Regression and correlation MATH 1442

Correlation (Page 520)

Measure the strength of the linear relationship between any two variables.

$$r=\frac{n\sum xy-\left(\sum x\right)\left(\sum y\right)}{\sqrt{n\left(\sum x^2\right)-\left(\sum x\right)^2}\sqrt{n\left(\sum y^2\right)-\left(\sum y\right)^2}}$$

Values of r range from -1 to +1. when $|r|\approx 1$ there is a strong linear relationship.
You can test the significance of the coefficient r by using table A-6 to test the hypothesis

H_0: $\rho = 0$ against H_1: $\rho \neq 0$ (Use Table A-6 on Appendix A)

$r^2=\frac{\text{explained variation}}{\text{total variation}}$ also called coefficient of determination
r^2 is the proportion of the variation of y that is explained by x.

Using technology: For TI-83 Use LinReg($ax+b$) on the STAT CALC menu, set DiagnosticOn. Alternatively you can also use LinRegTTest on the STAT TESTS menu, you have to provide the lists as L_1,L_2

Regression (Page 542)

If the linear correlation is significant you can set up a linear equation of the form:

$$\hat{y}=b_0+b_1x$$

Where b_0 and b_1 can be computed as follows:

$$b_1=\frac{n\sum xy-\left(\sum x\right)\left(\sum y\right)}{n\left(\sum x^2\right)-\left(\sum x\right)^2}$$

$$b_0=\frac{\left(\sum y\right)\left(\sum x^2\right)-\left(\sum x\right)\left(\sum xy\right)}{n\left(\sum x^2\right)-\left(\sum x\right)^2}$$

Alternatively you can compute b_0 by using:

$$b_0=\bar{y}-b_1\bar{x}$$

Using technology: For TI-83 Use LinReg($ax+b$) on the STAT CALC menu, provide L_1,L_2