Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

ECON/ACCT/BUSA 222—Bethany College

**Exam 02**

* There are 110 possible points on this exam. The test is out of 100.
* You have two hours 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.
* You are allowed a calculator for the exam. This calculator cannot be capable of storing equations. This calculator cannot double as a cell phone.
* Be sure to read all instructions and questions carefully.
* Remember to show all your work.
* Recall basic logic. “Water is wet” is a true statement. “Water is wet and leopards have stripes” is a false statement.
* You are allowed one 3” by 5” note card with the exam. You are allowed any information you deem important on it.
* *Please print clearly and neatly.*

**Part I: Multiple Choice.** *Choose the best answer to the following.*

4 points each.

1. Which of the following is an advantage of sampling over just surveying the population?
	1. It’s more accurate
	2. It’s often more practical
	3. It’s cheaper
	4. B & C
	5. None of the above
2. Francis is curious how Wal-Mart patrons feel about their shopping experience. He surveys every tenth person upon leaving the store. What kind of sample is this?
	1. Systematic
	2. Stratified
	3. Simple Random
	4. A & C
	5. None of the above
3. Which of the following is an example of a discrete probability distribution?
	1. The number of viewers of *American Idol* in a given week.
	2. The number of items in a refrigerator.
	3. The number of credit cards in a wallet.
	4. B & C
	5. None of the above
4. Each factory which makes Lays Potato Chips makes thousands of chips every day. Suppose you sample 100 chips to ensure the quality control machines are running correctly (like all things, some mistakes are expected even when they is running well). What technique should you use to determine if the mistakes are numerous enough to determine if the machine is broken?
5. Binomial distribution
6. Poisson distribution
7. z-test
8. t-test
9. None of the above
10. Which of the following is an example of Type 1 Error?
11. Not seeing a new television show which you would have enjoyed
12. Turning down a job offer from Facebook before the company took off on the basis that Facebook will never “make it big.”
13. Eating the same thing you always eat even though sometime better is available.
14. A & B
15. None of the above
16. Consider a uniform distribution with a maximum value of 10 and a minimum value of 4. What is the standard deviation of this distribution?
	1. √0.5
	2. √3
	3. √12
	4. √18
	5. None of the above
17. Donald owns a real estate company and wants to reward his best performing salesmen (“best” based on highest sales). He can afford to give a $5,000 bonus to the top 10% of salesmen. Sales follow a normal distribution with an average of $20,000 per week and a standard deviation of $3,000. To determine the cutoff point, Donald pulls up Excel for a normal inverted distribution. The function arguments look like this:



What, if anything, is wrong with what Donald is doing here?

* 1. The function should be NORMSINV (for standard normal), not NORMINV.
	2. The probability should be 0.9, not 0.1.
	3. The mean should be $5,000, not $20,000.
	4. A & C
	5. None of the above
1. I once told a friend that hybrid cars aren’t as eco-friendly as one might think. Because they save so much gas, people with hybrids end up driving more. My friend responded: “That’s absurd! I have a hybrid car and I don’t drive any more than I otherwise would.” What mistake was my friend making?
2. His sample is biased
3. He is accepting the null hypothesis when he should have rejected it
4. He is assuming his behavior hasn’t change but he may be wrong
5. A & B
6. None of the above
7. Under all circumstances, a normal distribution:
	1. Has a mean of zero
	2. Has most of its observations within one standard deviation of the mean
	3. Is bell-shaped
	4. B & C
	5. None of the above
8. Lars Costanzia runs an oil change shop. It takes, on average, 14 minutes for one of his employees to change someone’s oil. Lars just hired Kelly. After sampling 9 oil changes, Lars calculated Kelly to have an average change time of 12 minutes. Suppose Lars wants to know if his new employee is faster than his other ones. If X is Kelly’s true average (projecting her average into future performance), what is the null hypothesis?
	1. X = 12
	2. X = 14
	3. X > 12
	4. X < 14
	5. None of the above
9. Suppose the standard deviation of the population is 1 minute and the standard deviation of the sample is 2 minutes. Using the information from the previous question, what is the calculated value?
	1. t = -3
	2. t = -6
	3. z = -3
	4. z = -6
	5. None of the above
10. Kelly selects 11 books at random from a shelf of 30 books. She doesn’t put them back. Twenty of these books are fiction. If you are curious what the likelihood is that Kelly will select nothing but books of fiction, what technique would you use?
	1. Binomial distribution
	2. Poisson distribution
	3. z-test
	4. t-test
	5. None of the above

**Part II: True/False.** *Answer true or false, and justify your answer.*

10 points each.

1. Suppose Carol randomly surveys people with a job about how much each person makes. If she uses that data to estimate the average income for *all* Americans, then her sample is accurate but not precise.

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1. By the Central Limit Theorem (CLT), the mean of many sample means should equal the population mean.

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1. When you write your paper, an appropriate thesis statement could be “I explore how poverty rates affect CO2 emissions.”

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

16 points each.

1. Suppose cargo captain Kasidy Yates wants to invest in a new starship. To determine what she can afford, she needs to figure out what she can expect to transport (in cubic meters). Suppose she estimates the cubic meters of goods she can expect to transport using the latest orders from her busiest run: from Earth to Bajor. Based on previous experience, she knows that the standard deviation in cubic meters is 3,000. (A war just broke out and it will decrease trade—so she can’t use her previous data to determine the new mean—but it’s reasonable to assume the standard deviation is the same.) With 95% confidence, she wants to limit her error to no more than 600 cubic meters on either side of her mean. How many orders will she have to sample? (HINT: at 95% confidence, z=1.96.)

*Don’t forget the last question on the back!*

1. Consider Rachel, who works for an auto insurance company. She wants to know if men are worse drivers than women. In a survey of 100 men, 12 have caused a major accident in the past five years. In a survey of 110 women, 6 have caused a major accident in the past five years. At 95% confidence (z=1.96) do men have a higher accident rate than women?