Module 10: Advanced multiple regression

(The attached PDF file has better formatting.)

Homework assignment: Two correlated independent variables

Do this homework assignment after module 12, which gives the equations for the standard errors of the least squares estimators.

We regress the Y values on the X_1 and X_2 values in the table below.

X_1	X_2	Y	X_1	X_2	Y
1	1	1.016	6	8	-1.076
2	6	-3.429	7	4	3.461
3	2	0.049	8	9	-2.525
4	7	-3.099	9	5	4.195
5	3	0.359	10	10	-0.746

A. What is the correlation of X_1 and X_2?
B. What is the least squares estimator of α?
C. What is the least squares estimator of β_1, the coefficient of X_1?
D. What is the least squares estimator of β_2, the coefficient of X_2?
E. What is the standard error of the least squares estimator of β_1, the coefficient of X_1?
F. What is the standard error of the least squares estimator of β_2, the coefficient of X_2?

Show the formulas and the computations. You can check your work with Excel or other statistical software.

Jacob: When using the equation on page 106 and page 107, what is R^2? Is R^2 the value from the Excel regression add-in using these two explanatory variables?

Rachel: No, the R^2 in the equation on page 106 and page 107 is the correlation of the two explanatory variables, or the R^2 from a regression on one on the other. If one have more than two explanatory variables, it is the R^2 from a regression of the explanatory variable under consideration on all the other explanatory variables.

Illustration: In this homework assignment, the R^2 from the regression on the response variable on the two explanatory variables is 0.8712. The correlation of the two explanatory variables is 0.6364. Use 0.6364 in the equation, not 0.8712.