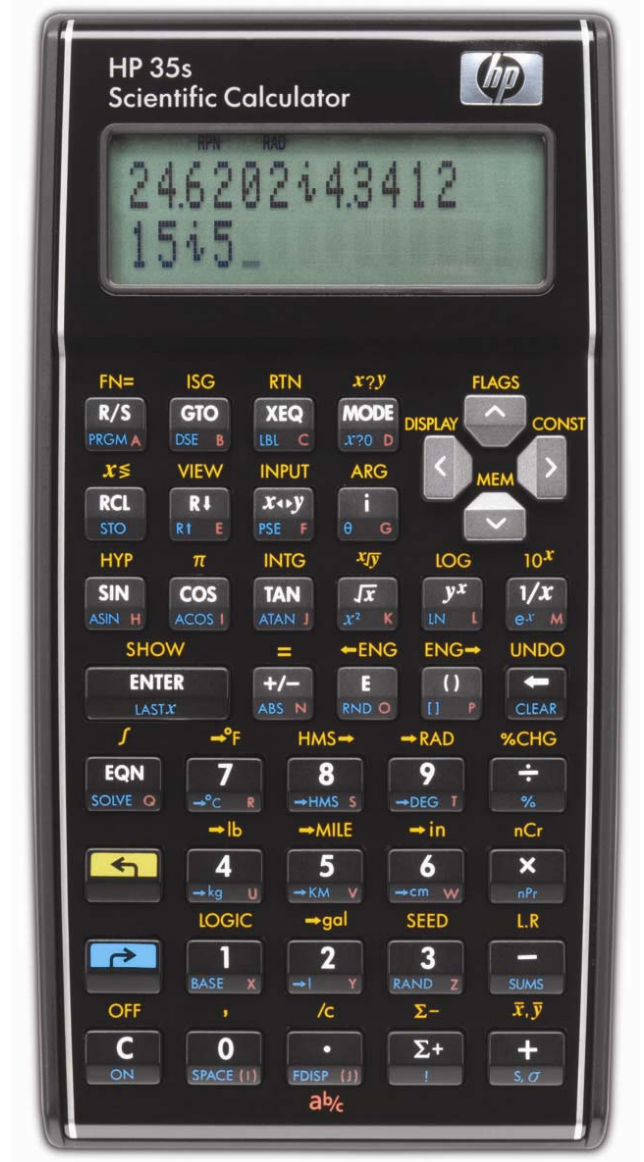hp calculators

HP 35s Average sales prices

Averages and standard deviations

Practice finding average sale prices and standard deviations

Averages and standard deviations

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. A 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. 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.

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 mean, press ⎡◼⎤ ⎡x̄,ȳ⎤. To view the standard deviation, press ⎡◼⎤ ⎡s,σ⎤. When either of these is pressed, the HP 35s displays a menu of possible values. Items on this menu are viewed by pressing the ⎡◄⎤ or ⎡►⎤ cursor keys.

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 finding average sale prices 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: Be sure to clear the statistics / summation memories before starting the problem.

⎡◼⎤ ⎡CLEAR⎤ ⎡4⎤

The keystrokes are the same whether in RPN or algebraic mode:

⎡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+⎤

To find the average, press: ⎡◼⎤ ⎡x̄,ȳ⎤. Figure 1 displays the menu shown.

Figure 1

To find the sample standard deviation, press: ⎡◼⎤ ⎡s,σ⎤. Figure 2 displays the menu shown.

Figure 2

To find the value two standard deviations above and below the average, press the following:

In RPN mode:

[→] [S,σ] [ENTER] [2] [×] [ENTER] [ENTER] [←] [x̄,ȳ] [ENTER] [+] [x↔y] [→] [LASTx] [x↔y] [−]

In algebraic mode:

[→] [S,σ] [ENTER] [×] [2] [+] [←] [x̄,ȳ] [ENTER] [ENTER] (computes the above value)
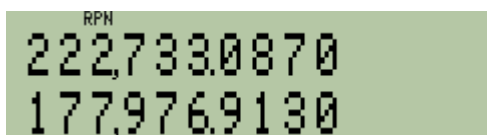[←] [x̄,ȳ] [ENTER] [−] [2] [×] [→] [S,σ] [ENTER] [ENTER] (computes the below value)

Figure 3

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. Figure 3 indicates the display in RPN mode.

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

[→] [CLEAR] [4]

The keystrokes are the same whether in RPN or algebraic mode:

[2][4][5][0][0][0][Σ+] [2][6][5][0][0][0][Σ+] [1][8][7][0][0][0][Σ+]
[1][8][8][0][0][0][Σ+] [2][0][3][0][0][0][Σ+] [2][4][1][9][0][0][Σ+]
[2][2][2][0][0][0][Σ+]

To find the average sales price, press: [←] [x̄,ȳ]. Figure 4 displays the menu shown.

Figure 4

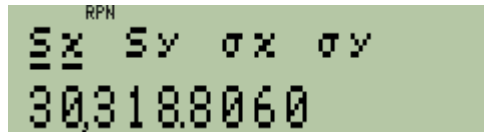To find the sample standard deviation, press: [→] [S,σ]. Figure 5 displays the menu shown.

Figure 5

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

Example 3: Julie has bought gas this week while showing houses at four gasoline stations as follows: 15 gallons at $1.56 per gallon, 7 gallons at $1.64 per gallon, 10 gallons at $1.70 per gallon and 17 gallons at $1.58 per gallon. What is the average price of the gasoline purchased?

Solution: The HP 35s has a weighted average mean calculation built-in that will solve this problem easily. Be sure to clear the statistics / summation memories before starting the problem.

[←] [CLEAR] [4]

In RPN or algebraic mode, press:

[1][5][ENTER][1][·][5][6][Σ+][7][ENTER][1][·][6][4][Σ+][1][0][ENTER][1][·][7][Σ+]
[1][7][ENTER][1][·][5][8][Σ+]

To find the weighted average price of gasoline purchased, press: [←][x̄,ȳ][>][>]. Figure 6 displays the menu shown.

Figure 6

Answer: The average price per gallon Julie has paid this week while showing houses is slightly less than $1.61.