* true?
a. About 39% of sophomores have *at least* a 3.0 GPA.
b. Sophomores represent 39% of GPAs from 3.0 to 4.0
c. Seniors represent about 29% of the reported GPAs at Pearson High School.
d. Only about 3% of seniors have GPAs *less than* 1.0.
e. About 11% of the reported GPAs are juniors with GPAs from 2.0 to 3.0.

48. A randomized block design is similar to which of the following sampling designs?

a. simple random sample
b. multi-stage cluster sample
c. stratified sample
d. convenience sample
e. systematic sample

49. In this year's county mathematics competition, a student scored 40; in last year's competition, the student scored 35. The average score this year was 38 with a standard deviation of 2. Last year's average score was 34 with a standard deviation of 1. Assuming the scores of the county mathematics competition are normally distributed in relation to the rest of the students in the county, in which year did the student score better?

a. The student scored better in this year's exam.
b. The student scored better in last year's exam.
c. The student scored equally well on both exams.
d. Without knowing the number of test items, it is impossible to determine the better score.
e. Without knowing the number of students taking the exam in the county, it is impossible to determine the better score.

50. The correlation between the depth (in feet) and length (in feet) for a sample of caves is found to be -0.346. If the measurement of depth is converted to meters, what will be the resulting correlation? (1 ft = 0.3048 m)

a. -0.627   b. -0.346   c. -0.105   d. 0.105   e. 0.346

51. An instant lottery game gives you probability 0.02 of winning on any one play. Plays are independent of each other. If you play 5 times, wheat is the probability that you win at least once?

a. 0.0961   b. 0.0922   c. 0.9039   d. 0.1   e. none of the above

52. Two manufacturers of canned goods add different amounts of water to their canned vegetables. For a 15.25 oz. can of vegetables, one manufacturer adds a mean of 4.5 oz. with a standard deviation of 0.63 oz. The other manufacturer adds a mean of 5.1 oz. with a standard deviation of 0.57 oz. What are the mean and standard deviation for the difference in the amount of water added? (Assume independence for the manufacturers.)

a. Mean 0.6 oz.; Standard deviation 0.06 oz.
b. Mean 0.6 oz.; Standard deviation 0.85 oz.
c. Mean 0.6 oz.; Standard deviation 0.072 oz.
d. Mean 9.6 oz.; Standard deviation 0.06 oz.
e. Mean 9.6 oz.; Standard deviation 1.20 oz.

53. If two events, A and B, are mutually exclusive, then the probability that both A and B occur simultaneously is

a. 0
b. 1
c. P(A) + P(B).
d. P(A) + P(B) – P(A ∩ B)
e. P(A)P(B)

54. A university is proposing a new procedure for professors to gain tenure. It intends to randomly sample five professors, five assistant professors, five associate professors, five adjunct professors, and five visiting professors. This is an example of what type of sampling design?

a. Simple random sample
b. Stratified random sample
c. Systematic random sample
d. Cluster sample
e. Convenience sample

55. Which of the following is a valid discrete probability distribution?

a.

x	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1
P(x)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

b.

x	-2	1	2	4
P(x)	0.2	0.6	0.2	0.1

c.

x	1	2	3
P(x)	0.3	0.2	0.1

d.

x	1	2	3	4
P(x)	0.1	0.2	0.3	-0.1

e.

x	-2	-1	1	2
P(x)	-0.3	-0.2	0.2	0.3

56. A fair coin is tossed eight times. Find the probability of getting at least two heads.

a. 0.035   b. 0.145   c. 0.109   d. 0.855   e. 0.965

57. As a promotional gimmick, a cereal manufacturer packages boxes of cereal with CD ROMs of popular games. There are five different games, but the purchasers do not know which game they are receiving when they purchase the cereal. A child would like to receive one game in particular. What is the probability that the child opens three boxes of cereal before receiving the desired game?

a. $\binom{5}{3}(0.2)^3(0.8)^2$ b. $\binom{5}{3}(0.2)^2(0.8)^3$ c. $\binom{5}{1}(0.6)(0.4)^4$

         d. $(0.8)^2(0.2)$ e. $(0.2)^2(0.8)$

58. A random variable has a standard deviation of 1.3. A new variable is created by transforming the values of the random variable using the following rule: Multiply each value by 2 and then add 5. What is the value of the standard deviation for this transformed variable?

a. 1.3   b. 2.6   c. 6.3   d. 7.6   e. 8.5

59. Given the information below, which statement is true?

X	2	4	6	8	10
P(X)	0.3	0.2	0	0.4	0.1

a. The expected value of the random variable is 6.
b. The expected value of the random variable is 0.
c. The variance of the random variable is 1.
d. The expected value of the random variable is 11.6.
e. The variance of the random variable is 8.64.

60. The weights of women are approximately normally distributed. This week, the z-score of weight for a member of a weight-watching group is 1.25. Which of the following is a correct interpretation of this z-score?

a. This week the member weighs 1.25 lb more than last week.
b. This week the member weighs 1.25 lb less than last week.
c. This week the member weighs 1.25 lb more than the average women.
d. This week the member weighs 1.25 standard deviations more than she did last week.
e. This week the member weighs 1.25 standard deviations more than the average women.

61. For a given school year, a reporter has been told that the average teacher's salary was $59,500 with a standard deviation of $17,200. The reporter also knows that teachers will be receiving raises of 3.25% for the next school year. What would the reporter write for the new average teacher's salary and standard deviation?

a. Mean $1934; Standard deviation $559
b. Mean $59,500; Standard deviation $17,200
c. Mean $59,500; Standard deviation $17,759
d. Mean $61,434; Standard deviation $17,200
e. Mean $62,434; Standard deviation $17,759

62. The coefficient of determination between two variables is computed to be 81%. Which of the following statements *must* be true?

a. Large values of the explanatory variable correspond with large values of the response variable.
b. Large values of the explanatory variable correspond with small values of the response variable.
c. A cause-and-effect relationship exists between the explanatory and response variables
d. There is a strong positive, linear relationship between the explanatory and response variables.
e. Approximately 81% of the variability in the response variable is explained by the regression on the explanatory variable.

63. An airline has an on-time probability of 82.4%. What is the probability that if you travel on this airline, no more than 3 of your next 10 flights will *not* be on time?

a. 0.1687   b. 0.00035   c. 0.7488   d. 0.000029   e. 0.9175

64. Since many individuals walk around their homes in their socks, a manufacturer has created a material for socks that is believed to be more resistant to wear than cotton. The manufacturer wishes to test this belief over a period of a month. Given a group of volunteers, which of the following designs will *best* test this new material's resistance to wear?

a. Have the volunteers wear the socks made from the new material for a month, and check the wear on the socks at the end of the month.
b. Allow half of the volunteers to wear cotton socks, while the other half wear socks made of the new material. Compare the wear on the socks at the end of the month.
c. Randomly assign half of the volunteers to wear cotton socks, while the other half wear socks made of the new material. Compare the wear on the socks at the end of the month.
d. Randomly assign half of the volunteers to wear cotton socks, while the other half wear socks made of the new material. At the end of two weeks, the volunteers should change sock types. Compare the wear on the socks at the end of the month.
e. For each volunteer, randomly choose which foot wears a cotton sock, while the other foot wears a sock made of the new material. Compare the wear on the socks at the end of the month.

65. In a certain community, 20% of cable subscribers also subscribe to the company's Internet service. You would like to design a simulation to estimate the probability that one of six randomly selected subscribers has the internet service. Using digit 0 through 9, which of the following assignments would be appropriate to model this situation?

a. Assign even digits as internet subscribers and odd digits are cable-only subscribers.
b. Assign 0 and 1 as internet subscribers and 2 – 9 as cable only subscribers.
c. Assign 0, 1, and 2 as internet subscribers and 3 – 9 as cable only subscribers.
d. Assign 1 – 6 as internet subscribers and 0, 7, 8, and 9 as cable only subscribers.
e. Assign 0, 1 and 2 as internet subscribers; 3, 4, 5, and 6 as cable only subscribers; and ignore 7, 8, and 9.

66. School administrators collect data on students attending the school. Which of the following variables is quantitative?

a. class (freshman, soph., junior, senior)
b. grade point average
c. whether the student is in AP classes
d. whether the student has taken the SAT
e. none of these

67. A professor has kept records on grades that students have earned in his class. If he wants to examine the percentage of students earning the grades A, B, C, D, and F during the most recent term, which kind of plot could he make?

a. boxplot   b. timeplot   c. dotplot   d. pie chart   e. histogram

68. Which is true of the data shown in the histogram?
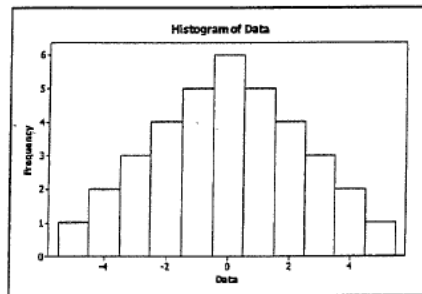
I. The distribution is approximately symmetric
II. The mean and median are approximately equal.
III. The median and IQR summarize the data better than the mean and standard deviation.

a. I only   b. III only   c. I and II   d. I and III   e. I, II and III

69. Two sections of a class took the same quiz. Section A had 15 students who had a mean score of 80, and Section B had 20 students who has a mean score of 90. Overall, what was the approximate mean score for all of the students on the quiz?

a. 84.3   b. 85.0   c. 85.7   d. None of these   e. It cannot be determined.

70. Your Stats teacher tells you your test score was in the 3rd quartile for the class. Which is true?

I. You got 75% on the test.
II. You can't really tell what this means without knowing the standard deviation.
III. You can't really tell what this means unless the class distribution is nearly Normal.

a. none of these   b. I only   c. II only   d. III only   e. II and III

71. Suppose that a Normal model described student scores in a history class. Parker has a standardized score (z-score) of +2.5. This means that Parker

a. is 2.5 points above the average for the class.
b. is 2.5 standard deviations above the average for the class.
c. has a standard deviation of 2.5
d. has a score that is 2.5 times the average of the class.
e. None of the above

72. The advantage of making a stem-and-leaf display instead of a dotplot is that a stem-and-leaf display

a. satisfies the area principle
b. shows the shape of the distribution better than a dotplot.
c. preserves the individual data values.
d. A stem-and-leaf display is for quantitative data, while a dotplot show categorical data.
e. none of these

73. The five-number summary of credit hours for 24 students in a statistics class is:

Min	Q1	Median	Q3	Max
13.0	15.0	16.5	18.0	22.0

Which statement is true?
a. There are no outliers in the data
b. There is at least one low outlier in the data.
c. There is at least one high outlier in the data.
d. There are both low and high outliers in the data.
e. None of the above.

74. Which of the following summaries are changed by adding a constant to each data value?
I. the mean
II. the median
III. the standard deviation

a. I only   b. III only   c. I and II   d. I and III   e. I, II and III

75. All but one of these statements contain a mistake. Which could be true?

a. The correlation between a football player's weight and the position he plays is 0.54
b. The correlation between the amount of fertilizer used and the yield of beans is 0.42
c. The correlation between a car's length and it fuel efficiency is 0.71 miles per gallon.
d. There is a high correlation (1.09) between height of a corn stalk and its age in weeks.
e. There is correlation of 0.63 between gender and political party.

76. Residuals are …

a. possible models not explored by the researcher.
b. variation in the data that is explained by the model.
c. the difference between observed responses and values predicted by the model.
d. data collected from individuals that is not consistent with the rest of the group.
e. none of these

77. If the point in the upper right corner of this scatterplot is removed from the data set, then what will happen to the slope of the line of best fit (b) and to the correlation (r)?

a. both will increase
b. both will decrease
c. b will increase, and r will decrease
d. b will decrease, and r will increase
e. both will remain the same.
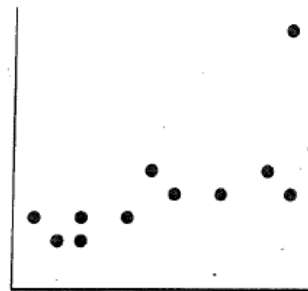
78. Among a dozen eggs, three are rotten. A cookie recipe calls for two eggs; they'll be selected randomly from that dozen. Which plan could be used to simulate the number of rotten eggs that might be chosen?

I. Let 0, 1, and 2 represents the rotten eggs, and 3, 4, …, 11 the good eggs. Generate two random number 0 - 11, ignoring repeats.
II. Randomly generate a 0, 1, or 2 to represent the number of rotten eggs you get.
III. Since 25% of the eggs are rotten, let 0 = rotten and 1, 2, 3 = good. Generate two random numbers 0 – 3 and see how many 0's you get.

a. I only   b. II only   c. III only   d. I or III   e. I, II or III

79. We wish to compare the average ages of the math and science teachers at your high school. Which is the best way to collect the data?

a. census   b. sample survey   c. observational study   d. experiment   e. simulation

80. Hoping to get information that would allow them to negotiate new rates with their advertisers, *Natural Health* magazine phoned a random sample of 600 subscribers. 64% of those polled said they use nutritional supplements. Which is true?

I. The population of interest is the people who read this magazine.
II. "64%" is not a statistic; it's the parameter of interest.
III. This sampling design should provide the company with a reasonably accurate estimate of the percentage of all subscribers who use supplement.

a. I only   b. I and II only   c. I and III only   d. II and III only   e. I, II and III

81. Suppose the state decides to randomly test high school wrestlers for steroid use. There are 16 teams in the league, and each team has 20 wrestlers. State investigators plan to test 32 of these athletes by randomly choosing two wrestlers from each team. Is this a simple random sample?

a. Yes, because the wrestlers were chosen at random.
b. Yes, because each wrestler is equally likely to be chosen.
c. Yes, because stratified samples are a type of simple random sample.
d. No, because not all possible groups of 32 wrestlers could have been the sample.
e. No, because a random sample of teams was not first chosen.

82. Which statement about bias is true?

I. Bias results from random variation and will always be present.
II. Bias results from a sampling method likely to produce samples that do not represent the population.
III. Bias is usually reduced when sample size is larger.

a. I only   b. II only   c. III only   d. I and III only   e. II and III only

83. Some marathons allow two runners to "split" the marathon by each running a half marathon. Alice and Sharon plan to split a marathon. Alice's half-marathon times average 92 minutes with a standard deviation of 4 minutes, and Sharon's half-marathon times average 96 minutes with a standard deviation of 2 minutes. Assume that the women's half-marathon times are independent. The expected time for Alice and Sharon to complete a full marathon is $92 + 96 = 188$ minutes. What is the standard deviation of their total time?

a. 2 minutes   b. 4.5 minutes   c. 6 minutes   d. 20 minutes
e. It cannot be determined

84. Of a – d, which is *not* critical part of designing a good experiment?

a. Control of known sources of variability   b. Random selection of subjects
c. Random assignment of subjects to treatments   d. Replication of the treatment
e. All of these are important

85. In an experiment the primary purpose of blinding is to reduce …

a. bias   b. confounding   c. randomness   d. under coverage   e. variation

86. A researcher wants to compare the performance of three types of pain relievers in volunteers suffering from arthritis. Because people of different ages may suffer arthritis of varying degrees of severity, the subjects are split into two groups: under 60 and over 60. Sujects in each group are randomly assigned to take one of the medications. Twenty minutes later they rate their levels of pain. This experiment …

a. is completely randomizes.   b. uses matched pairs
c. has two factors, medication and age.   d. has one factor (medication) blocked by age.
e. has one factor (age) blocked by medication type.

Use the following information for questions 87 – 88.
In an AP Stats class, 57% of students eat breakfast in the morning and 80% of students floss their teeth. Forty-six percent of students eat breakfast and also floss their teeth.

87. What is the probability that a student from this class eats breakfast but does not floss their teeth?

a. 9%   b. 11%   c. 34%   d. 57%   e. 91%

88. What is the probability that a student from this class eats breakfast or flosses their teeth?

a. 9%   b. 11%   c. 34%   d. 57%   e. 91%

89. Five juniors and four seniors have applied for two open student council positions. School administrators have decided to pick the two new members randomly. What is the probability that they are both juniors or both seniors.

a. 0.359   b. 0.444   c. 0.506   d. 0.569   e. 0.722

90. A fair coin has come up "heads" 10 times in a row. The probability that the coin will come up heads on the next flip is

a. less than 50%, since "tails" is due to come up
b. 50%
c. greater than 50%, since it appears that we are in a streak of "heads".
d. It cannot be determined.

91. According to the National Telecommunication and Information Administration, 56.5% of U.S. households owned a computer in 2001. What is the probability that of three randomly selected U.S. households at least one owned a computer in 2001?

a. 18.0%   b. 43.5%   c. 56.5%   d. 82.0%   e. 91.8%

92. According to the National Telecommunication and Information Administration, 50.5% of U.S. households had internet access in 2001. What is the probability that four randomly selected U.S. households all had internet access in 2001?

a. 6.5%   b. 12.6%   c. 49.5%   d. 50.5%   e. 93.5%

93. According to the National Telecommunication and Information Administration, 50.5% of U.S. households had internet access in 2001. What is the probability that fourth U.S. household you randomly selected is the first household to have internet access?

a. 0.065   b. 0.0638   c. 0.0613   d. 0.785   e. 0.1235

94. Ten percent of all trucks undergoing an inspection of their brakes will fail this inspection. Assume that trucks are independently undergoing this inspection one at a time. The expected number of trucks inspected before a truck's brakes fail inspection is

a. 2   b. 4   c. 5   d. 10   e. 20