Midterm Review

Name_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the problem.

1) As part of an economics class project, students were asked to randomly select 500 New York Stock Exchange (NYSE) stocks from the Wall Street Journal. As part of the project, students were asked to summarize the current prices (also referred to as the closing price of the stock for a particular trading date) of the collected stocks using graphical and numerical techniques. Identify the experimental unit of interest for this study. 1) _____

A) the current price (or closing price) of a NYSE stock
B) the 500 NYSE stocks that current prices were collected from
C) a single stock traded on the NYSE
D) the entire set of stocks that are traded on the NYSE

2) A study in the state of Georgia was conducted to determine the percentage of all community college students who have taken at least one online class. 1500 community college students were contacted and asked if they had taken at least one online class during their time at their community college. These responses were then used to estimate the percentage of all community college students who have taken at least one online class. Identify the population of interest in this study. 2) _____

A) the 1500 community college students contacted
B) all community college students in the state of Georgia
C) the response (Yes/No) to the question, "Have you taken at least one online class?"
D) the number of online classes a student has taken

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

3) A quality inspector tested 66 copiers in an attempt to estimate the average failure rate of the copier model. His study indicated that the number of failures decreased from two years ago, indicating an increase in the reliability of the copiers. Describe the variable of interest to the inspector. 3) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

4) Parking at a large university has become a very big problem. University administrators are interested in determining the average parking time (e.g. the time it takes a student to find a parking spot) of its students. An administrator inconspicuously followed 250 students and carefully recorded their parking times. What type of variable is the administration interested in collecting? 4) _____

A) qualitative data B) quantitative data

5) A postal worker counts the number of complaint letters received by the United States Postal Service in a given day. Identify the type of data collected. 5) _____

A) quantitative B) qualitative

6) Which data about paintings would *not* be qualitative? 6) _____

A) the style B) the artist C) the theme D) the value

7) What method of data collection would you use to collect data for a study where a political pollster wishes to determine if his candidate is leading in the polls? 7) _____

A) designed experiment B) observational study
C) survey D) published source

8) In an eye color study, 25 out of 50 people in the sample had brown eyes. In this situation, what does the number .50 represent? 8) _____

A) a class percentage B) a class frequency
C) a class relative frequency D) a class

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

9) A sample of 100 e-mail users were asked whether their primary e-mail account was a free account, an institutional (school or work) account, or an account that they pay for personally. Identify the classes for the resulting data. 9) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

10) What number is missing from the table? 10) _____

Year in College	Frequency	Relative Frequency
Freshman	600	.30
Sophomore	560	.28
Junior		.22
Senior	400	.20

A) 440 B) 480 C) 520 D) 220

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

11) The data below show the types of medals won by athletes representing the United States in the Winter Olympics. 11) _____

gold	gold	silver	gold	bronze	silver	silver
bronze	gold	silver	silver	bronze	silver	gold
gold	silver	silver	bronze	bronze	gold	silver
gold	gold	bronze	bronze			

a. Construct a frequency table for the data.
b. Construct a relative frequency table for the data.
c. Construct a frequency bar graph for the data.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Answer the question True or False.

12) All class intervals in a histogram have the same width. 12) _____

A) True B) False

13) The bars in a histogram should be arranged by height in descending order from left to right. 13) _____

A) True B) False

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Solve the problem.

14) Each year advertisers spend billions of dollars purchasing commercial time on network television. In the first 6 months of one year, advertisers spent $1.1 billion. Who were the largest spenders? In a recent article, the top 10 leading spenders and how much each spent (in million of dollars) were listed: 14) _____

Company A	$71	Company F	$25.9
Company B	63.7	Company G	24.6
Company C	54.5	Company H	23.1
Company D	54.1	Company I	23.6
Company E	28.5	Company J	19.8

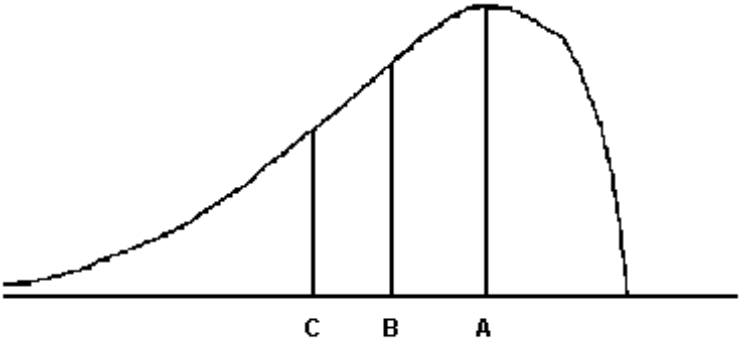
Calculate the mean and median for the data.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

15) The amount spent on textbooks for the fall term was recorded for a sample of five hundred university students. The mean expenditure was calculated to be $500 and the median expenditure was calculated to be $425. Which of the following interpretations of the median is correct? 15) _____

A) 50% of the students sampled had textbook costs equal to $425
B) 50% of the students sampled had textbook costs that were less than $425
C) The average of the textbook costs sampled was $425
D) The most frequently occurring textbook cost in the sample was $425

16) 16) _____



For the distribution drawn here, identify the mean, median, and mode.

A) A = mean, B = mode, C = median
B) A = median, B = mode, C = mean
C) A = mode, B = median, C = mean
D) A = mode, B = mean, C = median

17) The distribution of salaries of professional basketball players is skewed to the right. Which measure of central tendency would be the best measure to determine the location of the center of the distribution? 17) _____

A) range
B) mean
C) mode
D) median

Answer the question True or False.

18) The mean and the median are useful measures of central tendency for both qualitative and quantitative data. 18) _____

A) True B) False

19) In practice, the population mean μ is used to estimate the sample mean $\bar{x}$. 19) _____

A) True B) False

Solve the problem.

20) Each year advertisers spend billions of dollars purchasing commercial time on network television. In the first 6 months of one year, advertisers spent $1.1 billion. Who were the largest spenders? In a recent article, the top 10 leading spenders and how much each spent (in million of dollars) were listed: 20) _____

Company A	$70.7	Company F	$24.8
Company B	63.9	Company G	24
Company C	55.7	Company H	22.7
Company D	54.2	Company I	23.2
Company E	30.3	Company J	20.1

Calculate the sample variance.

A) 2080.829 B) 3763.035 C) 1864.521 D) 389.965

21) The top speeds for a sample of five new automobiles are listed below. Calculate the standard deviation of the speeds. Round to four decimal places. 21) _____

195, 100, 165, 130, 145

A) 168.0982 B) 35.8120 C) 235.1702 D) 130.01

22) Compute s^2 and s for the data set: $\frac{1}{10}, \frac{7}{10}, \frac{1}{10}, \frac{3}{5}, \frac{1}{10}, \frac{1}{5}$. 22) _____

A) 0.617; 0.786 B) 0.076; 0.276 C) 0.045; 0.213 D) 7.6; 2.757

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

23) For a given data set, which is typically greater, the range or the standard deviation? 23) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

24) The temperature fluctuated between a low of 73°F and a high of 89°F. Which of the following could be calculated using just this information? 24) _____

A) range B) variance

C) median D) standard deviation

Answer the question True or False.

25) The sample variance is always greater than the sample standard deviation. 25) _____

A) True B) False

26) A larger standard deviation means greater variability in the data. 26) _____

A) True B) False

Solve the problem.

27) The following is a list of 25 measurements: 27) _____

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

How many of the measurements fall within one standard deviation of the mean?

A) 18 B) 16 C) 13 D) 25

28) A sociologist recently conducted a survey of citizens over 60 years of age who have net worths too high to qualify for Medicaid but have no private health insurance. The ages of the 25 uninsured senior citizens were as follows: 28) _____

68	73	66	76	86	74	61	89	65	90	69	92	76
62	81	63	68	81	70	73	60	87	75	64	82	

Suppose the mean and standard deviation are 74.04 and 9.75, respectively. If we assume that the distribution of ages is mound-shaped and symmetric, what percentage of the respondents will be between 64.29 and 93.54 years old?

A) approximately 68% B) approximately 84%
C) approximately 81.5% D) approximately 95%

29) The amount of television viewed by today's youth is of primary concern to Parents Against Watching Television (PAWT). 300 parents of elementary school-aged children were asked to estimate the number of hours per week that their child watches television. The mean and the standard deviation for their responses were 17 and 3, respectively. PAWT constructed a stem-and-leaf display for the data that showed that the distribution of times was a symmetric, mound-shaped distribution. Give an interval where you believe approximately 95% of the television viewing times fell in the distribution. 29) _____

A) less than 23
B) between 11 and 23 hours per week
C) between 8 and 26 hours per week
D) less than 14 and more than 20 hours per week

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

30) The following data represent the scores of 50 students on a statistics exam. The mean score is 80.02, and the standard deviation is 11.9. 30) _____

39	51	59	63	66	68	68	69	70	71
71	71	73	74	76	76	76	77	78	79
79	79	79	80	80	82	83	83	83	85
85	86	86	88	88	88	88	89	89	89
90	90	91	91	92	95	96	97	97	98

What percentage of the scores lies within one standard deviation of the mean? two standard deviations of the mean? three standard deviations of the mean? Based on these percentages, do you believe that the distribution of scores is mound-shaped and symmetric? Explain.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

31) At the U.S. Open Tennis Championship a statistician keeps track of every serve that a player hits during the tournament. The statistician reported that the mean serve speed was 100 miles per hour (mph) and the standard deviation of the serve speeds was 15 mph. If nothing is known about the shape of the distribution, what percentage of the player's serve speeds are less than 70 mph? 31) _____

A) at most 25%
B) at most 11%
C) at most 12.5%
D) approximately 5%
E) approximately 2.5%

32) If nothing is known about the shape of a distribution, what percentage of the observations fall within 2 standard deviations of the mean? 32) _____

A) at least 75%
B) approximately 5%
C) approximately 95%
D) at most 25%

33) Find the z-score for the value 88, when the mean is 70 and the standard deviation is 1. 33) _____

A) $z = -1.24$ B) $z = 1.24$ C) $z = 18.00$ D) $z = 17.00$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

34) A study was designed to investigate the effects of two variables — (1) a student's level of mathematical anxiety and (2) teaching method — on a student's achievement in a mathematics course. Students who had a low level of mathematical anxiety were taught using the traditional expository method. These students obtained a mean score of 310 and a standard deviation of 50 on a standardized test. Find and interpret the z-score of a student who scored 490 on the standardized test. 34) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Answer the question True or False.

35) If a z-score is 0 or near 0, the measurement is located at or near the mean. 35) _____

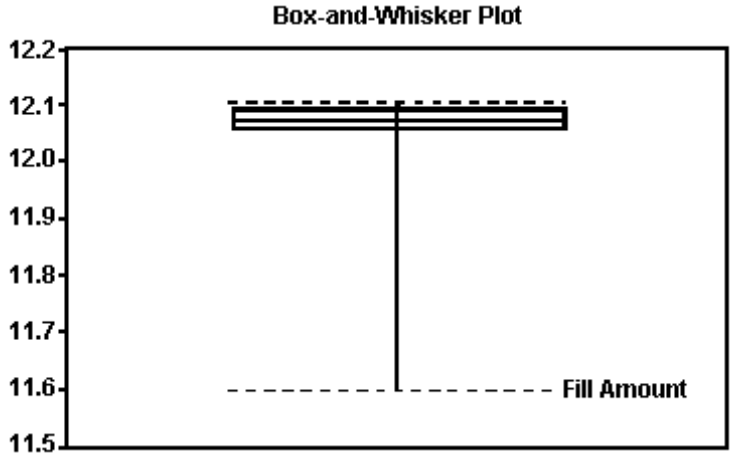
A) True
B) False

36) According to the empirical rule, z-scores of less than -3 or greater than 3 occur very infrequently for data from a mounded and symmetric distribution 36) _____

A) True
B) False

Solve the problem.

37) The box plot shown below displays the amount of soda that was poured by a filling machine into 12-ounce soda cans at a local bottling company. 37) _____



Based on the box plot, what shape do you believe the distribution of the data to have?

A) skewed to the right
B) approximately symmetric
C) skewed to the left
D) skewed to the center

38) Which of the following assignments of probabilities to the sample points A, B, and C is valid if A, B, and C are the only sample points in the experiment? 38) _____

A) $P(A) = \frac{1}{10}, P(B) = \frac{1}{10}, P(C) = \frac{1}{10}$

B) $P(A) = \frac{1}{5}, P(B) = \frac{1}{9}, P(C) = \frac{1}{6}$

C) $P(A) = -\frac{1}{4}, P(B) = \frac{1}{2}, P(C) = \frac{3}{4}$

D) $P(A) = 0, P(B) = \frac{1}{9}, P(C) = \frac{8}{9}$

39) A bag of candy was opened and the number of pieces was counted. The results are shown in the table below: 39) _____

Color	Number
Red	25
Brown	20
Green	20
Blue	15
Yellow	10
Orange	10

Find the probability that a randomly chosen piece of candy is not blue or red.

A) 0.60
B) 0.85
C) 0.40
D) 0.15

40) A bag of colored candies contains 20 red, 25 yellow, and 35 orange candies. An experiment consists of randomly choosing one candy from the bag and recording its color. What is the sample space for this experiment? 40) _____

A) {80}
B) {red, yellow, orange}
C) {20, 25, 35}
D) {1/4, 5/16, 7/16}

Answer the question True or False.

41) The probability of an event can be calculated by finding the sum of the probabilities of the individual sample points in the event and dividing by the number of sample points in the event. 41) _____

A) True B) False

Solve the problem.

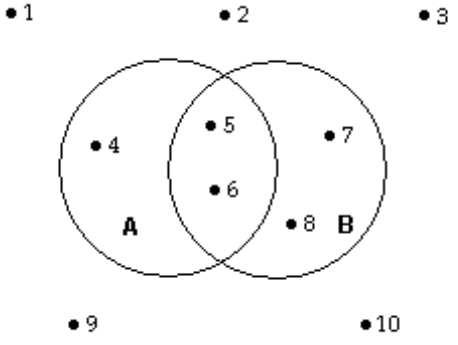
42) An experiment consists of randomly choosing a number between 1 and 10. Let E be the event that the number chosen is even. List the sample points in E. 42) _____

A) {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
B) {1, 3, 5, 7, 9}
C) {5}
D) {2, 4, 6, 8, 10}

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

43) A package of self-sticking notepads contains 6 yellow, 6 blue, 6 green, and 6 pink notepads. An experiment consists of randomly selecting one of the notepads and recording its color. Find the sample space for the experiment. 43) _____

44) The accompanying Venn diagram describes the sample space of a particular experiment and events A and B. Suppose $P(1) = P(2) = P(3) = P(4) = \frac{1}{16}$ and $P(5) = P(6) = P(7) = P(8) = P(9) = P(10) = \frac{1}{8}$. Find $P(A)$ and $P(B)$. 44) _____



MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

45) Probabilities of different types of vehicle-to-vehicle accidents are shown below: 45) _____

Accident	Probability
Car to Car	0.59
Car to Truck	0.14
Truck to Truck	0.27

Find the probability that an accident involves a car.

A) 0.14 B) 0.73 C) 0.59 D) 0.27

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

46) The manager of a warehouse club estimates that 7 out of 10 customers will donate a dollar to help a children's hospital during an annual drive to benefit the hospital. Using the manager's estimate, what is the probability that a randomly selected customer will donate a dollar? 46) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

47) A music store has 8 male and 12 female employees. Suppose one employee is selected at random and the employee's gender is observed. List the sample points for this experiment, and assign probabilities to the sample points. 47) _____

A) {male, female}; P(male) = .8 and P(female) = .12
B) {8, 12}; P(8) = .8 and P(12) = .12
C) {male, female}; P(male) = .4 and P(female) = .6
D) {8, 12}; P(8) = .5 and P(12) = .6

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

48) Two chips are drawn at random and without replacement from a bag containing three blue chips and one red chip. 48) _____

a. List the sample points for this experiment.
b. Assign probabilities to the sample points.
c. Find the probability of the event A = {Two blue chips are drawn}.
d. Find the probability of the event B = {A blue chip and a red chip are drawn}.
e. Find the probability of the event C = {Two red chips are drawn}.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Compute.

49) $\binom{10}{4}$ 49) _____

A) 6 B) 34 C) 5040 D) 210

Solve the problem.

50) There are 10 movies that Greg would like to rent but the store only allows him to have 4 movies at one time. In how many ways can Greg choose 4 of the 10 movies? 50) _____

A) 10,000 B) 5040 C) 210 D) 40

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

51) In how many ways can a manager choose 3 of his 8 employees to work overtime helping with inventory? 51) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

52) A number between 1 and 10, inclusive, is randomly chosen. Events A and B are defined as follows. 52) _____

A: {The number is even}
B: {The number is less than 7}

Which expression represents the event that the number is even or less than 7 or both?

A) B^C B) $A \cap B$ C) A^C D) $A \cup B$

53) A number between 1 and 10, inclusive, is randomly chosen. Events A and B are defined as follows. 53) _____

A: {The number is even}
B: {The number is less than 7}

Identify the sample points in the event $A \cap B$.

A) {1, 2, 3, 4, 5, 6, 8, 10} B) {1, 2, 3, 4, 5, 6, 7, 8, 10}
C) {1, 2, 3, 4, 5, 6, 7, 9} D) {2, 4, 6}

54) Fill in the blank. The _____ of two events A and B is the event that either A or B or both occur. 54) _____

A) complement B) intersection C) Venn diagram D) union

55) Fill in the blank. The _____ of two events A and B is the event that both A and B occur. 55) _____

A) union B) complement C) Venn diagram D) intersection

56) The overnight shipping business has skyrocketed in the last ten years. The single greatest predictor of a company's success is customer service. A study was conducted to determine the customer satisfaction levels for one overnight shipping business. In addition to the customer's satisfaction level, the customers were asked how often they used overnight shipping. The results are shown in the following table: 56) _____

	Satisfaction level			
Frequency of Use	High	Medium	Low	TOTAL
< 2 per month	250	140	10	400
2 - 5 per month	140	55	5	200
> 5 per month	70	25	5	100
TOTAL	460	220	20	700

Suppose that one customer who participated in the study is chosen at random. What is the probability that the customer had a high level of satisfaction and used the company more than five times per month?

A) $\frac{1}{10}$ B) $\frac{4}{5}$ C) $\frac{3}{10}$ D) $\frac{7}{10}$

57) Four hundred accidents that occurred on a Saturday night were analyzed. The number of vehicles involved and whether alcohol played a role in the accident were recorded. The results are shown below: 57) _____

	Number of Vehicles Involved			
Did Alcohol Play a Role?	1	2	3 or more	Totals
Yes	59	99	12	170
No	22	177	31	230
Totals	81	276	43	400

Suppose that one of the 400 accidents is chosen at random. What is the probability that the accident involved more than a single vehicle?

A) $\frac{319}{400}$ B) $\frac{81}{400}$ C) $\frac{43}{400}$ D) $\frac{3}{100}$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

58) Suppose that an experiment has five sample points, E_1, E_2, E_3, E_4, E_5, and that $P(E_1) = .2$, $P(E_2) = .3$, $P(E_3) = .1$, $P(E_4) = .1$, and $P(E_5) = .3$. If the events A and B are defined as $A = \{E_1, E_2, E_3\}$ and $B = \{E_2, E_3, E_4\}$ find $P(A \cap B)$. 58) _____

59) A pair of fair dice is tossed. Events A and B are defined as follows. 59) _____

A: {The sum of the numbers on the dice is 6}
B: {At least one of the numbers 3}

a. Identify the sample points in the event $A \cup B$.
b. Identify the sample points in the event $A \cap B$.
c. Find $P(A \cup B)$.
d. Find $P(A \cap B)$.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

60) A state energy agency mailed questionnaires on energy conservation to 1,000 homeowners in the state capital. Five hundred questionnaires were returned. Suppose an experiment consists of randomly selecting one of the returned questionnaires. Consider the events: 60) _____

A: {The home is constructed of brick}
B: {The home is more than 30 years old}

In terms of A and B, describe a home that is constructed of brick and is less than or equal to 30 years old.

A) $A \cap B$ B) $A \cup B$ C) $A \cap B^c$ D) $(A \cap B)^c$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

61) A fair die is rolled one time. Let B be the event {1, 2, 5}. List the sample points in the event B^c. 61) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Answer the question True or False.

62) If an event A includes the entire sample space, then $P(A^C) = 0$. 62) _____

A) True B) False

Solve the problem.

63) The table shows the political affiliations and types of jobs for workers in a particular state. Suppose a worker is selected at random within the state and the worker's political affiliation and type of job are noted. 63) _____

		Political Affiliation		
		Republican	Democrat	Independent
Type of job	White collar	19%	14%	15%
	Blue Collar	12%	9%	31%

Find the probability the worker is not an Independent.

A) 0.21 B) 0.54 C) 0.33 D) 0.46

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

64) Two chips are drawn at random and without replacement from a bag containing two blue chips and two red chips. Event A is defined as follows. 64) _____

A: {Both chips are red}

a. Describe the event A^C.
b. Identify the sample points in the event A^C.
c. Find $P(A^C)$.

65) Two chips are drawn at random and without replacement from a bag containing two blue chips and two red chips. Events A and B are defined as follows. 65) _____

A: {Both chips are red}
B: {At least one of the chips is blue}

Are the events A and B mutually exclusive? Explain.

66) A number between 1 and 10, inclusive, is randomly chosen. Events A, B, C, and D are defined as follows. 66) _____

A: {The number is even}
B: {The number is less than 7}
C: {The number is odd}
D: {The number is greater than 5}

Identify one pair of mutually exclusive events.

67) The table shows the number of each Ford car sold in the United States in June. Suppose the sales record for one of these cars is randomly selected and the type of car is identified. 67) _____

Type of Car	Number
Sedan	7,204
Convertible	9,089
Wagon	20,418
SUV	13,691
Van	15,837
Hatchback	15,350
Total	81,589

Events *A* and *B* are defined as follows.

A: {Convertible, SUV, Van}
B: {Fewer than 10,000 of the type of car were sold in June}

Is $P(A \cup B)$ equal to the sum of $P(A)$ and $P(B)$? Explain.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Answer the question True or False.

68) If events *A* and *B* are not mutually exclusive, then it is possible that $P(A) + P(B) > 1$. 68) _____
A) True B) False

69) An event and its complement are mutually exclusive. 69) _____
A) True B) False

Solve the problem.

70) In a class of 40 students, 22 are women, 10 are earning an A, and 7 are women that are earning an A. If a student is randomly selected from the class, find the probability that the student is a woman given that the student is earning an A. 70) _____
A) $\frac{11}{20}$ B) $\frac{5}{11}$ C) $\frac{7}{22}$ D) $\frac{7}{10}$

71) The table shows the political affiliations and types of jobs for workers in a particular state. Suppose a worker is selected at random within the state and the worker's political affiliation and type of job are noted. 71) _____

		Political Affiliation		
		Republican	Democrat	Independent
Type of job	White collar	10%	19%	12%
	Blue Collar	9%	15%	35%

Given that the worker is a Democrat, what is the probability that the worker has a white collar job.
A) 0.339 B) 0.559 C) 0.463 D) 0.607

72) For two events, A and B, $P(A) = \frac{1}{2}$, $P(B) = \frac{1}{3}$, and $P(A \cap B) = \frac{1}{4}$. Find $P(B \mid A)$. 72) _____

A) $\frac{1}{2}$ B) $\frac{3}{4}$ C) $\frac{1}{12}$ D) $\frac{1}{8}$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

73) A pair of fair dice is tossed. Events A and B are defined as follows. 73) _____

A: {The sum of the dice is 7}
B: {At least one of the numbers is 3}

Find $P(A \mid B)$ and $P(B \mid A)$.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Answer the question True or False.

74) For any events A and B, $P(A \mid B) + P(A^C \mid B) = 1$, meaning given that B occurs either A occurs or A does not occur. 74) _____

A) True B) False

Solve the problem.

75) Suppose that for a certain experiment $P(B) = 0.5$ and $P(A \mid B) = 0.2$. Find $P(A \cap B)$. 75) _____

A) 0.4 B) 0.1 C) 0.7 D) 0.3

76) A human gene carries a certain disease from a mother to her child with a probability rate of 0.33. That is, there is a 33% chance that the child becomes infected with the disease. Suppose a female carrier of the gene has three children. Assume that the infections, or lack thereof, are independent of one another. Find the probability that all three of the children get the disease from their mother. 76) _____

A) 0.301 B) 0.036 C) 0.964 D) 0.148

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

77) An exit poll during a recent election revealed that 55% of those voting were women and that 65% of the women voting favored Democratic candidates. What is the probability that a randomly chosen participant of the exit poll would be a woman who favored Democratic candidates? 77) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

78) A number between 1 and 10, inclusive, is randomly chosen. Events A, B, C, and D are defined as follows. 78) _____

A: {The number is even}
B: {The number is less than 7}
C: {The number is less than or equal to 7}
D: {The number is 5}

Identify one pair of independent events.

A) A and B B) B and D C) A and D D) A and C

79) Classify the events as dependent or independent: Events A and B where $P(A) = 0.3$, $P(B) = 0.4$, and $P(A \text{ and } B) = 0.12$. 79) _____

A) independent B) dependent

80) A basketball player has an 80% chance of making the first free-throw he shoots. If he makes the first free-throw shot, then he has a 90% chance of making the second free-throw he shoots. If he misses the first free-throw shot, then he only has a 70% chance of making the second free-throw he shoots. Suppose this player has been awarded two free-throw shots. Are the events, A - the player makes the first shot, and B - the player makes the second shot, independent events? 80) _____

A) Yes B) No

Answer the question True or False.

81) If A and B,are independent events, then $P(A) = P(B \mid A)$. 81) _____

A) True B) False

Solve the problem.

82) The school newspaper surveyed 100 commuter students and asked two questions. First, students were asked how many courses they were currently enrolled in. Second, the commuter students were asked to estimate how long it took them to drive to campus. Considering these two variables, number of courses would best be considered a _____ variable and drive time would be considered a _____ variable. 82) _____

A) discrete; discrete B) continuous; discrete

C) continuous; continuous D) discrete; continuous

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

83) A bottle contains 16 ounces of water. The variable x represents the volume, in ounces, of water remaining in the bottle after the first drink is taken. What are the natural bounds for the values of x? Is x discrete or continuous? Explain. 83) _____

84) A coin is flipped 6 times. The variable x represents the number of tails obtained. List the possible values of x. Is x discrete or continuous? Explain. 84) _____

85) Explain why the following is or is not a valid probability distribution for the discrete random variable x. 85) _____

x	10	20	30	40	50
$p(x)$	.3	.2	.2	.2	.2

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

86) Consider the given discrete probability distribution. Find $P(x \le 4)$. 86) _____

x	0	1	2	3	4	5
$p(x)$	.30	.25	.20	.15	.05	.05

A) .05 B) .95 C) .90 D) .10

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

87) Consider the given discrete probability distribution. Find $P(x < 2 \text{ or } x > 3)$. 87) _____

x	1	2	3	4	5
$p(x)$	.1	.2	.2	.3	.2

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

88) A local bakery has determined a probability distribution for the number of cheesecakes it sells in a given day. The distribution is as follows: 88) _____

Number sold in a day	0	5	10	15	20
Prob (Number sold)	0.06	0.2	0.13	0.08	0.53

Find the number of cheesecakes that this local bakery expects to sell in a day.

A) 10 B) 20 C) 14.1 D) 14.16

Answer the question True or False.

89) The expected value of a discrete random variable must be one of the values in which the random variable can result. 89) _____

A) True B) False

Solve the problem.

90) A discrete random variable x can assume five possible values: 2, 3, 5, 8, 10. Its probability distribution is shown below. Find the standard deviation of the distribution. 90) _____

x	2	3	5	8	10
p(x)	0.10	0.20	0.30	0.30	0.10

A) 5.7 B) 6.41 C) 1.845 D) 2.532

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

91) Find the mean and standard deviation of the probability distribution for the random variable x, which represents the number of cars per household in a small town. 91) _____

x	$P(x)$
0	.125
1	.428
2	.256
3	.108
4	.083

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

92) For a binomial distribution, which probability is *not* equal to the probability of 1 success in 5 trials where the probability of success is .4? 92) _____
A) the probability of 4 failures in 5 trials where the probability of failure is .6
B) the probability of 4 failures in 5 trials where the probability of success is .4
C) the probability of 4 failures in 5 trials where the probability of success is .6
D) the probability of 1 success in 5 trials where the probability of failure is .6

93) A recent study suggested that 70% of all eligible voters will vote in the next presidential election. Suppose 20 eligible voters were randomly selected from the population of all eligible voters. Which of the following is necessary for this problem to be analyzed using the binomial random variable? 93) _____

I. There are two outcomes possible for each of the 20 voters sampled.
II. The outcomes of the 20 voters must be considered independent of one another.
III. The probability a voter will actually vote is 0.70, the probability they won't is 0.30.
A) I only B) I, II, and III C) III only D) II only

Answer the question True or False.

94) A binomial random variable is defined to be the number of units sampled until *x* successes is observed. 94) _____
A) True B) False

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Solve the problem.

95) For a binomial distribution, if the probability of success is .48 on the first trial, what is the probability of failure on the second trial? 95) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

96) We believe that 95% of the population of all Business Statistics students consider statistics to be an exciting subject. Suppose we randomly and independently selected 21 students from the population. If the true percentage is really 95%, find the probability of observing 20 or more students who consider statistics to be an exciting subject. Round to six decimal places. 96) _____
A) 0.716972 B) 0.376410 C) 0.283028 D) 0.340562

97) It a recent study of college students indicated that 30% of all college students had at least one tattoo. A small private college decided to randomly and independently sample 15 of their students and ask if they have a tattoo. Use a binomial probability table to find the probability that exactly 5 of the students reported that they did have at least one tattoo. 97) _____
A) 0.515 B) 0.722 C) 0.207 D) 0.218

98) The probability that an individual is left-handed is 0.13. In a class of 70 students, what is the mean and standard deviation of the number of left-handed students? Round to the nearest hundredth when necessary. 98) _____
A) mean: 70; standard deviation: 2.81 B) mean: 9.1; standard deviation: 3.02
C) mean: 70; standard deviation: 3.02 D) mean: 9.1; standard deviation: 2.81

99) A recent study suggested that 70% of all eligible voters will vote in the next presidential election. Suppose 20 eligible voters were randomly selected from the population of all eligible voters. How many of the sampled voters do we expect to vote in the next presidential election? 99) _____

A) 0.3 B) 6 C) 14 D) 0.7

100) It a recent study of college students indicated that 30% of all college students had at least one tattoo. A small private college decided to randomly and independently sample 15 of their students and ask if they have a tattoo. Find the standard deviation for this binomial random variable. Round to the nearest hundredth when necessary. 100) _____

A) 4.5 B) 3.15 C) 1.77 D) 10.5

Answer the question True or False.

101) The total area under a probability distribution equals 1. 101) _____

A) True B) False

102) For any continuous probability distribution, $P(x = c) = 0$ for all values of c. 102) _____

A) True B) False

103) For a continuous probability distribution, the probability that x is between a and b is the same regardless of whether or not you include the endpoints, a and b, of the interval. 103) _____

A) True B) False

Solve the problem.

104) Use the standard normal distribution to find $P(0 < z < 2.25)$. 104) _____

A) .7888 B) .4878 C) .8817 D) .5122

105) Use the standard normal distribution to find $P(-2.50 < z < 1.50)$. 105) _____

A) .6167 B) .5496 C) .8822 D) .9270

106) Find a value of the standard normal random variable z, called z_0, such that $P(-z_0 \le z \le z_0) = 0.98$. 106) _____

A) 1.645 B) 2.33 C) 1.96 D) .99

107) For a standard normal random variable, find the probability that z exceeds the value -1.65. 107) _____

A) 0.0495 B) 0.9505 C) 0.5495 D) 0.4505

108) The weight of corn chips dispensed into a 48-ounce bag by the dispensing machine has been identified as possessing a normal distribution with a mean of 48.5 ounces and a standard deviation of 0.2 ounce. What proportion of the 48-ounce bags contain more than the advertised 48 ounces of chips? 108) _____

A) .5062 B) .4938 C) .0062 D) .9938

109) Before a new phone system was installed, the amount a company spent on personal calls followed a normal distribution with an average of $900 per month and a standard deviation of $50 per month. Refer to such expenses as PCE's (personal call expenses). Using the distribution above, what is the probability that during a randomly selected month PCE's were between $775.00 and $990.00? 109) _____

A) .0001 B) .0421 C) .9999 D) .9579

110) The tread life of a particular brand of tire is a random variable best described by a normal distribution with a mean of 60,000 miles and a standard deviation of 2500 miles. What is the probability a certain tire of this brand will last between 54,750 miles and 55,500 miles? 110) _____

A) .4920 B) .4649 C) .0180 D) .9813

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

111) The board of examiners that administers the real estate broker's examination in a certain state found that the mean score on the test was 513 and the standard deviation was 72. If the board wants to set the passing score so that only the best 80% of all applicants pass, what is the passing score? Assume that the scores are normally distributed. 111) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Answer the question True or False.

112) In most situations, the true mean and standard deviation are unknown quantities that have to be estimated. 112) _____

A) True B) False

113) A point estimator of a population parameter is a rule or formula which tells us how to use sample data to calculate a single number that can be used as an estimate of the population parameter. 113) _____

A) True B) False

Solve the problem.

114) The Central Limit Theorem states that the sampling distribution of the sample mean is approximately normal under certain conditions. Which of the following is a necessary condition for the Central Limit Theorem to be used? 114) _____

A) The population from which we are sampling must not be normally distributed.
B) The population from which we are sampling must be normally distributed.
C) The population size must be large (e.g., at least 30).
D) The sample size must be large (e.g., at least 30).

115) Which of the following statements about the sampling distribution of the sample mean is incorrect? 115) _____

A) The mean of the sampling distribution is μ.
B) The sampling distribution is generated by repeatedly taking samples of size n and computing the sample means.
C) The sampling distribution is approximately normal whenever the sample size is sufficiently large ($n \geq 30$).
D) The standard deviation of the sampling distribution is σ.

116) Which of the following does the Central Limit Theorem allow us to disregard when working with the sampling distribution of the sample mean? 116) _____

A) The mean of the population distribution.
B) The standard deviation of the population distribution.
C) The shape of the population distribution.
D) All of the above can be disregarded when the Central Limit Theorem is used.

117) The Central Limit Theorem is considered powerful in statistics because _____. 117) _____

A) it works for any population distribution provided the population mean is known
B) it works for any population distribution provided the sample size is sufficiently large
C) it works for any sample size provided the population is normal
D) it works for any sample provided the population distribution is known

Answer the question True or False.

118) As the sample size gets larger, the standard error of the sampling distribution of the sample mean gets larger as well. 118) _____

A) True B) False

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Solve the problem.

119) A random sample of size n is to be drawn from a population with $\mu = 700$ and $\sigma = 200$. What size sample would be necessary in order to reduce the standard error to 10? 119) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

120) The number of cars running a red light in a day, at a given intersection, possesses a distribution with a mean of 1.7 cars and a standard deviation of 5. The number of cars running the red light was observed on 100 randomly chosen days and the mean number of cars calculated. Describe the sampling distribution of the sample mean. 120) _____

A) shape unknown with mean = 1.7 and standard deviation = 0.5
B) shape unknown with mean = 1.7 and standard deviation = 5
C) approximately normal with mean = 1.7 and standard deviation = 5
D) approximately normal with mean = 1.7 and standard deviation = 0.5

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

121) Suppose a random sample of $n = 36$ measurements is selected from a population with mean $\mu = 256$ and variance $\sigma^2 = 144$. Find the mean and standard deviation of the sampling distribution of the sample mean $\bar{x}$. 121) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

122) The average score of all golfers for a particular course has a mean of 66 and a standard deviation of 3.5. Suppose 49 golfers played the course today. Find the probability that the average score of the 49 golfers exceeded 67. 122) _____

A) .1293 B) .4772 C) .3707 D) .0228

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

123) The weight of corn chips dispensed into a 10-ounce bag by the dispensing machine has been identified as possessing a normal distribution with a mean of 10.5 ounces and a standard deviation of .2 ounce. Suppose 100 bags of chips are randomly selected. Find the probability that the mean weight of these 100 bags exceeds 10.45 ounces. 123) _____

124) Suppose a random sample of $n = 64$ measurements is selected from a population with mean $\mu = 65$ and standard deviation $\sigma = 12$. Find the probability that $\bar{x}$ falls between 65.75 an 68.75. 124) _____

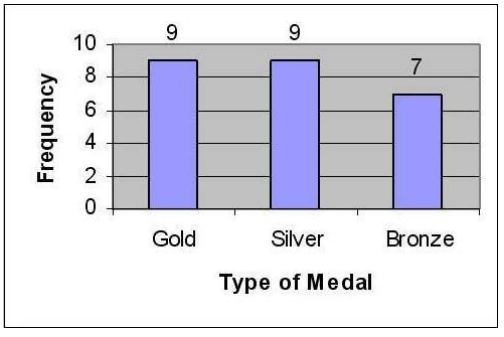
1) C
2) B
3) The variable of interest to the researcher is the failure rate of the copiers.
4) B
5) A
6) D
7) C
8) C
9) free account, institutional account, account paid for personally
10) A
11) a.

Medal	Frequency
Gold	9
Silver	9
Bronze	7

b.

Medal	Relative Frequency
Gold	.36
Silver	.36
Bronze	.28

c.



12) A
13) B

14) The mean of the data is $\bar{x} = \frac{\sum x}{n}$

$$\frac{71 + 63.7 + 54.5 + 54.1 + 28.5 + 25.9 + 24.6 + 23.1 + 23.6 + 19.8}{10}$$

$$= \frac{388.8}{10}$$

$= 38.88 \Rightarrow \$38.88$ million

The median is the average of the middle two observations.

$M = \frac{28.5 + 25.9}{2} = 27.20 \Rightarrow \$27.20$ million

15) B
16) C
17) D
18) B
19) B
20) D
21) B
22) B
23) range
24) A
25) B
26) A
27) B
28) C
29) B
30) 74% of the scores lie within one standard deviation of the mean, 96% within two standard deviations, and 98% within three standard deviations. These percentages are close to those given in the Empirical Rule, so the distribution is roughly mound-shaped and symmetric, though obviously skewed slightly to the left.
31) A
32) A
33) C
34) The z-score is $z = \frac{x - \mu}{\sigma}$.

For a score of 49, $z = \frac{490 - 310}{50} = 3.60$.

This student's score falls 3.60 standard deviations above the mean score of 310.
35) A
36) A
37) C
38) D
39) A
40) B
41) B
42) D
43) {yellow, blue, green, pink}
44) $P(A) = .3125$; $P(B) = .5$

45) B

46) $P(\text{donates a dollar}) = \frac{7}{10} = .7$

47) C

48) a. Let b_1, b_2, and b_3, represent the blue chips and r the red chip. The sample space is { b_1b_2, b_1b_3, b_1r, b_2b_3, b_2r, b_3r}.

b. Each sample point is assigned the probability $\frac{1}{6}$.

c. $P(A) = P(\{b_1b_2, b_1b_3, b_2b_3\}) = \frac{1}{6} + \frac{1}{6} + \frac{1}{6} = \frac{1}{2}$

d. $P(B) = P(\{b_1r, b_2r, b_3r\}) = \frac{1}{6} + \frac{1}{6} + \frac{1}{6} = \frac{1}{2}$

e. $P(C) = P(\varnothing) = 0$

49) D

50) C

51) $\binom{8}{3} = \frac{8!}{3!(8 - 3)!} = \frac{8!}{3!\ 5!} = 56$

52) D

53) D

54) D

55) D

56) A

57) A

58) $A \cap B = \{E_2, E_3\}$; $P(A \cap B) = P(E_2) + P(E_3) = .3 + .1 = .4$

59) a. {(1, 3), (1, 5), (2, 3), (2, 4), (3, 1), (3, 2), (3, 3), (3, 4), (3, 5) (3, 6)
(4, 2), (4, 3), (5, 1), (5, 3), (6, 3)}

b. {(3, 3)}

c. $P(A \cup B) = \frac{15}{36} = \frac{5}{12}$

d. $P(A \cap B) = \frac{1}{36}$

60) C

61) $B^c = \{3, 4, 6\}$

62) A

63) B

64) a. At least one chip is not red.

b. $\{b_1b_2, b_1r_1, b_1r_2, b_2r_1, b_2r_2\}$

c. $P(A^c) = \frac{5}{6}$

65) Yes, the events are mutually exclusive. If the chips are both red, then neither of the chips is blue, so the events have no sample points in common.

66) Events *A* and *C* are mutually exclusive since a number can not be both even and odd.

67) No, $P(A \cup B)$ is not equal to the sum of $P(A)$ and $P(B)$ because events *A* and *B* are not mutually exclusive.

68) A

69) A

70) D

71) B

72) A

73) $P(A \mid B) = \frac{P(A \cap B)}{P(B)} = \frac{2/36}{11/36} = \frac{2}{11}$; $P(B \mid A) = \frac{P(A \cap B)}{P(B)} = \frac{2/36}{6/36} = \frac{1}{3}$

74) A

75) B

76) B

77) P(woman and favored Democrats) = P(woman) P(favored Democrats | woman) = .55 × .65 = .3575

78) A

79) A

80) B

81) B

82) D

83) natural bounds for x: 0 ounces and 16 ounces; The variable x is continuous since the values of x correspond to the points in some interval.

84) possible values of x: {0, 1, 2, 3, 4, 5, 6}; The variable x is discrete since it has a finite number of distinct possible values.

85) This is not a valid probability distribution because the sum of the probabilities is greater than 1.

86) B

87) $P(x < 2 \text{ or } x > 3) = p(x = 1) + p(x = 4) + p(x = 5) = .1 + 03 + .2 = .6$

88) C

89) B

90) D

91) $\mu = 1.596$; $\sigma = 1.098$

92) C

93) B

94) B

95) Since the probability of success remains the same from trial to trial, the probability of success on the second trial is .48, so the probability of failure on the second trial is 1 - .48 = .52.

96) A

97) C

98) D

99) C

100) C

101) A

102) A

103) A

104) B

105) D

106) B

107) B

108) D

109) D

110) C

111) Let x be a score on this exam. Then x is a normally distributed random variable with $\mu = 513$ and $\sigma = 72$. We want to find the value of x_0, such that $P(x > x_0) = .80$. The z-score for the value $x = x_0$ is

$$z = \frac{x_0 - \mu}{\sigma} = \frac{x_0 - 513}{72}.$$

$$P(x > x_0) = P\left(z > \frac{x_2 - 513}{72}\right) = .80$$

We find $\frac{x_0 - 513}{72} \approx -.84$.

$x_0 - 513 = -.84(72) \Rightarrow x_0 = 513 - .84(72) = 452.52$

112) A
113) A
114) D
115) D
116) C
117) B
118) B

119) The standard error is $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$. If the standard error is desired to be 10, we get:

$$10 = \sigma/\sqrt{n} = \frac{200}{\sqrt{n}} \Rightarrow \sqrt{n} \cdot 10 = 200 \Rightarrow \sqrt{n} = \frac{200}{10} = 20 \Rightarrow n = 400$$

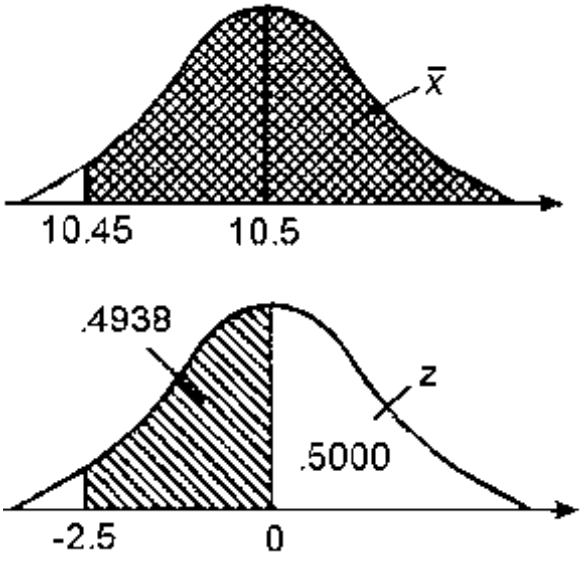
120) D

121) $\mu_{\bar{x}} = \mu = 256$; $\sigma_{\bar{x}} = \frac{\sqrt{144}}{\sqrt{36}} = \frac{12}{6} = 2$

122) D

123) $P(\bar{x} > 10.45) = P\left[z > \dfrac{10.45 - 10.50}{.2/\sqrt{100}}\right]$

$= P(z > -2.5) = .5 + .4938 = .9938$



124) $P(65.75 \le \bar{x} \le 68.75) = P(.5 \le z \le 2.5) \approx .3023$