

Instructions for carrying out statistical procedures and tests using Minitab

These instructions are closely linked to the author's book:

Essential Statistics for the Pharmaceutical Sciences
John Wiley & Sons Ltd <http://eu.wiley.com>
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For all references to chapters or tables, see the above book.

**Using Minitab to perform a
regression analysis**

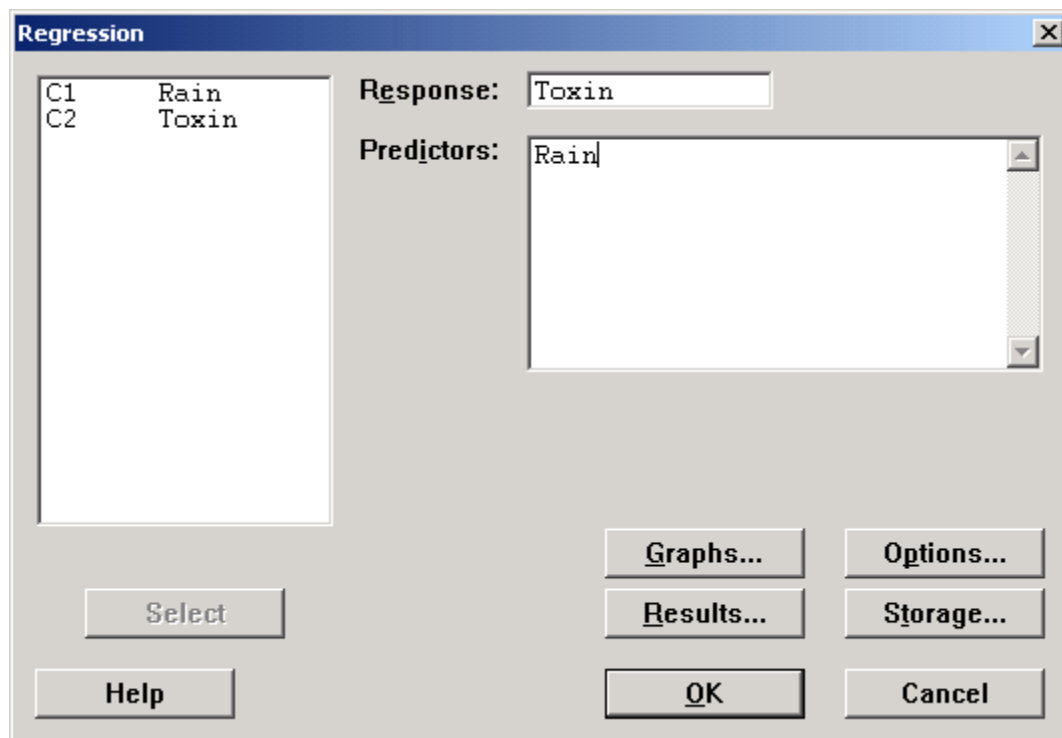
Using Minitab to perform a regression analysis

Example: Table 14.3 Rainfall at the growing site and concentration of fungal toxin in nuts.

The rainfall and toxin data are entered into two appropriately labelled columns. Then follow the menus:

Stat / Regression / Regression...

'Regression' does appear on two consecutive menus - the above is not a misprint. There are then two boxes to be completed, labelled 'Response:' and 'Predictors:'. The Response box takes the name of the column containing the dependent variable (Toxin concentration) and the Predictors box takes the independent variable (Rainfall). It is absolutely vital that the variables are allocated correctly to these two boxes. The Regression box should then appear as below:



The output will be as on the next page:

Regression Analysis: Toxin versus Rain

The regression equation is
Toxin = 10.6 + 6.73 Rain

Predictor	Coef	SE Coef	T	P
Constant	10.570	1.961	5.39	0.001
Rain	6.726	1.356	4.96	0.001

S = 2.16007 R-Sq = 75.5% R-Sq(adj) = 72.4%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	114.84	114.84	24.61	0.001
Residual Error	8	37.33	4.67		
Total	9	152.17			

The line (3rd from top) 'Toxin = 10.6 + 6.73 Rain' tells us that the regression equation is:

$$\text{Toxin concentration } (\mu\text{g}/100\text{g}) = 10.6 + 6.73 \times \text{rainfall (cm/week)}$$

Lower down, there is an R-Squared value (R-sq) which gives a measure of how closely the points fit to a straight line. Zero indicates random scatter and 1.0 indicates perfect fit to a straight line. It is usual to quote the 'Adjusted R-square' value (See Chapter 14).

The rest of the output is concerned with the statistical significance of the regression equation. In the final part of the output, labelled 'Analysis of Variance', there is a P value of 0.001, which is strongly significant.