

Take your time and make sure you follow all instructions. Where necessary, work must be shown in order to receive partial credit. Include input into the calculator in order to receive partial credit.

1. Determine ONLY the  $H_O$  and  $H_A$  for the following claims. [4 pts each]
  - a) A study claims that the percent of girls at a school is not 50%.
  
  
  
  
  
  
  
  
  
  
  - b) A researcher believes that over 35% of US adults are overweight.
  
  
  
  
  
  
  
  
  
  
  - c) A television network says that under 40% of its shows contain violence.
  
  
  
  
  
  
  
  
  
  
2. Decide if the following will be True or False under the assumption that everything else remains the same. [2 pts each]
  - a) Decreasing the confidence will decrease the margin of error.
  
  
  
  
  
  
  
  
  
  
  - b) Raising the margin of error will lower the sample size.
  
  
  
  
  
  
  
  
  
  
  - c) A Type I error is when the Null is false but it is not rejected.

3. A study finds American families' cell phone bills are normally distributed with a mean of \$89 and a standard deviation of \$24.5. If 16 families are randomly selected what is the probability their cell phone bills average below \$85? Be sure to check the necessary conditions. [12 pts]
4. The quality of food coming off a preparation line is routinely monitored for quality by periodically selecting a random sample to see if the quality of the food meets the specifications of the manufacturer. If the quality of the sample is rejected the line will be stopped to indentify and fix the problem. [13 pts]
- a) In this context, what is a Type I error?
  - b) In this context, what is a Type II error?
  - c) Which will be more serious to the consumer?

5. What size random sample would need to be selected to find a 90% confidence interval for the proportion of workers in a state that are currently unemployed within 4.5 percent? [12 pts]
6. A medical researcher finds that 32 out of 140 randomly selected adults over 40 years old have high blood pressure in a given state.
- (a) Give a 98% confidence interval for the percent of adults over 40 years old with high blood pressure. Construct the interval by hand, but your calculator can be used to check your results. Make sure the appropriate conditions are met.
  - (b) What does it mean to be 98% confident?
  - (c) Would the American Heart Association be correct in saying that a third of adults over 40 years old have high blood pressure in the given state? Why or why not? [25 pts]

7. A travel website says that over 85% of American families travel during the Holiday season whether it be for vacation or to visit family. To test the claim a group randomly selects 300 families and finds that 270 are planning to travel during the Holidays. Perform a 5% significance test. State the appropriate hypothesis, make sure the appropriate conditions are met, show the work for calculating the test statistics, show the  $p$ -value, and write a conclusion. [25 pts]