

Name: _____
BSAD 210—Montgomery College

EXAM 2

Practice #2

- There are 110 possible points on this exam. The test is out of 100.
- You have one class period to complete this exam, but you should be able to complete it in less than that
- Please turn off all cell phones and other electronic equipment.
- Be sure to read all instructions and questions carefully.
- Remember to show all your work. You may print your formulas in Excel using the Show Formulas option in the Formulas tab. Printed versions of your work showing formulas *and* showing the results counts as showing your work. But you must include both with your test for “showing your work” to count this way. Write your name on both print outs.
- Try all questions! You get zero points for questions that are not attempted.
- Note the last sheet lists all the equations you will need for this exam.
- *Please print clearly and neatly.*

Part I: Matching. Write the letter from the column on the right which best matches each word or phrase in the column on the left. You will not use all the options on the right and you cannot use the same option more than once.

2 points each.

- | | |
|-------------------------------|---|
| 1. ___ Alternative hypothesis | A. Changes as n changes |
| 2. ___ Margin of error | B. Example: This person is allergic to cats. |
| 3. ___ Null hypothesis | C. Example: This person is not allergic to cats. |
| 4. ___ Point estimate | D. Example: Share of people who like cats. |
| 5. ___ Proportion | E. Middle point for a confidence interval |
| 6. ___ t distribution | F. Used when you know the population range |
| 7. ___ z distribution | G. Used when you know the sample range |
| | H. Used when you know the population standard deviation |
| | I. What determines the size of a confidence interval |

Part II: Multiple Choice. Circle the best answer to the following.

4 points each.

8. A smaller α always results in:
 - a. A larger critical z score
 - b. A larger confidence level
 - c. A smaller confidence level
 - d. A & B
 - e. None of the above

9. Our definitions of type I error and type II error rely on understanding what the null hypothesis is. But it would be nice to have an accurate definition that does not rely on that technical detail. Which of the following definitions that don't refer to the null hypothesis describe type II error?
 - a. Determining that an unusual thing is actually due to randomness.
 - b. Mistakenly doing the unusual thing.
 - c. Mistakenly doing the usual thing.
 - d. Calculating a point estimate that's outside the confidence interval.
 - e. None of the above makes sense

10. We say "fail to reject" the null hypothesis rather than "accept" the null hypothesis. Why?
 - a. Because we don't have evidence that the null is correct.
 - b. Because the difference between the parameter and the statistics is not zero.
 - c. Because there is always randomness.
 - d. A & B
 - e. None of the above

11. A machine should put eight pounds of flour in a bag. Miguel tests if the machine is working well by weighing six randomly selected bags. The average weight of these bags is 6.1 pounds with a sample standard deviation of 1.2 pounds. What should Miguel conclude?
- It's statistically significant at the 90% level.
 - It's statistically significant at the 95% level and lower.
 - It's statistically significant at the 99% level and lower.
 - It's statistically significant at the 99.9% level and lower.
 - It's not statistically significant.
12. Suppose a flight time follows a normal distribution with an average of 2.5 hours and a standard deviation of ten minutes. What's the probability that the flight will last longer than 2 hours and 45 minutes (2.75 hours)?
- 0.0130
 - 0.4900
 - 0.9332
 - It is impossible to tell with the information provided.
 - It is possible to tell but the option is not listed here.
13. William Wails wonders which whistle is best for his whale-watching work. His whistle is important. When he sees a whale on a whale-watching trip, he can use the whistle to attract the attention of his passengers, but it's hard to hear over the wind and seas. His current whistle attracts 80% of passengers. He tries a new whistle and it attracts 83% of passengers. If you were to run an analysis on if this whistle is better, you need more information. What information do you need?
- How many trips he took.
 - The cost of the new whistle.
 - The standard deviation.
 - A & C
 - What you need isn't listed here.
14. Which idea explains why we can never "prove" anything in statistics?
- The central limit theorem
 - Hypothesis testing
 - The types of error
 - The confidence level
 - None of the above
15. What's the difference between practical significance and statistical significance?
- Statistical significance only occurs if there's practical significance.
 - Practical significance focuses on z scores while statistical significance uses t scores.
 - Statistical significance is the math side of the analysis while practical significance is more the business side of the analysis.
 - A & C
 - None; they are functionally the same thing.

16. Muhammad is running for a local election. He surveys 82 people and finds that 46 will vote for him. At 99.9% confidence, determine Muhammad's confidence interval.
- Between 0.381 & 0.741
 - Between 0.392 & 0.730
 - Between 0.420 & 0.702
 - Between 0.433 & 0.689
 - None of the above
17. Referring to the previous question, what's the smallest number of people Muhammad would have to survey to get a margin of error of no more than 0.03 (3%)?
- 1,844
 - 2,653
 - 2,964
 - 3,009
 - None of the above
18. Aziz wants a guarantee for his shipping company, reimbursing customers for unusually slow deliveries. Suppose the time it takes for a shipment to arrive follows a normal distribution with a mean of 20.6 days and a standard deviation of 3.1 days. If Aziz wants to reimburse no more than 1% of customers, how many days should he set his guarantee at?
- 13
 - 14
 - 27
 - 28
 - None of the above
19. Which of the following is/are true?
- "The CONFIDENCE function in Excel outputs the confidence interval."
 - "A confidence interval made with a critical t score will be smaller than a confidence interval made with a critical z score (holding all else constant)."
 - "A larger confidence interval is always preferred to a smaller one because you're more likely to include the population mean."
 - B & C
 - None of these are true

Part III: Short Answer. *Answer the following.*

16 points each.

20. Zachary Zambango is analyzing the amount of traffic at an intersection as part of a larger project to understand traffic patterns. He needs to know about how many cars pass through the intersection each weekday. After sampling 10 days, the sample average is 417.8 cars with a sample standard deviation of 38.8 cars. Give the confidence interval for 95% confidence and 99% confidence.

21. Suppose Octavian College advertises that 80% of its graduates find a job that requires a college degree within one year of getting their degrees. You wonder if this is accurate and test it by talking to 106 randomly selected recent graduates. Of those 100 recent graduates, 77 of them found a job that required a college degree. Is Octavian College's claim accurate?

In answering this question, be sure to:

- Show your work on the calculated value;
- Indicate what your calculated value is;
- Indicate what your critical values are; and
- Determine if this is statistically significant

22. I showed you how to derive the Empirical Rule in Excel. Using that same technique, determine a “new” empirical rule for 0.5, 1.5, and 2.5 standard deviations from the mean.

Exam 2 Equation and Information Reference

<i>Function</i>	<i>Output</i>
ABS	The absolute value of an input
AVERAGE	Arithmetic mean of a dataset
CONFIDENCE.NORM	Determines the margin of error to make a confidence interval (known σ)
CONFIDENCE.T	Determines the margin of error to make a confidence interval (unknown σ)
CORREL	Correlation coefficient of two variables
CTRL + `	Show formulas
CTRL + F	Find
CTRL + P	Print
CTRL + X	Cut highlighted area
CTRL + C	Copy highlighted area
CTRL + V	Paste highlighted area
CTRL + Z	Undo
F4	Makes cell reference absolute
GEOMEAN	Geometric mean of a dataset (adjustments must be added manually)
LARGE	Larger values of a dataset (k=1 is largest, k=2 is second largest, k=3 is third largest...)
MAX	Maximum value of a dataset
MEDIAN	Median of a dataset
MIN	Minimum value of a dataset
MODE	Mode of a dataset
NORM.DIST	Returns the normal distribution for a specified mean and standard deviation.
NORM.INV	Returns the inverse of the normal cumulative distribution for a specified mean and standard deviation.
NORM.S.DIST	Returns the standard normal distribution.
NORM.S.INV	Returns the inverse of the standard normal cumulative distribution. Useful for finding critical z scores.
QUARTILE	The 0 th to 4 th quartile of a dataset
SQRT	Finds the square root of the value in question.
SMALL	Smaller values of a dataset (k=1 is smallest, k=2 is second smallest, k=3 is third smallest...)
STDEV.S	Standard deviation of a sample
T.INV	Finds area under a t distribution; useful for finding one-tailed critical t scores.
T.INV.2T	Finds area under a t distribution; useful for finding two-tailed critical t scores.

Coefficient of Variation

$$CV_{sample} = \frac{s}{\bar{x}} (100)$$

z-test

$$z_{\bar{x}} = \left| \frac{\bar{x} - \mu_{H_0}}{\sigma/\sqrt{n}} \right|$$

Confidence interval for proportion

$$\widehat{CI}_{\bar{p}} = \bar{p} \mp z_{\alpha/2} \sqrt{\frac{\bar{p}(1-\bar{p})}{n}}$$

Proportion

$$z_p = \left| \frac{p - \pi}{\sqrt{\frac{\pi(1-\pi)}{n}}} \right|$$

Optimal Sample Size

$$n = \left(\frac{z_{\alpha/2} \sigma}{ME} \right)^2$$

t-test

$$n = \left(\frac{z_{\alpha/2}}{ME} \right)^2 \bar{p}(1-\bar{p})$$

$$t_{\bar{x}} = \left| \frac{\bar{x} - \mu_{H_0}}{s/\sqrt{n}} \right|$$

Critical z scores

Use =NORM.S.INV command

Confidence	α	$z_{\alpha/2}$	z_{α}
90%	0.1	1.645	1.280
95%	0.05	1.960	1.645
99%	0.01	2.576	2.330
99.9%	0.001	3.291	3.090

Critical t scores

Use T.INV or T.INV.2T commands