### Topics:

* Single Factor ANOVA and Multiple Comparisons Procedures
* Describing Visual Displays
* Lessons Covered: 31- 33
* Textbook Chapter (Optional): 10

### Grading:

* Points are listed next to each question and should total 25 points overall.
* Grading will be based on the content of the data analysis as well as the overall appearance of the document.
* Late assignments will not be graded.

### Deadlines:

* Final Submission: **Monday, December 1st**. All submissions must be PDF files.

### Instructions:

* Clearly label and **type answers** to the questions on the proceeding pages in Word, Google Docs, or other word processing software.
* Insert **diagrams or plots as a picture** in an appropriate location.
* Math Formulas need to be typed with Math Type, LaTeX, or clearly using key board symbols such as +, -. \*, /, sqrt() and ^
* Submit assignment to the Gradescope link as a PDF. Indicate the pages to the individual questions and also verify the correct document has been uploaded. Failing to follow this direction may result in point deductions.

### Allowances:

* You may use any resources listed or posted on the Canvas page for the course.
* You are encouraged to discuss the problems with other students, the instructor and TAs, however, all work must be your own words. Duplicate wording will be considered plagiarism.
* Outside resources need to be cited. Websites such as Chegg, CourseHero, Koofers, etc. are discouraged, but if used need to be cited and used within the boundaries of academic honesty.

**Part 1. (25 points)**

Single Factor ANOVA is a method we use when we want to compare a quantitative variable among more than two categories. It evaluates whether the means of different treatment groups, or populations, are equivalent. When we only have two populations then we can perform a two-sample t procedure, but when we have more populations we need to examine the data with Single Factor ANOVA.

In the R script DA6\_Single\_Factor\_ANOVA.R, follow along with the analysis that compares average number of roommates between majors for the ST314 online students. You will need to upload the student information dataset from Canvas.

Once you have reviewed the example analysis, conduct your own by choosing one of the following three options:

**Option 1:** Is there evidence average number of terms a student has been studying at OSU differs between majors for ST314 students?

**Option 2:** Is there evidence average weekly gaming hours per week differs between majors for ST314 students?

**Option 3:** Is there evidence average anticipated salary differs between majors for ST314 students?

**For the option you selected, answer the questions below. Use a significance level of 0.10.**

1. **(3 point)** Create side-by-side boxplot of the data and add color and a title to your plot. Paste your plot.

<Delete this text and answer the question here>

1. **(2 point)** From the side-by-side box plot, does there look to be a difference between the averages? Explain your reasoning.

<Delete this text and answer the question here>

1. **(2 point)** State the appropriate null and alternative hypothesis for the Single Factor ANOVA F test.

<Delete this text and answer the question here>

1. **(3 points)** State the conditions for the Single Factor ANOVA F Test. Is it reasonable to seem that these conditions are satisfied? Explain your reasoning. *If not, still proceed.*

<Delete this text and answer the question here>

1. Perform the Single Factor ANOVA F test in R.
   1. **(2 point)** Paste the ANOVA table.

<Delete this text and answer the question here>

* 1. **(2 points)** From the ANOVA table, what is the average between group variability and the average within group variability, respectively the MSTr and MSE?

<Delete this text and answer the question here>

1. Use the F statistic and p-value from the ANOVA table to state whether there is a significant difference between at least two of the group means.
   1. **(2 points)** State whether to reject the null. State the test statistic and p-value.

<Delete this text and answer the question here>

* 1. **(2 points)** Include a statement in terms of the strength of evidence in terms of the alternative. Include context.

<Delete this text and answer the question here>

1. Using the Tukey’s Multiple Comparison procedure output. Are there any individual comparisons that are significant at the 0.10 significance level?
   1. **(2 point)** Paste R output for the multiple comparisons procedure.

<Delete this text and answer the question here>

* 1. **(2 point)** List all comparisons that are significant (or state those that are not).

<Delete this text and answer the question here>

* 1. **(3 points)** Interpret the 90% F-W confidence interval for the difference with the smallest p-value (even if it is not significant).

<Delete this text and answer the question here>