Multivariate regression

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09/29/2011

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Linear regression

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- *regression line studies the relationship between two variables.*
- *the independent variable is called X.*
- *the dependent variable is called Y.*
- *We can write the equation of the line as*

$$Y = a_0 + a_1 X.$$

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- For example, to study the inflation in US, one should include the unemployment, GNP, and the deficit.
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- We label them X_1, X_2, and X_3.
- We label the dependent variable Y (in this example the inflation in US).

Definition

If there is more than one explanatory variable (X_1, X_2, X_3 say) and one response variable (Y), it may be useful to model it as

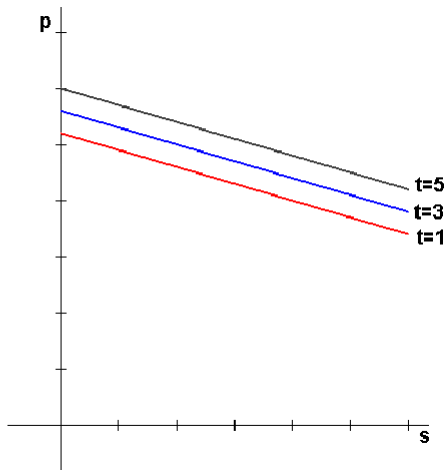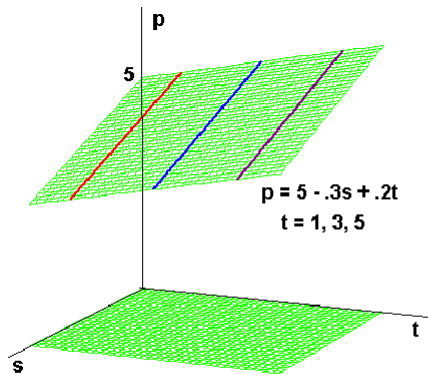$$y = a_0 + a_1 X_1 + a_2 X_2 + a_3 X_3.$$

Example

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Aspirin is so acidic that it often upsets the stomach, so it is often administered with an antacid – which limits its effect. Suppose the pain, measured by the rating of headache sufferers, is given by

$$p = 5 - .3s + .2t,$$

where s is the aspirin dose and t is the antacid dose.

$$p = 5 - .3s + .2t$$
$$t = 1, 3, 5$$

t=5
t=3
t=1

Correlation coefficient

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- If a coefficient is positive, then the relationship of this variable with the dependent variable is positive;

- if the coefficient is negative then the relationship is negative.

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- *Let's do an example in Excel.*