MATH 3070: Statistical Report Assignment No.1

For each of the following problems write your own report which contains (at least) three paragraphs:

**Introduction.** This paragraph (or two) provides a short description of data, and explains the variables which appear in the data set. It must also include the statement of study question(s) which gives rise to the experiment in the first place.

**Data analysis.** It should contain the “summary statistics” which includes the mean, the median, and the standard deviation. You should also include exploratory graphics such as histogram or boxplots when they are appropriate. Describe a statistical model and state null and alternative hypothesis (which can be omitted if it is clear in the statement of study questions). A description of test procedure is helpful along with justification on how you have chosen it. Then present the p-value required for the conclusion of the study. Do you get the same p-value if you choose different test procedures? If so, briefly explain what differences are.

**Conclusion.** This section provides a short discussion and your own answer to the study question(s) or the objective of study. You might start by restating the result of hypothesis test from the previous section, and explain what they support or contradict regarding the study question(s). If you see the weakness in your conclusion, make suggestions for future research.

1. **Sample assignment problem.** Conduct hypothesis test regarding “Car Mileage” (Data file mileage.csv). A federal regulatory agency is investigating an advertised claim that a certain device can increase the gasoline mileage of car.

The data set is available at e-Statistics. Go under the title “Data in Statistical Studies”→“Worksheet Data Sets.”

Then answer the following study questions:

* 1. Describe the null and the alternative hypothesis to determine whether there is a significant gain in mileage after the devices were installed.
	2. Calculate the test statistic and find the critical point for the test with significance level 0.05.
	3. State statistical findings from hypothesis test, and write a conclusion of study.
1. To determine the effect of the new method on the yield of penicillin, the data were collected for seven types of base blend (B1 to B7) to produce penicillin. ``Method I'' is referring to a current standard process, and ``Method II'' is referring to the process newly developed by a biomedical research firm.

The data set is available at e-Statistics. Go under the title “Data and Story Library” → “Penicillin yield.”

**Objective of study.** The biomedical research firm offered your company an exclusive right to use this method. The decision to use this method is a serious investment, but it may bring in a huge profit if this method can produce more penicillin per manufacturing unit. In your statistical report present your analysis and your recommendation to your boss.