STAT 6012: Linear Models for Data Science
Class Activity 2

Due date: Wednesday, July 17 by 10:50 am Via Canvas.

Complete the following questions an R Markdown file and submit your compiled HTML file. If you are working in a group, list the names (last, first) of the group members in alphabetical order of last names.

A fast-food chain plans to add a new item to its menu. However, they are still undecided between three possible marketing campaigns for promoting the new product. In order to determine which promotion has the greatest effect on sales, the new item is introduced at locations in several randomly selected markets. A different promotion is used at each location, and the weekly sales of the new item are recorded for the first four weeks.

The attached dataset contains information on the data collected for the marketing campaign. Read more about this dataset and the variable descriptions:

`https://www.kaggle.com/datasets/chebotinaa/fast-food-marketing-campaign-ab-test?resource=download`

Import the dataset in R and use it to answer the following questions:

1. [8] The company is interested in estimating the mean sales for promotion 3. The following code is a sample R Code that filters out data from Promotion 3.

```
Promotion3_data<-subset(AB_Test_data, Promotion==3)
```

   [Note: `AB_Test_data` is the name assigned to the imported dataset.]

   (a) [4] Use `Promotion3_data` to find a 95% Bootstrap confidence interval, using the quantile method with 1000 bootstrap samples, to estimate the mean sale amount generated based on Promotion 3.

   (b) [3] Use `Promotion3_data` to find a 95% confidence interval (t-interval) to estimate the mean sale amount generated based on Promotion 3. Also, **interpret** the 95% confidence interval.

   (c) [1] Compare the Bootstrap and t-intervals in terms of widths.

2. [2] Suppose that fast-food chain is mostly interested and excited about Promotions 2 and 3. The following code is a sample R Code that filters out data from Promotion 2 and 3.

```
Promotion_2_3<-subset(AB_Test_data, Promotion==2 | Promotion==3)
```

   Conduct an AB test analysis that compares mean sales between Promotion 2 and Promotion 3. Use your results to advice the fast-food chain management on which Promotion to use for the addition of the new item to its menu. Be sure to specify how much higher, on average, the recommended Promotion will generate over the other.