HW1

A. (1) Y_i : observed & random

β_1 : unobserved, fixed, to be estimated

μ_i : unobserved & random

(2) An estimator in general is a rule for using sample information to measure unknown parameters in the model.

An OLS estimator is obtained by minimizing the sum of squared loss.

(3) An estimate is a realization of an estimator for the sample.

(4) A residual in general is the difference of the observed dependent value and the fitted value.

We get the OLS residual if an OLS estimator is used for estimation.

(5) $se(\hat{\beta}_1) = \sqrt{\widehat{Var}(\hat{\beta}_1)} = \sqrt{\hat{\sigma}^2/n}$

$$\hat{\sigma}^2 = \frac{\sum \hat{\mu}_i^2}{n-1} = \frac{\sum (y_i - \hat{\beta}_1)^2}{n-1}$$

B.

$$\hat{\beta}_1 = \bar{y} = \frac{\Sigma y_i}{n} = 0.1212$$

$$\hat{\sigma}^2 = \frac{\Sigma (y_i - \hat{\beta}_1)^2}{n-1} = 0.0019$$

$$se(\hat{\beta}_1) = \sqrt{\hat{\sigma}^2 / n} = 0.0139$$

$H_0: \beta_1^0 = 0.200$, $H_A: \beta_1^0 \neq 0.200$, $\alpha = 0.05$

$$t = \frac{\hat{\beta}_1 - \beta_1^0}{se(\hat{\beta}_1)} = -5.669$$

$$|t| > t_{9, 0.025} = 2.262$$

Reject H_0 at 5% significance level.