

MATH 124 – Find Regression Coefficients

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This document will guide you through the steps needed to calculate the slope and intercept for the regression line by using excel. This document will use the data from the same dataset as the transforming data document (if you have not yet read that document you should do so now). We will focus on estimating the slope and intercept terms for the regression required for the first dataset (which required a log transformation of the x variable). A worked excel spreadsheet on the website will contain implementations of the methods described in this document.

Preliminaries

What we are trying to do is implement the following two formulas (discussed in class):

Slope	$b_1 = r \frac{s_y}{s_x}$
Intercept	$b_0 = \bar{y} - b_1 \bar{x}$

Inputting the formulas

1. Don't forget we want to fit the regression model

$$y_i = \beta_0 + \beta_1 \log x_i + \varepsilon_i$$

And we already have calculated a column of log transformed data values (column C) and have the y values in another column (column B)

2. The first thing to do is calculate all the requisite parts of the formulae above (ie the correlation, standard deviations and means).
3. Find an empty cell location (I suggest B128) and type "Correlation". Then move to the adjacent cell (C128) and type "=CORREL (B2:B56,C2:C56)".
4. Move to B129 and type "stddev x". Note that this will in fact be the standard deviation of the log x1 values. Go to the adjacent cell (C129) and type "=STDEV(C2:C56)"

5. Move to B130 and type “stddev y”. Go to the adjacent cell (C130) and type “=STDEV(B2:B56)”
6. Go to B131 and type “mean x”. Note that this will in fact be the mean of the log x1 values. Go to the adjacent cell (C131) and type “=average(C2:C56)”
7. Go to B132 and type “mean y”. Go to the adjacent cell (C132) and type “=average(B2:B56)”
8. Now it is time to start putting things together. First we do the slope. Go to the cell B134 and type “b1”. Then move to the cell C134 and type “=C128*C130/C129”. This takes the previously calculated correlation and combines it together with the standard deviations to compute the slope using the formula on the first page.
9. To do the intercept we first go to the cell B135 and type “b0”. Then move to the cell C135 and type “=C132-C134*C131”. This combines the slope estimate and the two means together to compute the intercept using the slope on the first page.
10. You are done.