Homework - 2 (SLR / MLR- 2)

ECO 204 (Spring 2025)
Instructor: Shaikh Tanvir Hossain

Due: 6th May (Section 1) and 5th (Section 9) in Class, Individual Submission

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Please write all the answers on paper and submit in class, and submit the excel / R script file in the classroom before coming to the class.

1. You have a data set titled `Fast_Food_Data_MLR.xlsx`, it has 3 in-dependent variables, Student Population in short Spop (measured in 1000s), Average Price in short Aprice (measured in BDT), Advertisement Expenditure in short Adv (measured in 1000 BDT) and dependent variable Msales (measured in 1000 taka), now answer following questions,
   (a) How do you think each of the independent variables and monthly sales are related? Just give a qualitative answer without any data work?
   (b) Plot the scatter plot between monthly sales and each of independent variables. Do you see any linear relationship for each of them?
   (c) Regress monthly sales on all other variables together. What are the slope and Intercept coefficients?
   (d) Write the sample regression function,
   (e) How would you interpret the intercept and different slopes in this case?
   (f) Calculate the predicted values (or fitted values) of monthly sales using the regression function when Spop $=$ 2, Aprice $=$ 280, Adv $=$ 50.
   (g) Calculate the predicted values (or fitted values) of monthly sales using the regression function when Spop $=$ 23, Aprice $=$ 260, Adv $=$ 180.
   (h) What is the population regression function (or conditional expectation function) in this case.
   (i) Calculate the 95% confidence interval for the population slope coefficient for Spop (which is β_1 in this case)
   (j) Is Spop a *statistically significant* predictor for Msales. This means - Test if the population slope coefficient for Spop is equal to zero at 5% significance level. Write down the Null and Alternative hypothesis clearly before doing the test.
   (k) Calculate the 95% confidence interval for the population slope coefficient for Aprice (which is β_2 in this case)
   (l) Is Aprice a statistically significant predictor for Msales.
   (m) Do a joint test, such that all slope co-efficients are equal to zero. What do you conclude? Write down the Null and Alternative hypothesis clearly before doing the test.