DSO 510: Homework 4

Due: Sunday, December 5 @ midnight

General Instructions

You must submit 1 word/pdf document with your screenshots and answers. Even if you have answered the questions in the statistical software (Excel, R, Python, etc.) you are using, you should summarize your answers in the document. You should also submit the file where you conducted your statistical analysis (Excel, R, Python, etc.) **This homework is optional.**

In the file, hw4.csv, you will find information on automobile sales. Here is an outline of the data:

Variable Name	Description
Price	The price (in thousands $) of the automobile.
Sales	The number of vehicles sold (in thousands).
Engine_Size	The engine size of the automobile (liters).
Fuel_Capacity	The fuel capacity of the automobile (gallons).
Fuel_Efficiency	The fuel efficiency of the automobile (miles per gallon)
Car_Brand	The brand of the automobile. The exact brand is hidden. (1: Brand 1; 2: Brand 2; 3: Brand 3; 4: Brand 4.

1. Using the data, estimate a univariate linear regression model for the relationship between sales and price. The independent variable is price and the dependent variable is sales. You want your model to speak in terms of elasticity, so your interpretation should be a 1% increase in price is associated with a x% change in sales. What does the model indicate is the relationship between price and sales? Is the relationship statistically different than zero?

2. Estimate another model that estimates the relationship between price and sales (similar to 1, this should speak in terms of elasticity), but this model also includes controls for all other variables available in the dataset (do not log transform engine size, fuel capacity, and fuel_effeciency). What does the model indicate is the relationship between price and sales? Is the relationship statistically different than zero?

3.   Using linear regression, test the null hypothesis that the expected difference in sales between car brand 2 and 3 is equal to zero, controlling for price, engine size, fuel capacity, and fuel efficiency.

4.   Test the null hypothesis that, controlling for engine size, fuel capacity, and fuel efficiency, the relationship between price and sales is the same for car brand 3 and car brand 4. That is, test the null hypothesis that a 1% increase in price is associated with the same percentage increase in sales for brand 3 and brand 4 cars.