LINEAR REGRESSION MODELS W4315

HOMEWORK 3 ANSWERS

October 12, 2009

Instructor: Frank Wood (10:35-11:50)

1. (20 points) 2.17 in the textbook

Answer:

Greater than. The conclusion is that we accept $H_0 : \beta_1 = 0$.

2. (60 points) 2.23 in the textbook

Answer:

a.

Source	MS	df	SS
Regression	3.5879	1	3.5879
Error	45.8176	118	0.3883
Total	49.4055	119	

b. MSR estimates $\sigma^2 + \beta_1^2 \sum (X_i - \overline{X})^2$. MSE estimates σ^2.
(A lot of you simply wrote the definition of MSR/MSE, however the problem asked about what do they estimate. Analogous to using sample mean to estimate the population mean, the quantity being estimated should be a population version.)
They estimate the same quantity when $\beta_1 = 0$.

c. $H_0 : \beta_1 = 0, H_a : \beta_1 \neq 0$.
$F^* = 3.5879/0.3883 = 9.24, F(0.99; 1, 118) = 6.855$
If $F^* < 6.855$, accept H_0, otherwise reject H_0.
We reject H_0.

d. $SSR = 3.5879$; 7.26%; coefficient or determination.

e. +0.2695.

f. R^2. R^2 is the proportion of variability in a data set that can be explained by the statistical model. It provides a measure of how well the data can be summarized by the model.

3. (20 points) 2.54 in the textbook

Answer:

Yes. The linear relationship between Y and X can be captured by β_1.
No. The variance of Y depends on X.