

Stat 213
Assignment #6

Minitab instructions for regression.

The following are two test scores for 10 individuals.

Test X	75	78	88	92	95	67	55	73	74	80
Test Y	81	73	85	85	89	73	66	81	81	81

Find the least squares regression line for predicting the likely score on test Y based on their score for test X.

1. Input all the data for Test X in column C1 and all the data for Test Y in column C2.
2. Go to the menu bar and select Stat<Regression.

Click the mouse on C2 Test Y in the rectangle on the left of the box: then press SELECT {Or type C1 in the Response cell). This enters the name of your variable as the response variable (dependent variable).

Click the mouse on C1 Test X in the rectangle on the left of the box, then press SELECT. This enters the name of your variable as the predictor variable(independent variable). Then click OK.

You will get a printout of the regression equation as well as the r^2 value.

$$\hat{y} = 39.87 + 0.51x \quad r^2 = 0.79$$

3. To see the scatter plot of the data with the fitted line, select Stats<Regression<Fitted Line Plot... Enter the response and predictor variables and click OK.
4. In order to show your work, you should make another column for $X \times Y$. To do this, click on Calc. Type C3 in the **store result in** box. To multiply columns, type C1*C2 in the Expression box and click OK. You will now have a column C3 in your worksheet.
5. To find the mean of a column, click Calc<Column Statistic. Select the column that you are interested in and then click mean, then OK. You do the same for the Sum and Sum of Squares.

$$\begin{array}{ll} n = 10 & \Sigma x^2 = 61,661 \\ \Sigma x = 777 & \Sigma^2 = 63,629 \\ \Sigma y = 795 & \Sigma xy = 62,432 \end{array}$$

Additional questions.

1. A morning newspaper lists the following used-car prices for a foreign compact, with age measured in years and selling price measured in thousands of dollars.

Age	1	2	2	3	3	4	6	7	8	10
Price	9.45	8.4	8.6	6.8	6.5	5.6	4.75	3.89	2.7	1.47

- (a) Find the least squared regression line for predicting price based on age. [$\hat{y} = 9.81 - 0.868(x)$]
- (b) Find the Se^2 . [0.255]
- (c) From the fitted regression line, determine the predicted value for the average selling price of a 5-year-old compact. [5.47]
- (d) Find r^2 and comment on it. [.967]

2. In an experiment designed to determine the relationship between the doses of a compost fertilizer x and the yield of a crop y , the following summary statistics are recorded:

$$n = 15, \quad \bar{x} = 10.8, \quad \bar{y} = 122.7, \quad S_{xx} = 70.6, \quad S_{yy} = 98.5, \quad S_{xy} = 68.3$$

Assume a linear relationship.

- (a) Find the equation of the least squares regression line. [$\hat{y} = 112.2521 + .9674(x)$]
- (b) Compute the error sum of squares and estimate δ^2 (Se^2). [32.4251, 2.4942]
- (c) Find r^2 and comment on it. (.6708)
- (d) Estimate the yield of crop for a dose of 10. [121.9261]

3. Many college students obtain college degree credits by demonstrating their proficiency on exams developed as part of the College Level Examination Program (CLEP). Based on their scores on the College Qualification Test (CQT), it would be helpful if students could predict their scores on a corresponding portion of the CLEP exam. The following data are for Total CQT score and mathematical CLEP score.

Total CQT	170	147	166	125	182	133	146	125	136
Total CLEP	698	518	725	485	745	538	485	625	471
Total CQT	179	174	128	152	157	174	185	171	102
Total CLEP	798	645	578	625	558	698	745	611	458

- (a) Find the least squares fit of a straight line. [$\hat{y} = 59 + 3.61(x)$]
 - (b) Find the Se^2 [4094]
 - (c) Find the r and comment on it. [0.8130]
4. Students' scores on the mathematics portion of the ACT examination, x , and on the final examination in first-semester calculus (200 points possible), y , are given and the following summary statistics are given.

$$n = 15, \quad \bar{x} = 26.6, \quad \bar{y} = 125, \quad \Sigma xx = 10781, \quad \Sigma yy = 249992, \quad \Sigma xy = 50919$$

Assume a linear relationship.

- (a) Find the equation of the least squares regression line. [$\hat{y} = -40.6941 + 6.2291(x)$]
- (b) Compute the error sum of squares and estimate δ^2 (Se^2). [9113.8019, 701.0617]
- (c) Find r^2 and comment on it. (.4164)
- (d) Estimate the final examination score for a student who scored 30 on the ACT examination. [146.1789]