

MTH 150 - Statistics - Final Exam – Review Exercises

1. Determine whether the statement describes a population or a sample.

The high school GPAs of all the parents of your classmates.

- A) Population B) Sample

2. Determine whether the statement describes a population or a sample.

The heights of 14 out of the 31 cucumber plants at Mr. Lonardo's greenhouse.

- A) Population B) Sample

3. Identify the population being studied and the sample chosen.

The heights of 4 out of the 35 okra plants at Mr. Lonardo's greenhouse.

A)

Population: The 35 okra plants at Mr. Lonardo's greenhouse.

Sample: The 4 okra plants at Mr. Lonardo's greenhouse.

B)

Population: All okra plants in greenhouses.

Sample: The 35 okra plants at Mr. Lonardo's greenhouse.

C)

Population: All okra plants in greenhouses.

Sample: The 4 okra plants at Mr. Lonardo's greenhouse.

4. Determine if the numerical value describes a population parameter or a sample statistic.

59% of all freshmen at your school reside on campus.

- A) Population Parameter B) Sample Statistic

5. Determine if the numerical value describes a parameter or a statistic.

A recent poll of 3798 corporate executives showed that the average price of their cars is \$31,200.

- A) Population Parameter B) Sample Statistic

6. Heights of trees are an example of which type of data?

- A) Discrete B) Continuous C) Neither

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7. The numbers of different colors various boxes of crayons have are an example of which type of data?
A) Discrete B) Continuous C) Neither

8. Indicate the level of measurement for the data set described.

Monthly amounts of rain in Seattle over 10 years

- A) Interval B) Ratio C) Ordinal D) Nominal
9. In order to help decide when and where to advertise, an electronics repair company decided to pull invoices and tally what types of products were repaired. There were twenty-five products repaired that month. What is the level of measurement for the data? Are the data qualitative or quantitative?

Electronics Repaired				
Blu-ray Player	TV	Radio	MP3 Player	DVD Player
MP3 Player	DVD Player	DVD Player	Blu-ray Player	MP3 Player
Blu-ray Player	DVD Player	MP3 Player	DVD Player	Blu-ray Player
TV	MP3 Player	Blu-ray Player	TV	TV
Blu-ray Player	Radio	DVD Player	Radio	Blu-ray Player

- A) ordinal, qualitative B) nominal, qualitative
C) interval, qualitative D) nominal, quantitative
10. Identify the sampling technique used for the following study.
A market researcher chooses ten people at random from each math class.
A) Census B) Simple Random Sampling C) Stratified Sampling
D) Cluster Sampling E) Systematic Sampling F) Convenience Sampling
11. Select the term which best describes the following scenario.
A study is done on a new drug designed to lower blood pressure. There are individuals involved in the study who have high blood pressure but are not given the drug.
A) single-blind experiment B) placebo effect
C) control group D) treatment group

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12. Consider the following data representing the price of plasma televisions (in dollars).
1162, 1221, 1204, 1356, 1252, 1240, 1254, 1253, 1192, 1399, 1209, 1361, 1319, 1233, 1136,
1275, 1371, 1174, 1403, 1181, 1407

Price of Plasma Televisions (in Dollars)					
Class	Frequency	Class Boundaries	Midpoint	Relative Frequency	Cumulative Frequency
1126– 1175					
1176– 1225					
1226– 1275					
1276– 1325					
1326– 1375					
1376– 1425					

Step 1. Determine the class width of the classes listed in the frequency table.

Answer: _____

Step 2. Determine the frequency of the first class.

Answer: _____

Step 3. Determine the lower class boundary for the third class.

Answer: _____

Step 4. Determine the upper class boundary for the fifth class.

Answer: _____

Step 5. Identify the midpoint of the sixth class.

Answer: _____

Step 6. Calculate the relative frequency of the fourth class. Determine your answer as a simplified fraction.

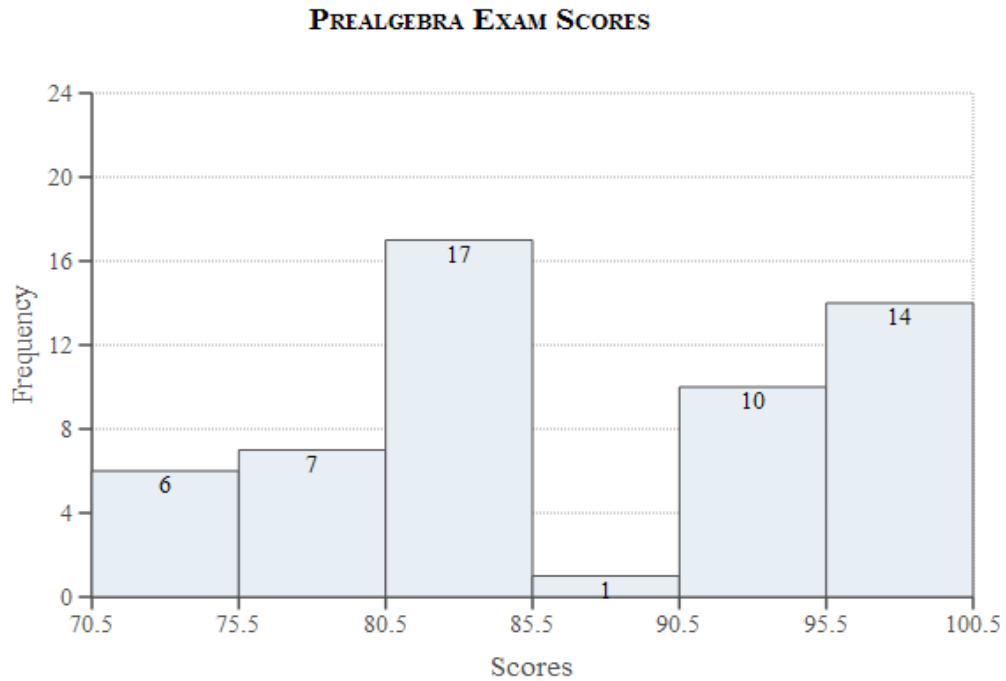
Answer: _____

Step 7. Compute the cumulative frequency of the second class.

Answer: _____

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13. The following histogram shows the exam scores for a Prealgebra class. Use this histogram to answer the questions.



Step 1. Find the number of the class containing the largest number of exam scores (1, 2, 3, 4, 5, or 6).

Answer: _____

Step 2. Find the upper class limit of the fourth class.

Answer: _____

Step 3. Find the class width for this histogram.

Answer: _____

Step 4. Find the number of students that took this exam.

Answer: _____

Step 5. Find the percentage of students that scored higher than 95.5. Round your answer to the nearest percent.

Answer: _____ %

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17. Consider the following data.

$-5, -5, 14, 14, 14, -5, 15$

Step 1. Determine the mean of the given data.

Answer: _____

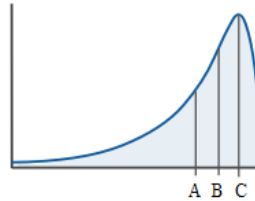
Step 2. Determine the median of the given data.

Answer: _____

Step 3. Determine if the data set is unimodal, bimodal, multimodal, or has no mode. Identify the mode(s), if any exist.

Answer: _____

18. For the graph shown, determine which letter represents the mean, the median, and the mode. Letters may be used more than once.



Answer: Mean = _____

Median = _____

Mode = _____

19. Calculate the range, population variance, and population standard deviation for the following data set. If necessary, round to one more decimal place than the largest number of decimal places given in the data.

$7, 8, 9, 10, 11, 12, 13, 14, 15, 16$

Answer:

Range: _____

Population Variance: _____

Population Standard Deviation: _____

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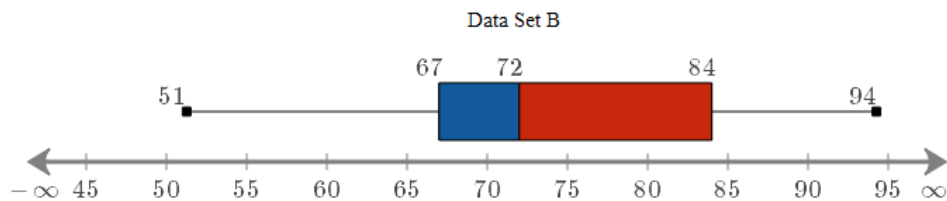
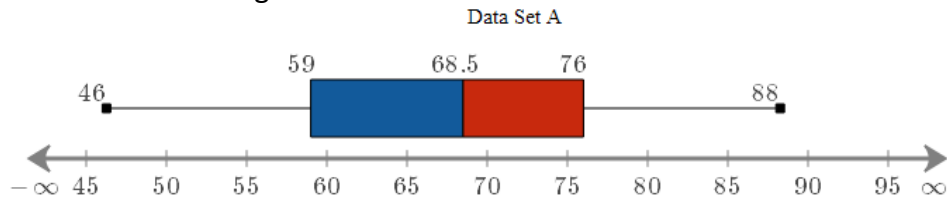
20. Suppose that grade point averages of undergraduate students at one university have a bell-shaped distribution with a mean of 2.54 and a standard deviation of 0.43. Using the empirical rule, what percentage of the students have grade point averages that are less than 3.83? Please do not round your answer.

Answer: _____%

21. Suppose that diastolic blood pressure readings of adult males have a bell-shaped distribution with a mean of 82 mmHg and a standard deviation of 10 mmHg. Using the empirical rule, what percentage of adult males have diastolic blood pressure readings that are at least 102 mmHg? Please do not round your answer.

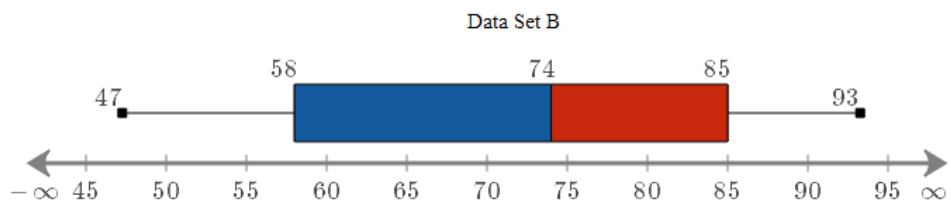
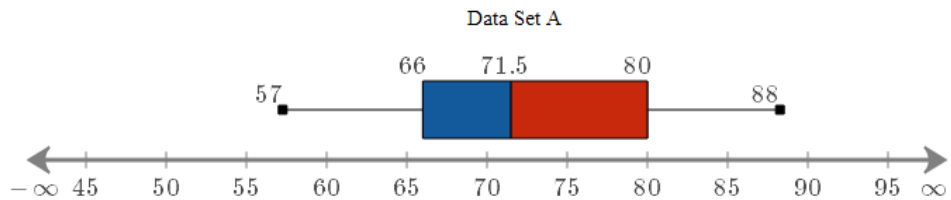
Answer: _____%

22. **Step 1.** Which data set has the largest value?



- A) Data Set A B) Data Set B

- Step 2.** Which data set has the smallest variation?



- A) Data Set A B) Data Set B

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23. Given the following data, find the diameter that represents the 36th percentile.

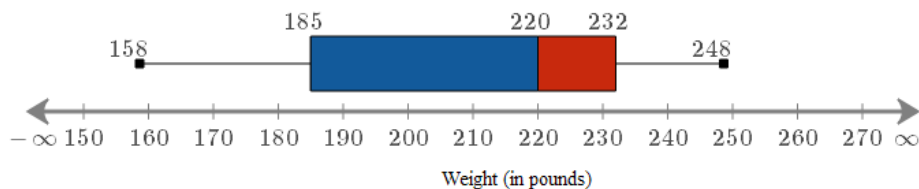
Diameters of Golf Balls				
1.35	1.62	1.32	1.52	1.59
1.65	1.48	1.65	1.49	1.62
1.48	1.65	1.67	1.48	1.61

Answer: _____

24. A manufacturer makes bags of popcorn and bags of potato chips. The average weight of a bag of popcorn is supposed to be 3.07 ounces with an allowable deviation of 0.03 ounces. The average weight of a bag of potato chips is supposed to be 5.07 ounces with an allowable deviation of 0.04 ounces. A factory worker randomly selects a bag of popcorn from the assembly line and it has a weight of 3.06 ounces. Then the worker randomly selects a bag of potato chips from the assembly line and it has a weight of 5.03 ounces. Which description closely matches the findings on the assembly line?

- A) The popcorn bag assembly line is closer to the specifications given because its z-score is closer to the standard than the potato chip bag assembly line.
- B) The popcorn bag assembly line is closer to the specifications given because its z-score is further from the standard than the potato chip bag assembly line.
- C) The potato chip bag assembly line is closer to the specifications given because its z-score is closer to the standard than the popcorn bag assembly line.
- D) The potato chip bag assembly line is closer to the specifications given because its z-score is further from the standard than the popcorn bag assembly line.

25. A high school has 48 players on the football team. The summary of the players' weights is given in the box plot. Approximately, what is the percentage of players weighing greater than or equal to 232 pounds?



Answer: _____ %

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26. Calculate the five-number summary of the given data. Use the approximation method.

9, 10, 16, 24, 23, 11, 9, 11, 3, 16, 21, 15, 13, 21, 8

Answer: _____

27. A box contains 27 red marbles, 33 white marbles, and 85 blue marbles.

If a marble is randomly selected from the box, what is the probability that it is red? Express your answer as a simplified fraction or a decimal rounded to four decimal places.

Answer: _____

28. What is the probability of rolling a sum of 9 on a standard pair of six-sided dice? Express your answer as a fraction or a decimal number rounded to three decimal places, if necessary.

Answer: _____

29. There are 720 identical plastic chips numbered 1 through 720 in a box.

What is the probability of reaching into the box and randomly drawing a chip number that is smaller than 569? Express your answer as a simplified fraction or a decimal rounded to four decimal places.

Answer: _____

30. Determine whether the following events are mutually exclusive.

Choosing a heart or a black card out of a standard deck of cards.

A) Mutually Exclusive

B) Not Mutually Exclusive

31. Determine whether the following events are mutually exclusive.

Choosing a king or a club out of a standard deck of cards.

A) Mutually Exclusive

B) Not Mutually Exclusive

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32. A group fitness gym classifies its fitness class attendees by class type and member status. The marketing team has gathered data from a random month, in which there were 2315 class attendees. The data is summarized in the table below.

Class Type and Member Status of Class Attendees		
Class Type	Member	Non-Member
Barre	262	242
Boot Camp	266	240
Boxing	233	212
Spinning	290	214
Yoga	153	203

What is the probability that a class attendee is a member of the gym and is attending a boxing class or is a non-member of the gym and is attending a yoga class? Enter a fraction or round your answer to 4 decimal places, if necessary.

Answer: _____

33. A group fitness gym classifies its fitness class attendees by class type and member status. The marketing team has gathered data from a random month, in which there were 2318 class attendees. The data is summarized in the table below.

Class Type and Member Status of Class Attendees		
Class Type	Member	Non-Member
Barre	264	290
Boot Camp	260	93
Boxing	291	181
Spinning	230	270
Yoga	191	248

Step 1. What is the probability that an attendee does not attend a yoga class? Enter a fraction or round your answer to 4 decimal places, if necessary.

Answer: _____

Step 2. What is the probability that an attendee attends a boxing class given that he is a non-member of the gym? Enter a fraction or round your answer to 4 decimal places, if necessary.

Answer: _____

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34. Two cards are drawn without replacement from a standard deck of 52 playing cards. What is the probability of choosing a diamond for the second card drawn, if the first card, drawn without replacement, was a spade? Express your answer as a fraction or a decimal number rounded to four decimal places.

Answer: _____

35. Two cards are drawn without replacement from a standard deck of 52 playing cards. What is the probability of choosing a spade and then, without replacement, a heart? Express your answer as a fraction or a decimal number rounded to four decimal places.

Answer: _____

36. Suppose you like to keep a jar of change on your desk. Currently, the jar contains the following:

5 Pennies 26 Dimes

18 Nickels 10 Quarters

What is the probability that you reach into the jar and randomly grab a nickel and then, without replacement, another nickel? Express your answer as a fraction or a decimal number rounded to four decimal places.

Answer: _____

37. A value meal package at Ron's Subs consists of a drink, a sandwich, and a bag of chips. There are 4 types of drinks to choose from, 5 types of sandwiches, and 3 types of chips. How many different value meal packages are possible?

Answer: _____

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38. Mrs. Burke's biology class has 128 students, classified by academic year and major, as illustrated in the table. Mrs. Burke randomly chooses one student to collect yesterday's work.

Mrs. Burke's Biology Class		
Academic Year	Biology Majors	Non-Biology Majors
Freshmen	19	17
Sophomores	17	14
Juniors	16	10
Seniors	17	18

Step 1. What is the probability that she selects a biology major, given that she chooses randomly from only the seniors? Enter a fraction or round your answer to 4 decimal places, if necessary.

Answer: _____

Step 2. What is the probability that she selects a senior, given that she chooses a biology major? Enter a fraction or round your answer to 4 decimal places, if necessary.

Answer: _____

39. Consider the following data:

x	-3	-2	-1	0	1
P(X = x)	0.1	0.1	0.2	0.3	0.3

Step 1. Find the expected value $E(X)$. Round your answer to one decimal place.

Answer: _____

Step 2. Find the variance. Round your answer to one decimal place.

Answer: _____

Step 3. Find the standard deviation. Round your answer to one decimal place.

Answer: _____

Step 4. Find the value of $P(X > -2)$. Round your answer to one decimal place.

Answer: _____

Step 5. Find the value of $P(X \leq -3)$. Round your answer to one decimal place.

Answer: _____

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40. In the long run, which plan has the higher payout?

Plan A	
Payout	P(Payout)
\$5000	0.4
\$50,000	0.28
\$90,000	0.32

Plan B	
Payout	P(Payout)
-\$10,000	0.07
\$15,000	0.6
\$90,000	0.33

- A) Plan A B) Plan B

41. Which plan has the least amount of risk?

Plan A	
Payout	P(Payout)
\$20,000	0.12
\$25,000	0.69
\$75,000	0.19

Plan B	
Payout	P(Payout)
\$50,000	0.25
\$75,000	0.45
\$100,000	0.3

- A) Plan A B) Plan B

42. Suppose that you and a friend are playing cards and you decide to make a friendly wager. The bet is that you will draw two cards without replacement from a standard deck. If both cards are diamonds, your friend will pay you \$41. Otherwise, you have to pay your friend \$5.

Step 1. What is the expected value of your bet? Round your answer to two decimal places. Losses must be expressed as negative values.

Answer: \$ _____

Step 2. If this same bet is made 537 times, how much would you expect to win or lose? Round your answer to two decimal places. Losses must be expressed as negative values.

Answer: \$ _____

43. A researcher wishes to conduct a study of the color preferences of new car buyers. Suppose that 40% of this population prefers the color red. If 18 buyers are randomly selected, what is the probability that exactly 8 buyers would prefer red? Round your answer to four decimal places.

Answer: _____

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44. A quality control inspector has drawn a sample of 16 light bulbs from a recent production lot. If the number of defective bulbs is 2 or less, the lot passes inspection. Suppose 20% of the bulbs in the lot are defective. What is the probability that the lot will pass inspection? Round your answer to four decimal places.

Answer: _____

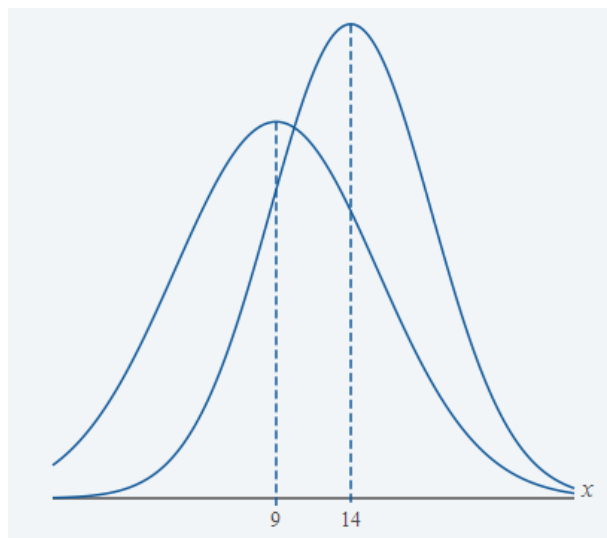
45. A real estate agent has 17 properties that she shows. She feels that there is a 30% chance of selling any one property during a week. The chance of selling any one property is independent of selling another property. Compute the probability of selling more than 4 properties in one week. Round your answer to four decimal places.

Answer: _____

46. Decide which of the following statements are true.

- A) There are a limited number of normal distributions.
- B) The inflection points for any normal distribution are one standard deviation on either side of the mean.
- C) The x -axis is a horizontal asymptote for all normal distributions.
- D) The line of symmetry for all normal distributions is $x=0$.

47. The following is a graph of two normal distributions plotted on the same x -axis.



Based on the graph above, which statement best describes the graph?

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47. (cont.)

- A) The two distributions have means that differ by 5 units and different standard deviations.
- B) The two distributions have means that differ by 5 units and equal standard deviations.
- C) The two distributions have equal means and standard deviations that differ by 5 units.
- D) The two distributions have equal means and equal standard deviations.

48. Find the area under the standard normal curve to the left of $z = 1.96$. Round your answer to four decimal places, if necessary.

Answer: _____

49. Use the z -score formula, $z = \frac{x-\mu}{\sigma}$, and the information below to find the mean, μ . Round your answer to one decimal place, if necessary.

$$z = 1.75, \quad x = 20.3, \quad \text{and} \quad \sigma = 4.8$$

Answer: $\mu =$ _____

50. The diameters of ball bearings are distributed normally. The mean diameter is 147 millimeters and the standard deviation is 5 millimeters. Find the probability that the diameter of a selected bearing is greater than 138 millimeters. Round your answer to four decimal places.

Answer: _____

51. The life of light bulbs is distributed normally. The standard deviation of the lifetime is 25 hours and the mean lifetime of a bulb is 580 hours. Find the probability of a bulb lasting for at most 617 hours. Round your answer to four decimal places.

Answer: _____

52. Find the value of z such that 0.06 of the area lies to the right of z . Round your answer to two decimal places.

Answer: _____

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53. The diameters of bolts produced in a machine shop are normally distributed with a mean of 5.11 millimeters and a standard deviation of 0.07 millimeters. Find the two diameters that separate the top 9% and the bottom 9%. These diameters could serve as limits used to identify which bolts should be rejected. Round your answer to the nearest hundredth, if necessary.

Answer: _____

54. A study on the latest fad diet claimed that the amounts of weight lost by all people on this diet had a mean of 20.9 pounds and a standard deviation of 4.3 pounds.

Step 1. If a sampling distribution is created using samples of the amounts of weight lost by 88 people on this diet, what would be the mean of the sampling distribution of sample means? Round to two decimal places, if necessary.

Answer: _____

Step 2. If a sampling distribution is created using samples of the amounts of weight lost by 88 people on this diet, what would be the standard deviation of the sampling distribution of sample means? Round to two decimal places, if necessary.

Answer: _____

55. Suppose babies born in a large hospital have a mean weight of 3524 grams, and a standard deviation of 282 grams.

If 84 babies are sampled at random from the hospital, what is the probability that the mean weight of the sample babies would differ from the population mean by less than 46 grams? Round your answer to four decimal places.

Answer: _____

56. A quality control expert at LIFE batteries wants to test their new batteries. The design engineer claims they have a variance of 3364 with a mean life of 530 minutes.

If the claim is true, in a sample of 75 batteries, what is the probability that the mean battery life would be greater than 533.2 minutes? Round your answer to four decimal places.

Answer: _____

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57. A door delivery florist wishes to estimate the proportion of people in his city that will purchase his flowers. Suppose the true proportion is 0.05.

If 259 are sampled, what is the probability that the sample proportion will differ from the population proportion by less than 0.03? Round your answer to four decimal places.

Answer: _____

58. Suppose 52% of the population has a retirement account.

If a random sample of size 471 is selected, what is the probability that the proportion of persons with a retirement account will differ from the population proportion by greater than 4%? Round your answer to four decimal places.

Answer: _____

59. A research company desires to know the mean consumption of meat per week among people over age 24. They believe that the meat consumption has a mean of 4.4 pounds, and want to construct a 90% confidence interval with a maximum error of 0.08 pounds. Assuming a variance of 0.36 pounds, what is the minimum number of people over age 24 they must include in their sample? Round your answer up to the next integer.

Answer: _____

60. Given the following confidence interval for a population mean, compute the margin of error, E .

$$12.36 < \mu < 12.80$$

Answer: $E =$ _____

61. A professor wants to estimate how many hours per week her students study. A simple random sample of 56 students had a mean of 20 hours of studying per week. Construct a 95% confidence interval for the mean number of hours a student studies per week. Assume that the population standard deviation is known to be 2.3 hours per week. Round to two decimal places.

Answer: Lower Endpoint: _____

Upper Endpoint: _____

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62. A certain test preparation course is designed to help students improve their scores on the MCAT exam. A mock exam is given at the beginning and end of the course to determine the effectiveness of the course. The following measurements are the net change in 7 students' scores on the exam after completing the course:

37, 12, 12, 17, 13, 32, 23

Using these data, construct a 80% confidence interval for the average net change in a student's score after completing the course. Assume the population is approximately normal.

Step 1. Calculate the sample mean for the given sample data. Round your answer to one decimal place.

Answer: _____

Step 2. Calculate the sample standard deviation for the given sample data. Round your answer to one decimal place.

Answer: _____

Step 3. Find the critical value that should be used in constructing the confidence interval. Round your answer to three decimal places.

Answer: _____

Step 4. Construct the 80% confidence interval. Round your answer to one decimal place.

Answer: Lower endpoint: _____ Upper endpoint: _____

63. How will decreasing the level of confidence without changing the sample size affect the width of a confidence interval for a population mean? Assume that the population standard deviation is unknown and the population distribution is approximately normal.

Select your answer from the choices below.

- A) The margin of error will increase because the critical value will decrease. The increased margin of error will cause the confidence interval to be wider.
- B) The margin of error will decrease because the critical value will decrease. The decreased margin of error will cause the confidence interval to be narrower.
- C) The margin of error will decrease because the critical value will increase. The decreased margin of error will cause the confidence interval to be narrower.
- D) The margin of error will increase because the critical value will increase. The increased margin of error will cause the confidence interval to be wider.

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64. Wildlife conservationists studying grizzly bears in the United States found that the mean weight of 22 adult males was 664 pounds with a standard deviation of 88 pounds. Construct a 99% confidence interval for the mean weight of all adult male grizzly bears in the United States. Assume that the weights of all adult male grizzly bears in the United States are normally distributed. Round to the nearest whole number.

Answer: Lower endpoint: _____

Upper endpoint: _____

65. The state education commission wants to estimate the fraction of tenth grade students that have reading skills at or below the eighth grade level. In an earlier study, the population proportion was estimated to be 0.22.

How large a sample would be required in order to estimate the fraction of tenth graders reading at or below the eighth grade level at the 85% confidence level with an error of at most 0.03? Round your answer up to the next integer.

Answer: _____

66. The American Heart Association is about to conduct an anti-smoking campaign and wants to know the fraction of Americans over 20 who smoke.

Step 1. Suppose a sample of 966 Americans over 20 is drawn. Of these people, 783 don't smoke. Using the data, estimate the proportion of Americans over 20 who smoke. Enter your answer as a fraction or a decimal number rounded to three decimal places.

Answer: _____

Step 2. Suppose a sample of 966 Americans over 20 is drawn. Of these people, 783 don't smoke. Using the data, construct the 98% confidence interval for the population proportion of Americans over 20 who smoke. Round your answers to three decimal places.

Answer: Lower endpoint: _____ Upper endpoint: _____

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67. Russell is doing some research before buying his first house. He is looking at two different areas of the city, and he wants to know if there is a significant difference between the mean prices of homes in the two areas. For the 31 homes he samples in the first area, the mean home price is \$152,400. Public records indicate that home prices in the first area have a population standard deviation of \$37,495. For the 35 homes he samples in the second area, the mean home price is \$161,700. Again, public records show that home prices in the second area have a population standard deviation of \$29,205. Let Population 1 be homes in the first area and Population 2 be homes in the second area. Construct a 99% confidence interval for the true difference between the mean home prices in the two areas. Round the endpoints of the interval to the nearest whole number, if necessary.

Answer:

Lower Endpoint= _____

Upper Endpoint= _____

68. A newsletter publisher believes that over 80% of their readers own a personal computer. Is there sufficient evidence at the 0.02 level to substantiate the publisher's claim?

State the null and alternative hypotheses for the above scenario.

Answer: H_0 : _____

H_a : _____

69. A sample of 1400 computer chips revealed that 53% of the chips fail in the first 1000 hours of their use. The company's promotional literature claimed that 56% fail in the first 1000 hours of their use. Is there sufficient evidence at the 0.01 level to dispute the company's claim?

State the null and alternative hypotheses for the above scenario.

Answer: H_0 : _____

H_a : _____

70. A newsletter publisher believes that less than 44% of their readers own a Rolls Royce. For marketing purposes, a potential advertiser wants to confirm this claim. After performing a test at the 0.05 level of significance, the advertiser failed to reject the null hypothesis.

What is the conclusion regarding the publisher's claim?

- A) There is sufficient evidence at the 0.05 level of significance that the percentage is less than 44%.
- B) There is not sufficient evidence at the 0.05 level of significance to say that the percentage is less than 44%.

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71. An engineer has designed a valve that will regulate water pressure on an automobile engine. The valve was tested on 290 engines and the mean pressure was 4.1 pounds/square inch (psi). Assume the population standard deviation is 0.6. If the valve was designed to produce a mean pressure of 4.2 psi, is there sufficient evidence at the 0.02 level that the valve does not perform to the specifications?

Step 1. State the null and alternative hypotheses.

Answer: H_0 : _____

H_a : _____

Step 2. Find the value of the test statistic. Round your answer to two decimal places.

Answer: _____

Step 3. Specify if the test is one-tailed or two-tailed.

A) One-Tailed Test

B) Two-Tailed Test

Step 4. Find the P -value of the test statistic. Round your answer to four decimal places.

Answer: _____

Step 5. Identify the level of significance for the hypothesis test.

Answer: _____

Step 6. Make the decision to reject or fail to reject the null hypothesis.

A) Reject Null Hypothesis

B) Fail to Reject Null Hypothesis

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72. The U.S. Energy Information Administration claimed that U.S. residential customers used an average of 10,368 kilowatt hours (kWh) of electricity this year. A local power company believes that residents in their area use more electricity on average than EIA's reported average. To test their claim, the company chooses a random sample of 128 of their customers and calculates that these customers used an average of 10,745kWh of electricity last year. Assuming that the population standard deviation is 2198kWh, is there sufficient evidence to support the power company's claim at the 0.05 level of significance?

Step 1. State the null and alternative hypotheses for the test. Fill in the blank below.

$$\begin{aligned} H_0 & : \mu = 10,368 \\ H_a & : \mu \underline{\hspace{2cm}} 10,368 \end{aligned}$$

- A) > B) < C) \neq

Step 2. Compute the value of the test statistic. Round your answer to two decimal places.

Answer: _____

Step 3. Draw a conclusion and interpret the decision.

- A) We fail to reject the null hypothesis and conclude that there is sufficient evidence at a 0.05 level of significance to support the power company's claim that the mean amount of electricity for their residents is more than the national average.
- B) We reject the null hypothesis and conclude that there is sufficient evidence at a 0.05 level of significance to support the power company's claim that the mean amount of electricity for their residents is more than the national average.
- C) We fail to reject the null hypothesis and conclude that there is insufficient evidence at a 0.05 level of significance to support the power company's claim that the mean amount of electricity for their residents is more than the national average.
- D) We reject the null hypothesis and conclude that there is insufficient evidence at a 0.05 level of significance to support the power company's claim that the mean amount of electricity for their residents is more than the national average.

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73. A children's clothing company sells hand-smocked dresses for girls. The length of one particular size of dress is designed to be 24 inches. The company regularly tests the lengths of the garments to ensure quality control, and if the mean length is found to be significantly longer or shorter than 24 inches, the machines must be adjusted. The most recent simple random sample of 18 dresses had a mean length of 21.65 inches with a standard deviation of 4.70 inches. Assume that the population distribution is approximately normal. Perform a hypothesis test on the accuracy of the machines at the 0.025 level of significance.

Step 1. State the null and alternative hypotheses for the test. Fill in the blank below.

$$\begin{aligned} H_0 & : \mu = 24 \\ H_a & : \mu \underline{\hspace{1cm}} 24 \end{aligned}$$

- A) \neq B) $>$ C) $<$

Step 2. Compute the value of the test statistic. Round your answer to three decimal places.

Answer: _____

Step 3. Draw a conclusion and interpret the decision.

- A) We fail to reject the null hypothesis and conclude that there is insufficient evidence at a 0.025 level of significance that the mean length of the particular size of dress is found to be significantly longer or shorter than 24 inches and the machines must be adjusted.
- B) We reject the null hypothesis and conclude that there is sufficient evidence at a 0.025 level of significance that the mean length of the particular size of dress is found to be significantly longer or shorter than 24 inches and the machines must be adjusted.
- C) We reject the null hypothesis and conclude that there is insufficient evidence at a 0.025 level of significance that the mean length of the particular size of dress is found to be significantly longer or shorter than 24 inches and the machines must be adjusted.
- D) We fail to reject the null hypothesis and conclude that there is sufficient evidence at a 0.025 level of significance that the mean length of the particular size of dress is found to be significantly longer or shorter than 24 inches and the machines must be adjusted.

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74. One study claimed that 85% of college students identify themselves as procrastinators. A professor believes that the claim regarding college students is too high. The professor conducts a simple random sample of 164 college students and finds that 132 of them identify themselves as procrastinators. Does this evidence support the professor's claim that fewer than 85% of college students are procrastinators? Use a 0.10 level of significance.

Step 1. State the null and alternative hypotheses for the test. Fill in the blank below.

$$H_0 : p = 0.85$$
$$H_a : p \underline{\hspace{1cm}} 0.85$$

- A) < B) > C) ≠

Step 2. Compute the value of the test statistic. Round your answer to two decimal places.

Answer: _____

Step 3. Draw a conclusion and interpret the decision.

- A) We fail to reject the null hypothesis and conclude that there is insufficient evidence at a 0.10 level of significance that fewer than 85% of college students are procrastinators.
- B) We reject the null hypothesis and conclude that there is insufficient evidence at a 0.10 level of significance that fewer than 85% of college students are procrastinators.
- C) We fail to reject the null hypothesis and conclude that there is sufficient evidence at a 0.10 level of significance that fewer than 85% of college students are procrastinators.
- D) We reject the null hypothesis and conclude that there is sufficient evidence at a 0.10 level of significance that fewer than 85% of college students are procrastinators.

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75. A parent interest group is looking at whether birth order affects scores on the ACT test. It was suggested that, on average, first-born children earn lower ACT scores than second-born children. After surveying a random sample of 125 first-born children, the parents' group found that they had a mean score of 24.3 on the ACT. A survey of 250 second-born children resulted in a mean ACT score of 24.6. Assume that the population standard deviation for first-born children is known to be 2.1 points and the population standard deviation for second-born children is known to be 0.6 points. Is there sufficient evidence at the 10% level of significance to say that the mean ACT score of first-born children is lower than the mean ACT score of second-born children? Let first-born children be Population 1 and let second-born children be Population 2.

Step 1. State the null and alternative hypotheses for the test. Fill in the blank below.

$$\begin{aligned} H_0 & : \mu_1 = \mu_2 \\ H_a & : \mu_1 \underline{\hspace{1cm}} \mu_2 \end{aligned}$$

- A) > B) \neq C) <

Step 2. Compute the value of the test statistic. Round your answer to two decimal places.

Answer: _____

Step 3. Draw a conclusion and interpret the decision.

- A) We reject the null hypothesis and conclude that there is insufficient evidence at a 0.10 level of significance to support the parent interest group's claim that first-born children earn lower ACT scores on average than second-born children.
- B) We fail to reject the null hypothesis and conclude that there is insufficient evidence at a 0.10 level of significance to support the parent interest group's claim that first-born children earn lower ACT scores on average than second-born children.
- C) We reject the null hypothesis and conclude that there is sufficient evidence at a 0.10 level of significance to support the parent interest group's claim that first-born children earn lower ACT scores on average than second-born children.
- D) We fail to reject the null hypothesis and conclude that there is sufficient evidence at a 0.10 level of significance to support the parent interest group's claim that first-born children earn lower ACT scores on average than second-born children.

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1. Correct Answer: Population
2. Correct Answer: Sample
3. Correct Answer:
Population: The 35 okra plants at Mr. Lonardo's greenhouse.
Sample: The 4 okra plants at Mr. Lonardo's greenhouse.
4. Correct Answer: Population Parameter
5. Correct Answer: Sample Statistic
6. Correct Answer: Continuous
7. Correct Answer: Discrete
8. Correct Answer: Ratio
9. Correct Answer: nominal, qualitative
10. Correct Answer: Stratified Sampling
11. Correct Answer: control group
12. Step 1. Correct Answer: 50
Step 2. Correct Answer: 3
Step 3. Correct Answer: 1225.5
Step 4. Correct Answer: 1375.5
Step 5. Correct Answer: 1400.5
Step 6. Correct Answer: $\frac{1}{21}$
Step 7. Correct Answer: 8
13. Step 1. Correct Answer: 3
Step 2. Correct Answer: 90
Step 3. Correct Answer: 5
Step 4. Correct Answer: 55
Step 5. Correct Answer: 25%
14. Step 1. Correct Answer: 18 orders
Step 2. Correct Answer: 198.7 pounds
Step 3. Correct Answer: 199 pounds
15. Correct Answer: Symmetrical, but not uniform
16. Correct Answer: Skewed to the left
17. Step 1. Correct Answer: 6
Step 2. Correct Answer: 14
Step 3. Correct Answer: Bimodal, Mode 1 = -5 , Mode 2 = 14
18. Correct Answer: Mean = A, Median = B, Mode = C
19. Correct Answer: Range: 9, Population variance: 8.3, Population standard deviation: 2.9
20. Correct Answer: 99.85%
21. Correct Answer: 2.5%
22. Step 1. Correct Answer: Data Set B
Step 2. Correct Answer: Data Set A
23. Correct Answer: 1.49
24. Correct Answer: The popcorn bag assembly line is closer to the specifications given because its z-score is closer to the standard than the potato chip bag assembly line.
25. Correct Answer: 25%
26. Correct Answer: 3, 9, 13, 21, 24
27. Correct Answer: $\frac{27}{145}$ or 0.1862

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28. Correct Answer: $\frac{1}{9}$ or 0.111
29. Correct Answer: $\frac{71}{90}$ or 0.7889
30. Correct Answer: Mutually Exclusive
31. Correct Answer: Not Mutually Exclusive
32. Correct Answer: 0.1883
33. **Step 1.** Correct Answer: 0.8106
Step 2. Correct Answer: 0.1673
34. Correct Answer: $\frac{13}{51}$ or 0.2549
35. Correct Answer: $\frac{13}{204}$ or 0.0637
36. Correct Answer: $\frac{153}{1711}$ or 0.0894
37. Correct Answer: 60
38. **Step 1.** Correct Answer: 0.4857
Step 2. Correct Answer: 0.2464
39. Step 1. Correct Answer: -0.4
Step 2. Correct Answer: 1.6
Step 3. Correct Answer: 1.3
Step 4. Correct Answer: 0.8
Step 5. Correct Answer: 0.1
40. Correct Answer: Plan A
41. Correct Answer: Plan B
42. Step 1. Correct Answer: $-\$2.29$
Step 2. Correct Answer: $-\$1229.73$
43. Correct Answer: 0.1734
44. Correct Answer: 0.3518
45. Correct Answer: 0.6113
46. Correct Answer: The inflection points for any normal distribution are one standard deviation on either side of the mean., The x-axis is a horizontal asymptote for all normal distributions.
47. Correct Answer: The two distributions have means that differ by 5 units and different standard deviations.
48. Correct Answer: 0.975
49. Correct Answer: $\mu = 11.9$
50. Correct Answer: 0.9641
51. Correct Answer: 0.9306
52. Correct Answer: 1.56
53. Correct Answer: 5.02 millimeters and 5.20 millimeters
54. **Step 1.** Correct Answer: 20.9
Step 2. Correct Answer: 0.46
55. Correct Answer: 0.8664
56. Correct Answer: 0.3156
57. Correct Answer: 0.9736
58. Correct Answer: 0.0818
59. Correct Answer: 153
60. Correct Answer: 0.22
61. Correct Answer: Lower Endpoint: 19.40 Upper Endpoint: 20.60

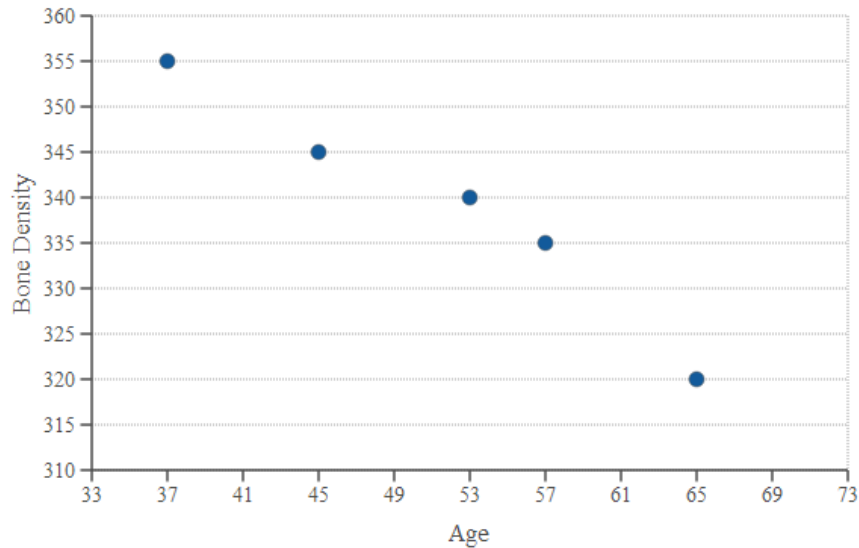
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62. Step 1. Correct Answer: 20.9
Step 2. Correct Answer: 10.2
Step 3. Correct Answer: 1.440
Step 4. Correct Answer: Lower endpoint: 15.3 Upper endpoint: 26.5
63. Correct Answer: The margin of error will decrease because the critical value will decrease. The decreased margin of error will cause the confidence interval to be narrower.
64. Correct Answer: Lower endpoint: 611 Upper endpoint: 717
65. Correct Answer: 396
66. Step 1. Correct Answer: 0.189
Step 2. Correct Answer: Lower endpoint: 0.160 Upper endpoint: 0.218
67. Correct Answer: Lower Endpoint= $-30,808$ Upper Endpoint= $12,208$
68. Correct Answer: $H_0: p = 0.8, H_a: p > 0.8$
69. Correct Answer: $H_0: p = 0.56, H_a: p \neq 0.56$
70. Correct Answer: There is not sufficient evidence at the 0.05 level of significance to say that the percentage is less than 44%.
71. Step 1. Correct Answer:
$$H_0: \mu = 4.2$$
$$H_a: \mu \neq 4.2$$

Step 2. Correct Answer: -2.84
Step 3. Correct Answer: Two-Tailed Test
Step 4. Correct Answer: 0.0045
Step 5. Correct Answer: 0.02
Step 6. Correct Answer: Reject Null Hypothesis
72. **Step 1.** Correct Answer: $>$
Step 2. Correct Answer: 1.94
Step 3. Correct Answer: We reject the null hypothesis and conclude that there is sufficient evidence at a 0.05 level of significance to support the power company's claim that the mean amount of electricity for their residents is more than the national average.
73. **Step 1.** Correct Answer: \neq
Step 2. Correct Answer: -2.121
Step 3. Correct Answer: We fail to reject the null hypothesis and conclude that there is insufficient evidence at a 0.025 level of significance that the mean length of the particular size of dress is found to be significantly longer or shorter than 24 inches and the machines must be adjusted.
74. **Step 1.** Correct Answer: $<$
Step 2. Correct Answer: -1.62
Step 3. Correct Answer: We reject the null hypothesis and conclude that there is sufficient evidence at a 0.10 level of significance that fewer than 85% of college students are procrastinators.

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75. **Step 1.** Correct Answer: $<$
Step 2. Correct Answer: -1.57
Step 3. Correct Answer: We reject the null hypothesis and conclude that there is sufficient evidence at a 0.10 level of significance to support the parent interest group's claim that first-born children earn lower ACT scores on average than second-born children.
76. Correct Answer: Negative
77. Correct Answer:



78. **Step 1.** Correct Answer: $\hat{y} = 11.496 + 0.857x$
Step 2. Correct Answer: 87.77
79. **Step 1.** Correct Answer: $\hat{y} = 4.397 + 0.069x$
Step 2. Correct Answer: \$25.93