hp calculators
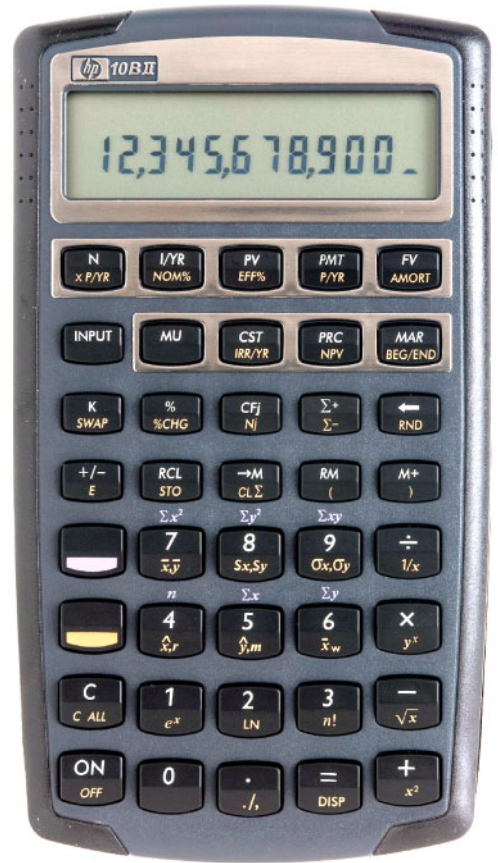
HP 10BII Statistics – Averages and Standard Deviations

Statistics on the HP 10BII

Averages and standard deviations

Practice solving problems involving averages
and standard deviations

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Statistics on the HP 10BII

The HP 10BII has many built-in statistics functions that apply to finding averages and standard deviations as well as linear regression, correlation and rearranging items.

Averages and standard deviations

Before beginning a new statistics problem, it is always a good idea to clear the statistics registers by pressing the yellow-shifted function of the ⌨→M key, or ▭ ⌨CLΣ .

The average is defined as the sum of all data points divided by the number of data points included. It is a measure of central tendency and is the most commonly used measure. On the HP 10BII, the average of a set of numbers is found by entering each number and pressing the ⌨Σ+ key. Pairs of numbers can be entered by keying the first number, pressing ⌨INPUT and then entering the second number and pressing the ⌨Σ+ key. Note that each time the ⌨Σ+ key is pressed, the HP 10BII will display a number representing the number of data points / pairs entered into the statistics registers. Wrong numbers (or pairs of numbers) can be deleted by entering the wrong number (or pair of numbers) again and pressing ▭ ⌨Σ- . Once all the numbers have been entered, pressing ▭ ⌨x̄,ȳ will compute and display the average. If pairs of numbers have been entered, the average of the first number of each pair will be displayed. To see the average of the second number of each pair, press ▭ ⌨SWAP .

The standard deviation is a measure of dispersion around a central value. To compute the standard deviation, the sum of the squared differences between each individual data point and the average of all the data points is taken and then divided by the number of data points included (or, in the case of sample data, the number of data points included minus one). The square root of this value is then taken to obtain the standard deviation.

On the HP 10BII, to calculate the population standard deviation, press ▭ ⌨σx,σy . To calculate the sample standard deviation, press ▭ ⌨Sx,Sy . If pairs of numbers have been entered, the standard deviation of the first number of each pair will be displayed. To see the standard deviation of the second number of each pair, press ▭ ⌨SWAP .

The property of the standard deviation is such that when the underlying data is normally distributed, approximately 68% of all values will lie within one standard deviation on either side of the mean and approximately 95% of all values will lie within two standard deviations on either side of the mean. This has application to many fields, particularly when trying to decide if an observed value is unusual by being significantly different from the mean.

Practice solving problems involving averages and standard deviations

Example 1:   The sales price of the last 10 homes sold in the Parkdale community were: $198,000; $185,000; $205,200; $225,300; $206,700; $201,850; $200,000; $189,000; $192,100; $200,400. What is the average of these sales prices and what is the sample standard deviation? Would a sales price of $240,000 be considered unusual in the same community?

Solution:
1 9 8 0 0 0 Σ+   1 8 5 0 0 0 Σ+   2 0 5 2 0 0 Σ+
2 2 5 3 0 0 Σ+   2 0 6 7 0 0 Σ+   2 0 1 8 5 0 Σ+
2 0 0 0 0 0 Σ+   1 8 9 0 0 0 Σ+   1 9 2 1 0 0 Σ+
2 0 0 4 0 0 Σ+
▭ x̄,ȳ
▭ Sx,Sy

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Answer: The average sales price is $200,355 and the sample standard deviation is $11,189. Within two standard deviations on either side of this average, in this case between $177,977 and $222,733, 95% of all home sales prices should fall. If a home were to sell for $240,000 in this area, it would be an unusual event.

Example 2:   The sales price of the last 7 homes sold in the real estate office's zip code were: $245,000; $265,000; $187,000; $188,000; $203,000; $241,900; $222,000. What is the average of these sales prices and what is the sample standard deviation?

Solution: $\boxed{2}\boxed{4}\boxed{5}\boxed{0}\boxed{0}\boxed{0}\boxed{\Sigma^+}\boxed{2}\boxed{6}\boxed{5}\boxed{0}\boxed{0}\boxed{0}\boxed{\Sigma^+}\boxed{1}\boxed{8}\boxed{7}\boxed{0}\boxed{0}\boxed{0}\boxed{\Sigma^+}$
$\boxed{1}\boxed{8}\boxed{8}\boxed{0}\boxed{0}\boxed{0}\boxed{\Sigma^+}\boxed{2}\boxed{0}\boxed{3}\boxed{0}\boxed{0}\boxed{0}\boxed{\Sigma^+}\boxed{2}\boxed{4}\boxed{1}\boxed{9}\boxed{0}\boxed{0}\boxed{\Sigma^+}$
$\boxed{2}\boxed{2}\boxed{2}\boxed{0}\boxed{0}\boxed{0}\boxed{\Sigma^+}$
$\boxed{}\boxed{\bar{x},\bar{y}}$
$\boxed{}\boxed{Sx,Sy}$

Answer: The average sales price is $221,700 and the sample standard deviation is $30,318.81.