MT 143, Exam #2 ("Paper"), Spring 2020 Name ______

Instructions: The data below is provided in advance of the exam date so that you can use technology to analyze the data. You may use any technology you wish or do any part of the analysis by hand. Your analysis in the form of printed graphs and calculations, and any required explanations must be loaded to the paper-test submission box by the due date. These answers will be graded by hand.

 Consider the following scenario: According to the CTIA-The Wireless Association, the mean monthly cell phone bill was \$47.47 in 2010. A researcher suspects that the mean monthly cell phone bill is different today. (20 points) a. State the null and alternative hypotheses in this situation with appropriate notation.

- b. Is the hypothesis test one-tailed or two-tailed?
- c. What kind of information would you need in addition to what was provided to determine if the test is a z-test or a t-test?

d. What is the relationship between the p-value and the chance of a Type I error in the context of this problem?

e. What is a Type II error in the context of this problem?

2. A statistics department at a state university maintains a tutoring service for students in its introductory service courses. The service has been staffed with the expectation that 40% of its students would be from the business statistics course, 30% from engineering statistics, 20% from the statistics course for social science students, and the other 10% from the course for agriculture students. A random sample of n=120 students revealed 50, 40, 18, and 12 from the four courses. Does this data suggest that the percentages on which staffing was based are not correct? State and test the relevant hypotheses using $\alpha = .05$. [Conduct a goodness-of-fit test.] (20 points)

3. Folacin is the only B vitamin present in any significant amount in tea, and recent advances in assay methods have made accurate determination of folacin content feasible. Consider the accompanying data on folacin content for randomly selected specimens of the four leading brands of green tea.

Brand	Observations						
1	8.0	6.3	6.7	8.7	9.0	10.2	9.7
2	5.8	7.6	9.9	6.2	8.5		
3	6.9	7.6	5.1	7.5	5.4	6.2	
4	6.5	7.2	8.0	4.6	5.1	4.1	

Does this data suggest that true average folacin content is the same for all brands? Carry out a single-factor ANOVA test using $\alpha = .05$ via the *P*-value method. (20 points) 4. A data file is provided, **143exam2data.xlsx**, with data on gender and salary taken from a retail company's files. Conduct a two-sample hypothesis test to determine if the mean salary of one gender are different than the mean salary of the other. In this data set, **1**=male. Clearly state your null and alternative hypotheses and interpret the results. Is there sufficient evidence to think the mean salaries are different? (20 points)