



EE325 Introductory to Econometric Semester 2/2017

Instruction

1. There will be no solution given for these extra problems
2. Try to do it on your own and truly understand the process. No one can help you in the exam.
3. If you have any troubles, you can contact me after you try on your own and show me your work.

Prove these statements

1.

$$ESS = \sum (\hat{Y} - \bar{Y})^2 = \hat{\beta}_2^2 \sum (X - \bar{X})^2$$

2.

$$\sum X \hat{u} = 0$$

3.

$$Var(\hat{\beta}_1) = \sigma^2 (\sum X^2 / n \sum x^2)$$

4.

$$Var(Y) = \sigma^2$$

Tips on mathematics prove

1. Know your statistical formula such as properties of expectation and variance.
2. Know your parameters/variables.
 - Whether it is random or non-random. This will be very important for using expectation and variance.
 - Whether it can take one or many values. For example, X_i can take n values from X_1 to X_n , while $\hat{\beta}$ can only be one value for one sample. This will be very important for using summation, $\sum$.
3. Try to break the equation into small parts
 - For example, $Var(\bar{Y}) = Var(\frac{\sum_{i=1}^n Y_i}{n}) = Var(\frac{Y_1 + \dots + Y_n}{n})$
4. Try many approaches.
 - Change the initial equation.
 - Doing things from bigger perspective.
 - Multiply by 1 such as $\frac{n}{n}$.
 - Grouping/Transform variables such as $\sum X_i$ to $n\bar{X}$.