

Assignment #1

Instructions:

- For all questions, answer up to 4 decimal places.
- This assignment is due on **Tuesday, Mar 9, 2021 before class (11.00)**.
- Write your answer in either digital or ordinary paper. For digital paper, export pages into a single PDF file. For ordinary paper, take photos of your writing and convert them into a single PDF file as well.
- There is no need to rewrite the question. Assign number item, ie. 1 a., clearly before your answer is sufficient.
- Submit your assignment into Moodle.
- Name your file as StudentID_Nickname (in Thai) such as 123456789_วิฑูรย์

1. Given this information

$$\begin{array}{l} n = 30 \qquad \sum_{i=1}^n X_i = 366 \qquad \sum_{i=1}^n Y_i = 631 \qquad \bar{X} = 12.20 \qquad \bar{Y} = 21.03 \\ \sum_{i=1}^n (X_i)^2 = 5,564 \qquad \sum_{i=1}^n X_i Y_i = 7,524 \qquad \sum_{i=1}^n (X_i - \bar{X})^2 = 1098.8 \qquad \sum_{i=1}^n (Y_i - \bar{Y})^2 = 882.97 \\ \sum_{i=1}^n (X_i - \bar{X})(Y_i - \bar{Y}) = -174.20 \qquad \sum_{i=1}^n \hat{u}_i^2 = 873.14 \end{array}$$

Answer the following questions. Show your work.

- From regression model: $Y_i = \beta_1 + \beta_2 X_i + u_i$, $u_i \sim NIID(0, \sigma^2)$ (normally, identically and independently distributed), find the estimators of β_1 and β_2 with OLS method and explain the meaning of the model.
- Find r^2 and explain its meaning.
- If $X_i = 5$, estimate the value of \hat{Y}_i and explain its meaning.
- Find the estimators of $\text{var}(u_i)$, $\text{var}(\hat{\beta}_1)$ and $\text{var}(\hat{\beta}_2)$
- Test the hypothesis whether coefficients are different from zero at 0.05 level of significance.
- Test the hypothesis whether coefficients are less than zero at 0.01 level of significance.

2. Given that Y is market price of a car (USD) while X is how long a car aged (years), results of the regression are as follows.

$$\hat{Y}_i = 7,836 - 502.4X_i$$

(52) (411.8)

Given that u_i is normally, identically and independently distributed with zero mean and σ^2 variance, total number of observations is 11,

$$\bar{X} = 7.45,$$

$$\hat{\sigma}^2 = 212,877,$$

$$\sum(X_i - \bar{X})^2 = 78.73,$$

Answer the following questions. Show your work.

- a) Does the sign of $\hat{\beta}_2$ make economic sense? Provide your explanation.
- b) If you are a car expert and someone asks you to estimate how much his car will be **averagely** priced at when his car is 5 years old, how much is the market price range that you would estimate that you can make sure that for 95% of the time, market price will be within the specific range?
- c) If you multiply all the X with 10, report the new SRF with the standard error resulted from the multiplication.
- d) Calculate the elasticity of market price when a car is 10 years old.