**HW 10: Statistical Inference with  Last Name: Stark, Cameron.**

**Problem 1** According to the U.S. Census Bureau, the percentage of mothers who worked in 2010 was 45%. Economists speculate that the shrinking middle class has probably led to an increase in the percentage of mothers that work. A sample of 500 mothers found that 248 worked. We want to test the economist’s theory.

* 1. What type of hypothesis test would we want to run?

*We want to run an upper tail hypothesis test because we are interested in if the proportion of mothers working has increased from the known/previous amount*

* 1. What is 0 in this problem?

0 = .45

* 1. Write out the two formal hypotheses (i.e. with the correct notation)
  2. Are the conditions for using the Central Limit Theorem satisfied (justify your answer)?
* *Is Random? : Not stated but can be assumed to be random*
* *Large enough? : Yes, because of the two below conditions*
  + *E[success] = 225 > 10*
  + *E[failures] = 275 >10*
* *To large? : 500 is less that 10% of U.S. mothers*
  1. What is the null distribution for the sample proportions?

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* 1. Compute the p-value give its value.

*P-value = .019*

* 1. Run the hypothesis test at =5%. What is your STATISTICAL decision (i.e. reject the null or fail to reject the null). Explain how you made the decision

*Reject the null because 5% > 1.9%*

* 1. State your final conclusion (remember this is the statement where you use ordinary language)

*At a significance level of 5%, there is sufficient evidence that the proportion of mothers working has increased since the previous test.*

**Problem 2**

In this problem, we want to find the 95% confidence interval for the average percentage of working mothers in problem 1.

1. What is the margin of error you computed for this problem?

*MOE = 0.043*

1. Write out the 95% confidence interval for the percentage of working mothers

*[45.2%, 53.9%]*

1. Explain what 95% confidence means

*95% percent of samples taken will have the actual proportion of the population within its range of values*