

Name _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. Each question is worth 3 points.

Answer the question.

1) A magazine publisher mails a survey to every subscriber asking about the timeliness of its subscription service. The publisher finds that only 3% of the subscribers responded. This 3% represents what? 1) _____

- A) The population B) The sample

2) Researchers are concerned that the weight of the average American school child is increasing, implying, among other things, that children's clothing should be manufactured and marketed in larger sizes. If X is the weight of school children sampled in a nationwide study, then X is an example of 2) _____

- A) a categorical random variable. B) a discrete random variable.
 C) a continuous random variable. D) a parameter.

Provide the requested table entry.

3) The data in the following table reflect the amount of time 40 students in a section of Statistics 101 spend on homework each day. Determine the value that should be entered in the relative frequency column for the class 30–44. 3) _____

Homework time (minutes)	Number of students	Relative frequency
0-14	2	
15-29	4	
30-44	10	
45-59	16	
60-74	6	
75-89	2	

- A) 0.25 B) 10 C) 10% D) 25%

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

4)

Stem	Leaves
8	5 8
9	1 8
10	5 5

4) _____

- A) 81, 88, 81, 98, 105, 105
 B) 85, 88, 91, 91, 105, 105
 C) 85, 81, 88, 91, 101, 105
 D) 81, 85, 81, 98, 108, 105
 E) 85, 88, 91, 98, 105, 105

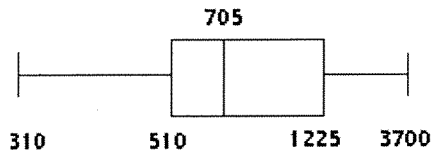
Construct and interpret a boxplot or a modified boxplot as specified.

8) The weekly salaries (in dollars) of 24 randomly selected employees of a company are shown below. Construct a boxplot for the data.

8) _____

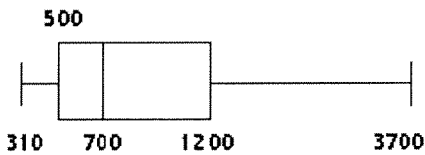
310 320 450 460 470 500 520 540
 580 600 650 700 710 840 870 900
 1000 1200 1250 1300 1400 1720 2500 3700

A)



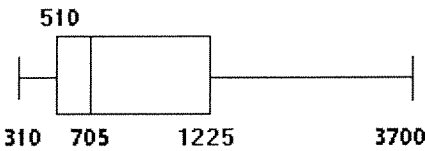
The data is fairly symmetrical.

B)



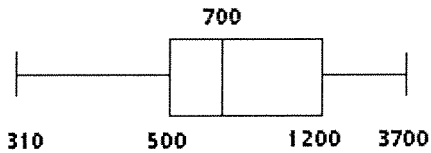
The data is highly right-skewed.

C)



The data is highly right-skewed.

D)



The data is fairly symmetrical.

Use the regression equation to predict the y-value corresponding to the given x-value. Round your answer to the nearest tenth.

9) The regression equation relating dexterity scores (x) and productivity scores (y) for ten randomly

9) _____

selected employees of a company is $\hat{y} = 5.50 + 1.91x$. Predict the productivity score for an employee whose dexterity score is 24.

A) 51.3

B) 56.3

C) 58.2

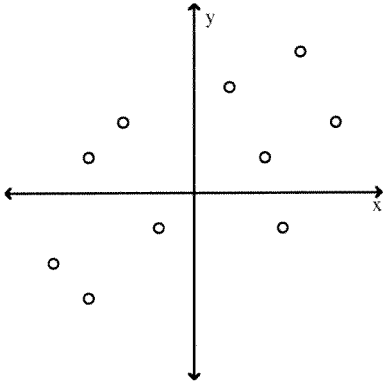
D) 133.9

Provide an appropriate response.

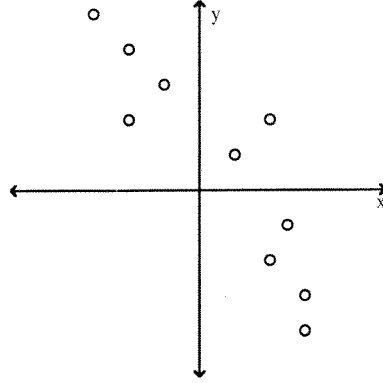
10) Determine which scatterplot shows the strongest linear correlation.

10) _____

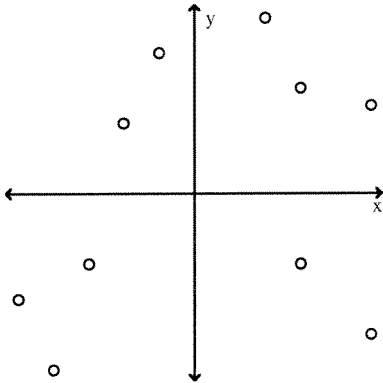
A)



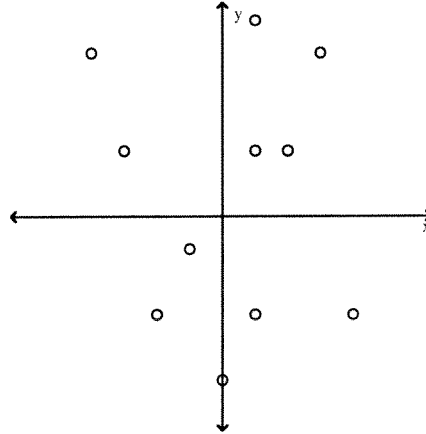
B)



C)



D)



11) Which of the following statements concerning the linear correlation coefficient are true?

11) _____

A: If the linear correlation coefficient for two variables is zero, then there is no relationship between the variables.

B: If the slope of the regression line is negative, then the linear correlation coefficient is negative.

C: The value of the linear correlation coefficient always lies between -1 and 1.

D: A linear correlation coefficient of 0.62 suggests a stronger linear relationship than a linear correlation coefficient of -0.82.

A) B and C

B) C and D

C) A and B

D) A and D

Find the indicated probability.

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

12) _____

A) $\frac{3}{4}$

B) $\frac{1}{4}$

C) $\frac{1}{2}$

D) $\frac{7}{8}$

Find the indicated probability by using the general addition rule.

- 13) For a person selected randomly from a certain population, events A and B are defined as follows. 13) _____

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

For this particular population, it is found that $P(A) = 0.50$, $P(B) = 0.21$, and $P(A \& B) = 0.15$. Find $P(A \text{ or } B)$. Round approximations to two decimal places.

- A) 0.56 B) 0.71 C) 0.41 D) 0.86

- 14) Let A and B be events such that $P(A) = \frac{2}{9}$, $P(B) = \frac{5}{36}$, and $P(A \text{ or } B) = \frac{19}{72}$. 14) _____

Determine $P(A \& B)$.

- A) $\frac{5}{8}$ B) $\frac{7}{72}$ C) $\frac{5}{162}$ D) $\frac{13}{36}$

Find the specified probability.

- 15) The number of loaves of rye bread left on the shelf of a local bakery at closing (denoted by the random variable X) varies from day to day. Past records show that the probability distribution of X is as shown in the following table. Find the probability that there will be at least three loaves left over at the end of any given day. 15) _____

x	0	1	2	3	4	5	6
$P(X = x)$	0.20	0.25	0.20	0.15	0.10	0.08	0.02

- A) 0.35 B) 0.65 C) 0.15 D) 0.20

Use a table of areas for the standard normal curve to find the required z-score.

- 16) Find the z-score for which the area under the standard normal curve to its left is 0.04. 16) _____
- A) -1.48 B) -1.63 C) -1.89 D) -1.75

Find the indicated probability or percentage for the normally distributed variable.

- 17) A bank's loan officer rates applicants for credit. The ratings are normally distributed with a mean of 200 and a standard deviation of 50. If an applicant is randomly selected, find the probability of a rating that is between 170 and 220. 17) _____

- A) 0.1554 B) 0.3811 C) 0.0703 D) 0.2257

Use a table of areas to find the specified area under the standard normal curve.

- 18) The area that lies either to the left of -2.61 or to the right of 0.66 18) _____
- A) 0.2591 B) 0.7409 C) 1.2501 D) 0.7499

Identify the distribution of the sample mean. In particular, state whether the distribution of \bar{x} is normal or approximately normal and give its mean and standard deviation.

- 19) The heights of people in a certain population are normally distributed with a mean of 68 inches and a standard deviation of 3.1 inches. Determine the sampling distribution of the mean for samples of size 44. 19) _____

- A) Normal, mean = 68 inches, standard deviation = 0.07 inches
 B) Approximately normal, mean = 68 inches, standard deviation = 0.07 inches
 C) Normal, mean = 68 inches, standard deviation = 3.1 inches
 D) Normal, mean = 68 inches, standard deviation = 0.47 inches

Find the indicated probability or percentage for the sampling error.

- 20) The monthly expenditures on food by single adults in one city are normally distributed with a mean of \$410 and a standard deviation of \$70. What is the probability that the sampling error made in estimating the mean monthly expenditure of all single adults in that city by the mean of a random sample of 90 such adults will be at most \$10? 20) _____
- A) 0.9131 B) 0.8262 C) 0.9990 D) 0.1114

Solve the problem.

- 21) A sample of 80 college students yields a mean annual income of \$3673. Assuming that $\sigma = \$812$, find the margin of error in estimating μ at the 99% level of confidence. 21) _____
- A) \$178 B) \$212 C) \$234 D) \$1057

Find the necessary sample size.

- 22) Weights of women in one age group are normally distributed with a standard deviation σ of 14 lb. A researcher wishes to estimate the mean weight of all women in this age group. Find how large a sample must be drawn in order to be 90 percent confident that the sample mean will not differ from the population mean by more than 3.9 lb. 22) _____
- A) 50 B) 33 C) 35 D) 36

Find the confidence interval specified. Assume that the population is normally distributed.

- 23) A savings and loan association needs information concerning the checking account balances of its local customers. A random sample of 14 accounts was checked and yielded a mean balance of \$664.14 and a standard deviation of \$297.29. Find a 90% confidence interval for the true mean checking account balance for local customers. 23) _____
- A) \$493.71 to \$834.57 B) \$455.65 to \$872.63
C) \$523.43 to \$804.85 D) \$492.52 to \$835.76

Provide an appropriate response.

- 24) Suppose you have obtained a 95% confidence interval for μ . Which of the following statements is/are true regarding the relationship between precision and confidence level? Assume that the sample size is fixed. 24) _____
- I. Increasing the confidence level to 99% will result in a narrower interval.
II. Decreasing the confidence level to 90% will result in greater precision.
III. Decreasing the precision will result in a higher confidence level.
IV. Increasing the precision will result in a higher confidence level.
- A) I and IV B) II and IV C) I and III D) II and III

Find the confidence interval specified.

- 25) A laboratory tested 70 chicken eggs and found that the mean amount of cholesterol was 190 milligrams. Assume that $\sigma = 16.4$ milligrams. Construct a 95% confidence interval for the true mean cholesterol content, μ , of all such eggs. 25) _____
- A) 186.8 to 193.2 milligrams B) 186.2 to 193.8 milligrams
C) 184.9 to 195.1 milligrams D) 185.4 to 194.6 milligrams

A hypothesis test is to be performed. Determine the null and alternative hypotheses.

- 26) The manufacturer of a refrigerator system for beer kegs produces refrigerators that are supposed to maintain a mean temperature, μ , of 45°F, ideal for a certain type of German pilsner. The owner of the brewery does not agree with the refrigerator manufacturer, and wants to conduct a hypothesis test to determine whether the true mean temperature differs from this value. 26) _____
- A) $H_0 : \mu = 45^\circ\text{F}$ B) $H_0 : \mu \leq 45^\circ\text{F}$ C) $H_0 : \mu \neq 45^\circ\text{F}$ D) $H_0 : \mu \geq 45^\circ\text{F}$
 $H_a : \mu \neq 45^\circ\text{F}$ $H_a : \mu > 45^\circ\text{F}$ $H_a : \mu = 45^\circ\text{F}$ $H_a : \mu < 45^\circ\text{F}$

For the given hypothesis test, explain the meaning of a Type I error, a Type II error, or a correct decision as specified.

- 27) The maximum acceptable level of a certain toxic chemical in vegetables has been set at 0.4 parts per million (ppm). A consumer health group measured the level of the chemical in a random sample of tomatoes obtained from one producer to determine whether the mean level of the chemical in these tomatoes exceeds the recommended limit. 27) _____
- The hypotheses are
 $H_0 : \mu = 0.4$ ppm
 $H_a : \mu > 0.4$ ppm
- where μ is the mean level of the chemical in tomatoes from this producer. Explain the meaning of a Type I error.
- A) A Type I error would occur if, in fact, $\mu = 0.4$ ppm, but the results of the sampling lead to the conclusion that $\mu > 0.4$ ppm
B) A Type I error would occur if, in fact, $\mu = 0.4$ ppm, but the results of the sampling fail to lead to rejection of that fact.
C) A Type I error would occur if, in fact, $\mu > 0.4$ ppm, but the results of the sampling fail to lead to that conclusion.
D) A Type I error would occur if, in fact, $\mu > 0.4$ ppm, and the results of the sampling lead to rejection of the null hypothesis that $\mu = 0.4$ ppm.

A sample mean, sample standard deviation, and sample size are given. Use the one-mean t-test to perform the required hypothesis test about the mean, μ , of the population from which the sample was drawn. Use the critical-value approach.

- 28) $\bar{x} = 3.16$, $s = 0.51$, $n = 9$, $H_0 : \mu = 2.85$, $H_a : \mu > 2.85$, $\alpha = 0.01$ 28) _____
- A) Test statistic: $t = 1.82$. Critical value: $t = 2.896$. Do not reject H_0 . There is not sufficient evidence to support the claim that the mean is greater than 2.85.
B) Test statistic: $t = 1.82$. Critical value: $t = 2.896$. Reject H_0 . There is sufficient evidence to support the claim that the mean is greater than 2.85.
C) Test statistic: $t = 1.82$. Critical value: $t = 2.821$. Do not reject H_0 . There is not sufficient evidence to support the claim that the mean is greater than 2.85.
D) Test statistic: $t = 1.82$. Critical value: $t = 2.33$. Do not reject H_0 . There is not sufficient evidence to support the claim that the mean is greater than 2.85.

A sample mean, sample size, and population standard deviation are given. Use the one-mean z-test to perform the required hypothesis test at the given significance level. Use the P-value approach.

- 29) $\bar{x} = 21$, $n = 18$, $\sigma = 7$, $H_0 : \mu = 24$, $H_a : \mu < 24$, $\alpha = 0.05$ 29) _____
- A) $z = -1.82$; P-value = 0.0344; reject H_0
B) $z = -0.43$; P-value = 0.3336; do not reject H_0
C) $z = -0.43$; P-value = 0.0336; reject H_0
D) $z = -1.82$; P-value = 0.0688; do not reject H_0

Solve the problem.

- 30) A researcher wants to perform a hypothesis test to determine whether the mean length of marriages in California differs from the mean length of marriages in Texas. Identify the variable for the proposed hypothesis test. 30) _____
- A) Percent of marriages ending in divorce
 - B) Length of marriage
 - C) Difference between mean length of marriages in California and mean length of marriages in Texas
 - D) State
- 31) A researcher wants to perform a hypothesis test to determine whether the mean length of marriages in California differs from the mean length of marriages in Texas. Identify the two populations for the proposed hypothesis test. 31) _____
- A) Lengths of California marriages and lengths of Texas marriages
 - B) Adults living in California and adults living in Texas
 - C) Marriages in California and marriages in Texas
 - D) Married men and married women
- 32) A variable of two populations has a mean of 11 and a standard deviation of 8 for one of the populations and a mean of 48 and a standard deviation of 6 for the other population. For independent samples of sizes 14 and 20, respectively, **find the standard deviation of $\bar{x}_1 - \bar{x}_2$** . 32) _____
Round your answer to the nearest hundredth.
- A) 0.93 B) 1.66 C) 2.52 D) 6.37

FREE RESPONSE. Answer each question in your blue book. Work must be shown to receive credit. Each question is worth 10 points.

- 33) The weights of five players on a football team are shown below. 33) _____

Player	A	B	C	D	E
Weight (lb)	290	310	250	255	220

Consider these players to be a population of interest. The mean weight, μ , for the population is 265 pounds. Construct a table that shows all of the possible samples of size four. For each of the possible samples, list the players in the sample, their weights, and the sample mean. The first line of the table is shown below.

Sample	Weights	\bar{x}
A, B, C, D	290, 310, 250, 255	276.25

Use your table to find the probability that, for a random sample of size four, the sample mean will be within 10 lb of the population mean.

34) Consider the following data set and summary statistics.

34) _____

x	2	4	5	6
y	7	11	13	20

$S_{xx} = 8.75$, $S_{yy} = 88.75$, $S_{xy} = 26.25$, $SSR = 78.75$, $SST = 88.75$

- Determine the regression equation for the data. Round the final values to three significant digits, if necessary.
- Use the regression equation to predict the y -value corresponding to $x = 3$. Round your answer to the nearest tenth.
- Determine the percentage of variation in the observed values of the response variable that is explained by the regression. Round to the nearest tenth of a percent, if needed.

35) A spinner has regions numbered 1 through 21. Let A be the event that the spinner stops on an even number and B be the event that the spinner stops on a multiple of 3.

35) _____

- Find $P(A)$, $P(B)$, and $P(A \& B)$.
- Draw a Venn diagram to display the events **A**, **B**, **(A & B)**, and **not (A or B)**.
- Find the probability that the spinner will stop on an even number or a multiple of 3.

Preliminary data analyses indicate that it is reasonable to use a t-test to carry out the specified hypothesis test.

36) Last year, the mean annual salary for adults in one town was \$35,000. A researcher wants to perform a hypothesis test to determine whether the mean annual salary for adults in this town has changed. The mean annual salary for a random sample of 17 adults from the town was $\bar{x} = \$27,298$ with a standard deviation, s , of \$14,200. Use a significance level of $\alpha = 0.05$.

36) _____