

A.M.D.G.

Minitab is a powerful piece of statistical software that is commonly used both in research and by statistics professors. Since it is prohibitively expensive, it is not commonly used by students in either high school or college, but it is important that students are able to read Minitab outputs.

Honestly, Minitab will normally have way more information than a student would ever need, so what is very important is being able to pick out the information that you need.

Here is a typical (partial) Minitab output:

Regression Analysis

The regression equation is

Range of motion = 108 + 0.871 (Age)

Predictor	Coef	StDev	T	P
Constant	107.58	11.12	9.67	0.000
Age	0.870	0.4146	2.10	0.062

S = 10.42

R-Sq = 30.6%

R-Sq(adj) = 23.7%

Notice that they actually tell us the regression equation (with words in lieu of variables):

range of motion = 108 + 0.871 (age)

But if they had excluded that part, we simply look at the table provided:

Regression Analysis

The regression equation is

Range of motion = 108 + 0.871 (Age)

Predictor	Coef	StDev	T	P
Constant	107.58	11.12	9.67	0.000
Age	0.870	0.4146	2.10	0.062

S = 10.42

R-Sq = 30.6%

R-Sq(adj) = 23.7%

Notice that under "Predictor" it says "Constant" and "Age"

"Constant" means the y-intercept

"Age" indicates that the explanatory variable is (in this case) Age.

Under "Coef" it says 2 numbers:

The one next to "constant" is the y-intercept (as mentioned above).

The one next to the explanatory variable ("Age" in this case) is the slope.

"R-Sq" is your r^2 value. To find r , just take the square root of the decimal value.

IGNORE EVERYTHING ELSE!!!!

(But we will look at the "S" eventually)

Look at these Minitab outputs and use them to respond to the prompts:

- 1) Below is the Minitab output relating weights (in tons of cargo) to time (in hours) it takes for dockworkers to unload a boat

Predictor	Coef	StDev	T	P
Constant	21.84	25.54	0.86	0.404
Weight	0.036538	0.002977	12.27	0.000

$s = 30.32$ $R\text{-}Sq = 89.3\%$ $R\text{-}Sq(adj) = 88.7\%$

- a) What is the equation of the least squares regression line? Predict the time required to unload 15.5 tons of cargo.
- b) What proportion of the variation is explained by the explanatory variable?
- c) What is the value of the correlation coefficient? Based on this, does a linear regression seem appropriate? Describe the strength and direction of the variation.
- d) Interpret the slope and the y -intercept in context.

- 2) Below is the Minitab output relating age of an injured athlete to time (in days) it takes for the athlete to return to their sport. Athletes of age 18 to 39 were used in the data collection.

Regression Analysis

The regression equation is

Return to Sport = $-5.05 + 0.272$ Age

Predictor	Coef	SE Coef	T	P
Constant	-5.054	4.355	-1.16	0.279
Age	0.2715	0.1427	1.90	0.094

- a) What is the equation of the least squares regression line? Predict the time to return for an athlete who is 22 years old.
- b) What is the predicted time for an athlete who is 10 years old? 79 years old?
- c) Do you think that the predictions for b) are appropriate? Explain briefly.
- d) Interpret the slope and the y -intercept in context.
- e) The Minitab also lists $R\text{-Sq} = 78.4\%$. Interpret this number, and find the value of r . Describe the direction and strength of the linear correlation based on this r value.

3) Below is the Minitab output relating time spent reviewing for a test (in minutes) and the exam score (in points out of 100). Students sampled studied from 30 to 90 minutes.

Predictor	Coef	StDev	T	P
Constant	44.540	1.813	24.57	0.000
Review time	0.55528	0.05501	10.09	0.000

S = 6.35447

R-Sq = 49.7%

R-Sq(adj) = 49.1%

- What is the equation of the least squares regression line? Predict the score for a student who spent 83 minutes studying.
- What proportion of the variation is explained by the explanatory variable?
- What is the value of the correlation coefficient? Based on this, does a linear regression seem appropriate? Describe the strength and direction of the variation.
- Interpret the slope and the y -intercept in context.
- What would this model predict for studying time of 5 minutes? Of 240 minutes? Are these values appropriate or not? Explain.