ECO240 Quiz 3 Questions and Answers [May 11, 2009]

n = 30

$y = -301 + 51X_1 + 0.025X_2 + 2896X_3 - 70X_4$

SE (19) (0.0142) (455) (69)

	SS	MS
Regression	1037	259
Error	1149	46
Total	2186	

$y = -42 + 91.4X_1 + 0.000393X_2$

SE (1.94) (0.0014)

	SS	MS
Regression	759	379
Error	1426	53
Total	2186	

You are given the following table values and the formulas for test statistics.

t (25,0.025) = 2.060 F(4, 25, 0.05) = 2.76 F(2, 25, 0.05) = 3.39	$F^c = \frac{\frac{SSR}{K}}{\frac{SSE}{n-k-1}}$ $F^c = \frac{(SSE(r) - SSE)/r}{S_e^2}$

Q1 Test H_0: $\beta_1=0$, H_1: $\beta_1\neq0$, $\alpha=0.05$

Test statistics: $t^c = 51/19 = 2.68$

Decision rule: Reject H_0 if $t^c > t^t$ or $t^c < -t^t$, now $t^c = 2.68$, $t^t = 2.060$ <= upper tail test

Reject H_0 if $t^c = 2.68 > t^t = 2.060$

Decision: Since $t^c > t^t$, reject H_0.

- Complete decision rule: Reject H_0 if $t^c > 2.060$ or $t^c < -2.060$.
- However, once you determine that the test is upper (or lower) tail test, you use just one of them. Reject H_0 if $t^c > 2.060$ for upper tail test, **OR** Reject H0 if $t^c < -2.060$. **DO NOT** test against both. Just one of three cases (t^c in lower tail, in non-rejection region, or in upper tail) occurs.

Q2 Test H_0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$, H_1: at least one $\beta_j \neq 0$

Test statistics: $F^c = \frac{\frac{SSR}{K}}{\frac{SSE}{n-k-1}}$ = [1037/4] / [1149/(30-4-1)] = 5.64

Decision Rule: Reject H_0 if $F^c > F^t = 2.76$.

Decision: Since $F^c = 5.62 > F^t = 2.76$, reject H_0.

- In this question, K = number of independent variables.

Q3 Test H_0: $\beta_3 = \beta_4 = 0$, H_1: at least one $\beta_j \neq 0$

Test statistics: $F^c = \frac{(SSE(r) - SSE)/r}{S_e^2}$ = [(1426-1149)/2]/46 = 3.01

Decision Rule: Reject H_0 if $F^c > F^t = 3.39$.

Decision: Since $F^c = 3.01 < F^t = 3.39$, fail to reject H_0.

- In this question, K = the number of independent variables which are not dropped from the full model and are included in the restricted model. r = the number of independent variables which are dropped from the full model.