**MA 209 Practice Exam 3**

**Spring 2022**

**Directions:** You have 80 minutes to complete this exam. Always label units where appropriate. You may use the provided Jupyter Notebook, the reference information you prepared, and a standard or graphing calculator, but no cell phones or other electronic devices are allowed. You may not use the text book or other online resources. Please turn off your cell phone and store it during the exam. Also, you must work alone. Good luck!

**I, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, am fully aware of and have abided by the BSC Honor Code in completing this exam.**

1. Red Pearl is a restaurant on Valley Road that makes delicious food. The owners want to know if orders are filled fast enough. Over the course of a month, 400 randomly selected customers are asked to write on the receipt if they were satisfied with the wait time. Of those 400 customers, 355 were satisfied with the wait time. We will be considering a 95% confidence interval for the proportion of customers that are satisfied.
   1. Explain why the requirements for constructing such a confidence interval are met.
   2. Find a 95% confidence interval. Round to 2 decimal places.
   3. Which is the correct conclusion based on the confidence interval above?
      1. We are 95% confident that the sample proportion of satisfied customers lies in the interval.
      2. 95% of customers are satisfied with their wait time.
      3. We are 95% confident that the proportion of all customers at Red Pearl who are satisfied with their wait times lies in the interval.
      4. 95% of the time the population proportion falls within this interval.
   4. If the owners had selected fewer customers for their sample (and had the same sample proportion), the margin of error would:
      1. be smaller.
      2. be larger.
      3. stay the same.
      4. need more information to be determined.
   5. How does a 99% confidence interval compare to a 95% confidence interval if they both use the same sample?
      1. The 99% confidence interval is smaller.
      2. The 99% confidence interval is larger.
      3. The 99% confidence interval is the same size.
      4. It depends upon the sample taken.
2. Explain the overall logic behind a hypothesis test in complete sentences.
3. In an upcoming election, locals will vote on a bill which would raise property taxes to benefit local public schools. A random sample of 500 likely voters had 53% of the respondents supporting the bill. To raise the property taxes, a majority (more than 50%) of all voters must support the bill. Perform a hypothesis test to see if at least a majority of all voters will support the bill.
   1. State the hypotheses, using correct notation.
   2. Is this a left-tailed, right-tailed, or two-tailed test?
   3. Explicitly check any assumptions needed to perform the test.
   4. Find the test statistic.
   5. Find the P-value.
   6. Interpret the P-value in context.
   7. Determine whether you would reject the null if the significance level is given as .
4. Historically, the average human body temperature was thought to be 98.6. Assume you know that . A random sample of 150 people recorded a mean body temperature of 98.4.
   1. Find a 99.7% confidence interval for average body temperature. Round to 2 decimal places.
   2. For this specific interval, you are 99.7% confident of what?
5. Historically, the average human body temperature was thought to be 98.6. Suppose you do not know , and that in the sample from the previous question, the sample standard deviation was 1.1. Test whether there is evidence that the actual population mean temperature is lower than the historically believed mean.
   1. State the hypotheses, using correct notation.
   2. Is this a left-tailed, right-tailed, or two-tailed test?
   3. Explicitly check any assumptions needed to perform the test.
   4. Compute the test statistic.
   5. Find the P-value.
   6. Assume the α = 0.05. State your conclusion in the context of the problem.
6. The admissions staff at Louisiana State University would like to claim in their mailings to prospective students that LSU engineering graduates earn more money than engineering graduates from Louisiana Tech University. A random sample of 150 LSU graduates shows an average starting salary of $55,000 with a standard deviation of $7,500, while a random sample of 137 Louisiana Tech graduates shows an average starting salary of $53,000 with a standard deviation of $7,000. Set up and conduct an appropriate hypothesis test to see if it is reasonable for the admissions staff to make the stated claim. All statements should use proper notation and terminology.
7. The provided CSV file, Grade\_Example.csv, shows the grades for two past sections of Dr. Barton’s MA 207 class. Use single-variable linear regression to determine the component of the final COURSE\_GRADE that is the best predictor of COURSE\_GRADE.
   1. Use appropriate language in your determination, including an interpretation of the best value.
   2. Interpret the slope for one of your regression lines.
8. Suppose a student wants to predict their final course grade based on their midterm performance. Assume midterm performance includes the first two exams and the homework. Use multiple regression to predict the final course grade for a student who made an 80% on Exam 1, a 92% on Exam 2, and a 75% on the homework. Based on the how confident should the student be about the prediction?