

**Instructions:** This exam is in two parts: Part I is to be completed partly at home using the materials posted in the course for the at-home portion and you will answer questions about that work during the in-class portion of the exam; Part II is to be completed entirely in class. You may not use cell phones, and you may only access internet resources you are specifically directed to use.

At home, prepare for questions in Part I using R. Open the data file entitled **324exam2data.xlsx** posted in Blackboard. (Note: this file has multiple sheets of data. You may want to separate the data into separate files to upload to R, or look up how to access multiple sheets in R from a single upload.) Complete the calculations noted below. You will be asked for additional analysis and interpretation of this data in the in-class portion of the test. Print out the results of your analysis and code, and bring the pages with you to the exam. You will submit all this work along with the in-class exam.

1. A sample of 81 students is selected and it is determined that their mean math ACT score is 24.2. If the true mean math score is actually 21.6 (with a standard deviation of 5.2), what is the power of the one-sample test to detect this 3-point difference?

From Sheet 1:

2. Customer purchases from a store are recorded and the type of card they use. Conduct an appropriate hypothesis test of the data to determine if the total sale is more for the store card than for other cards. Test your assumptions.

From Sheet 2:

3. Conduct a two-way ANOVA test on whether promotion type or competitor affect sales (and any interactions). Apply Tukey's method to plot the differences of means for each set of effects. Which factors produce the highest sales? Be sure to check your data for normality. Create a comparative boxplot of both factors to confirm your analysis.

From Sheet 3:

4. Use the data to determine if salary type in the dataset had tried or has not tried the product (lasagna) the same rate. You'll need to count the number of salaried vs hourly in the data, and within each group, count the number of people who have tried or not tried the product in each group. Conduct a two-sample proportion test to determine if the difference is statistically significant. Check the assumptions of your test.
5. Using Neighborhood, Dwell Type and Live Alone, conduct a three-way ANOVA of school car value. Test main and interaction effects where possible. Test for the normality of car value. Apply Tukey's method.
6. Conduct a one-sample hypothesis test of CC Debt (credit card debt) to see if there is significant reason to believe CC Debt is greater than \$1,400 per person.
7. Build a sampling distribution of Income. Collect 1000 samples of 50 people each. Calculate the mean of the sample. Build a histogram of your sample mean data. Find the mean (of the means) and the standard deviation of your sample means (the standard error). Find the mean and standard deviation of the original data. Compare the results.