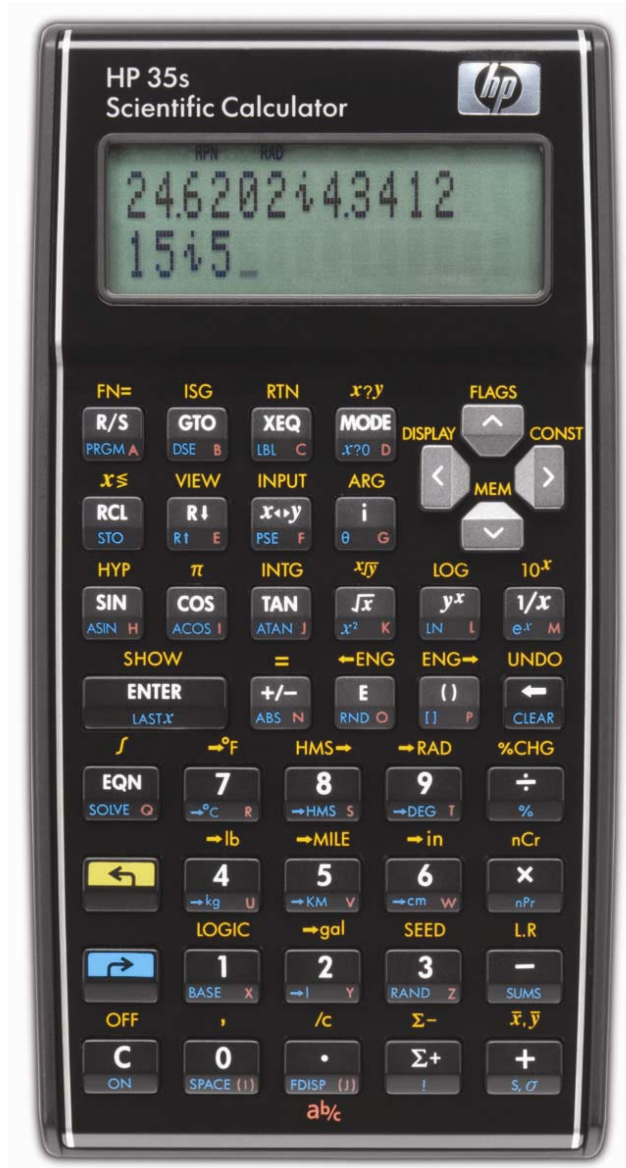
hp calculators

HP 35s Linear Regression

Linear Regression

Practice solving linear regression problems



Linear Regression

Linear regression calculates the equation for a line that "best fits" a set of ordered pairs by minimizing the sum of the squared residuals between the actual data points and the predicted data points using the estimated line's slope and intercept. The equation of the line produced by linear regression is in the form Y = mX + b, where m is the slope of the line and b is the Y-intercept. Once the slope and intercept have been calculated, it is fairly easy to substitute other values for X and predict a corresponding value for Y, or to substitute a value for Y and predict a value for X. When the X value is a measure of time (months or years, for example), the equation is specifically referred to as a trend line.

On the HP 35s, values are entered into the statistical / summation registers by keying in the number (or pair of numbers) desired and pressing [Σ+]. This process is repeated for all numbers or pair of numbers. When entering a pair of numbers in RPN or algebraic mode, key the Y value, press [ENTER], then key the X value and press [Σ+].

To view the linear regression results, press [↰] [L.R.]. The HP 35s displays a menu of relevant values. Items on this menu are viewed by pressing the [<] or [>] cursor keys of the HP 35s.

This menu allows you to predict a value for X given a Y value, or predict a value for Y given an X value. It also displays the linear regression line's correlation, slope, and y-intercept. The correlation will always be between –1 and +1, where values closer to –1 and +1 indicating a good "fit" of the line to the data. Values nearer to zero indicate little to no "fit." Little reliance should be placed upon predictions made where the correlation is not near –1 or +1. Exactly how far away from these values the correlation can be and the equation still be considered a good predictor is a matter of debate. To use a value displayed on the menu, press the [ENTER] button and the value will be copied for further use. This is illustrated in the problems below.

Practice solving linear regression problems

Example 1: What is the slope and y-intercept of the line that best fits the points (0,4), (2,5) and (3,6)?

Solution: Be sure to clear the statistics / summation memories before starting the problem.

[↱] [CLEAR] [4]

In RPN or algebraic mode:

[4] [ENTER] [1] [Σ+] [5] [ENTER] [2] [Σ+] [6] [ENTER] [3] [Σ+]

To view the linear regression results, press [↰] [L.R.]. Figure 1 displays the menu shown.

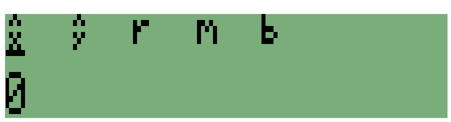


Figure 1

In either RPN or algebraic mode, press: [>] [>] [>] to view the slope.

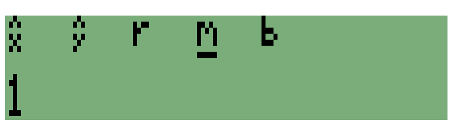


Figure 2

In either RPN or algebraic mode, press: [>] to view the y-intercept.

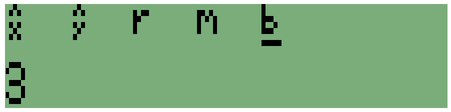


Figure 3

<u>Answer:</u> The slope of the line is 1 and the y-intercept is 3. The linear regression equation is Y = 1 X + 3.

<u>Example 2:</u> What is the slope and y-intercept of the line that best fits the points (2,5), (4,10), (6,20), and (9,25)? What is the correlation? Is the linear regression line a good fit to the data points?

<u>Solution:</u> Be sure to clear the statistics / summation memories before starting the problem.

[shift] [CLEAR] [4]

In RPN or algebraic mode:

[5] [ENTER] [2] [Σ+] [1] [0] [ENTER] [4] [Σ+] [2] [0] [ENTER] [6] [Σ+] [2] [5] [ENTER] [9] [Σ+]

To view the linear regression results, press [shift] [L.R.]. Figure 4 displays the menu shown.

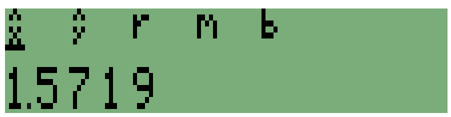


Figure 4

In either RPN or algebraic mode, press: [>] [>] [>] to view the slope.

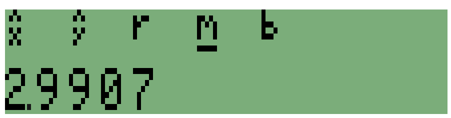


Figure 5

In either RPN or algebraic mode, press: [>] to view the y-intercept.

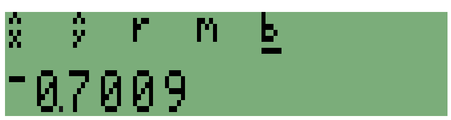


Figure 6

In either RPN or algebraic mode, press: [<] [<] to view the correlation.

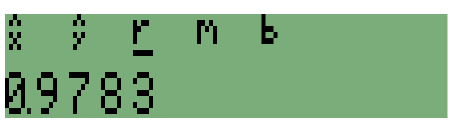


Figure 7

<u>Answer:</u> The slope of the line is 2.991 and the y-intercept is –0.701. The linear regression equation is Y = 2.991 X – 0.701. The correlation value of 0.9783 indicates a very good fit of the linear regression line to the data points. It is a "good fit".