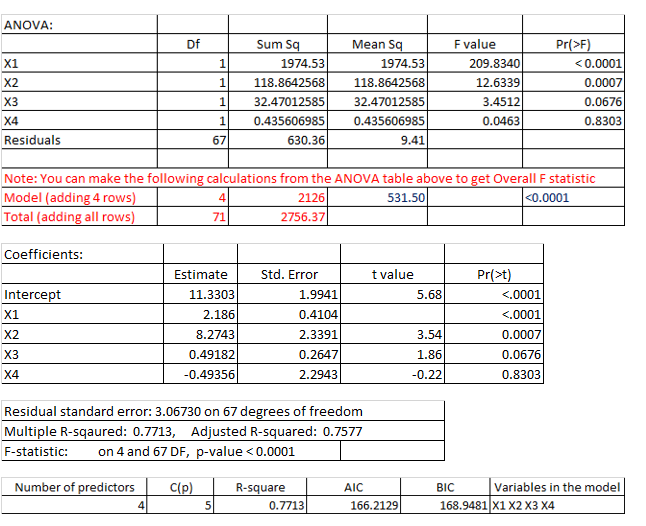
computational Assigment #2

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### Mechanics and computations

# Model #1



1. How many observations are in the sample data?

Observations = Total + 1 = df (67) + k (4) + 1 = **72**

1. Write out the null and alternate hypotheses for the t-test for Beta1.

H0 : β1 = 0

Ha : β1 ≠ 0

1. Compute the t- statistic for Beta1. Conduct the hypothesis test and interpret the result.

T = t0 = B̂1 / SB̂ = 2.186 / 0.4104 = 5.3265

t-test with 99% confidence (α = 0.01),

Threshold: tα/2, n – 2 = t0.01, 70 = 2.6479

**Reject** H0, since |t0| > t0.01, 70

There is insufficient evidence to accept the null hypothesis, β1 = 0, therefore X1 is a valid indicator of Y in this model and therefore should be included in the model.

1. Compute the R-Squared value for Model 1, using information from the ANOVA table. Interpret this statistic.

Sum of Squares due to **Regression** = 1974.53 + 118.8643 + 32.4701 + 0.4356 = 2126.3 = SSR

Sum of Squared **Error** = 630.36 = SSE

Sum of Squares **Total** = SST = SSR + SSE

**R2** = SSR / SST = 2126.3 / 2756.66= **0.7713**

The total / “global” proportion of variation explained by the regression model, model 1, is 77.13%.

1. Compute the Adjusted R-Squared value for Model 1. Discuss why Adjusted R-squared and the R-squared values are different.

Let,

n = 72, R2 = 0.7713, k = 4

**Adjusted R2** = 1 – [(1 – R2)(n – 1) / (n – k – 1)] = **0.7577**

The adjusted R2 statistic penalizes the model for adding independent / predictor variables to the model that don’t have relevance in predicting the response variable. The adjusted R2 term is the proportion of variance explained by the relevant terms in the model.

1. Write out the null and alternate hypotheses for the Overall F-test.

H0 : β1 = β2 = β3 = β4 = 0

Ha : βj ≠ 0, for at least one value of j (for j in 1, 2, 3, 4)

1. Compute the F-statistic for the Overall F-test. Conduct the hypothesis test and interpret the result.

Sum of Squares due to **Regression** = SSR = 1974.53 + 118.8642568 + 32.47012585 + 0.435606985

Sum of Squared **Error** = SSE = 630.36

Sum of Squares **Total** = SST = SST = SSR + SSE

Let,

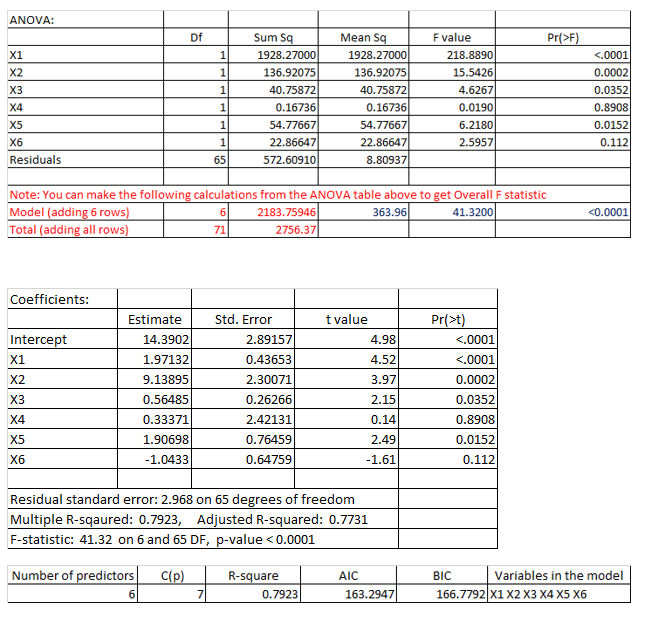
N = 72, p = 4

F = [ (SST - SSE) / p ] / [ SSE / ( n – p – 1 ) ] = 56.5003 on p = 4 and 67 DF

p-value: < 0.0001

There is insufficient evidence (F = 56.5003, P < 0.001) to conclude that at least one of the slope parameters is not equal to zero (reject the null). This model explains more variance than the intercept alone.

# Model #2



1. Now let’s consider Model 1 and Model 2 as a pair of models. Does Model 1 nest Model 2 or does Model 2 nest Model 1? Explain.
2. Write out the null and alternate hypotheses for a nested F-test using Model 1 and Model 2.
3. Compute the F-statistic for a nested F-test using Model 1 and Model 2. Conduct the hypothesis test and interpret the results.

### Application

### Conclusion