**Name**

## Math 201 Exam 2

**Please work out each of the given problems. Credit will be based on the steps that you show towards the final answer. Show your work.**

**Problem 1 Circle True or False**

1. If you will be constructing a 95% confidence interval for the mean number of pets per household, then there is a 95% chance that the population mean number of pets will lie within your confidence interval that you will construct.  
   **True False**
2. The sample mean will always be in the center of the confidence interval for the population mean. **True False**
3. If a 95% confidence interval for the proportion of snowboarders at the resort who hold a season pass is [0.15,0.23], then there is a 95% chance that if another sample were taken with the same sample size, then between 15% and 23% of this new sample of snowboarders will hold a season pass. **True False**
4. The distribution of all possible sample means of sample size 98 of cars’ miles per gallon is approximately normal even though the miles per gallon for all cars is not normal.   
    **True False**
5. If you are performing a hypothesis test, you need to be concerned about both a type I and type II error, but after making your conclusion, you only need to be concerned about one of these possible errors. **True False**
6. If you select a 5% level of significance for a hypothesis test to see if more than 10% of all people have shoplifted, then if 10% of all men have shoplifted, then there will be a 5% chance that you will end up saying that more than 10% shoplift. **True False**
7. If you conduct a hypothesis test to see if geese will consume more food that is thrown to them then ducks and if you find the p-value = 0.03, then there is a 3% chance that they consume the same amount of food that is thrown to them. **True False**
8. If the standard deviation of the population is 15 then the sampling distribution for samples with n = 9 will have a standard deviation of 5 regardless of the distribution of the population.  
    **True False**

**Problem 2**

29% of American college students are obese. Is the obesity rate smaller for LTCC students? Of the 200 students who were part of the study, 41 were obese.

1. State the Null and Alternative Hypotheses
2. Write down the test you are using and calculate the test statistic and P-Value.
3. Use a complete sentence to state your results using the level of significance of 0.10 in the context of the question.
4. The level of significance, 0.10, represents a probability. Use a complete sentence to interpret this probability in the context of the study.

1. Either a Type 1 or Type 2 error is relevant here. State which one and then give the repercussions of it.

**Problem 3** You want to construct a 97% confidence interval for the percent of Americans who are in love. If you want the margin of error to be no more than 3%, how many Americans must you survey?

# Problem 4 You are interested in the mean amount of money that Californians spend on food each week. You surveyed 54 Californians who spent an average of $118 each week on food and their standard deviation was $37.

1. Come up with the appropriate 95% confidence interval.
2. Interpret the confidence interval in the context of the study.
3. 95% represents a probability. Interpret this probability in the context of the study.

# Problem 5 You are interested in the percent of elementary statistics students who will eventually need to take a more advanced statistics class. 75 of the 340 elementary statistics students who you observed throughout their college career eventually took a more advanced statistics class.

1. Come up with the appropriate 95% confidence interval.
2. Use a complete sentence to interpret the confidence interval in the context of this study.

1. Was the sample size large enough in order to use the normal distribution? Explain numerically.

**Problem 6** Suppose that the number of times a day people smile is normally distributed with mean 20 and standard deviation 6. For each part write down the distribution, sketch the appropriate diagram, answer the question and state whether or not the normality assumption was needed.

1. What is the probability that a randomly selected person smiles at least 15.2 times each day?
2. If 29 people are randomly selected, what is the probability that they smile between 550 and 600 total times each day?
3. If 10 people are randomly selected, what is the probability that the total number of smiles for these 10 people will be fewer than 190 smiles each day?
4. Find the third quartile for the number of smiles each day a person smiles.

1. What is the probability that a randomly selected person will smile more than 22 times per day given that the person smiles more than 18 times per day?