hp calculators

HP 10BII Statistics – Weighted Averages

Statistics on the HP 10BII

Weighted averages

Practice solving problems involving weighted averages

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.

Weighted averages

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⌉ .

A simple average is defined as the sum of all data points divided by the number of data points included. This gives each data value equal weight toward the computed simple average value. A weighted average is an average that is computed by giving different weights to individual data values and computing the "average" appropriately.

On the HP 10BII, the simple average of a set of numbers is found by entering each number and pressing the ⌈Σ+⌉ key. A weighted average, however, is found by entering pairs of numbers. The first number of each pair should be the data value and the second number of each pair is that data value's weight. The "weight" of each data value may be the frequency with which that data value occurs or it could be the probability associated with that data value. On the HP 10BII, 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 ⬛ ⌈x̄w⌉ compute and display the weighted average.

Practice solving problems involving weighted averages

Example 1: Jill has received 6 telephone calls each night over the last 18 nights. Tonight, she received 4 telephone calls. What is the weighted average number of calls Jill has received over the last 18 nights? Solve this using a simple average and the built-in weighted average functions.

Solution: Using the simple average function:

⬛ ⌈CLΣ⌉
⌈6⌉ ⌈Σ+⌉ ⌈6⌉ ⌈Σ+⌉ ⌈6⌉ ⌈Σ+⌉ ⌈6⌉ ⌈Σ+⌉ ⌈6⌉ ⌈Σ+⌉ ⌈6⌉ ⌈Σ+⌉ ⌈6⌉ ⌈Σ+⌉ ⌈6⌉ ⌈Σ+⌉ ⌈6⌉ ⌈Σ+⌉ ⌈6⌉ ⌈Σ+⌉
⌈6⌉ ⌈Σ+⌉ ⌈6⌉ ⌈Σ+⌉ ⌈6⌉ ⌈Σ+⌉ ⌈6⌉ ⌈Σ+⌉ ⌈6⌉ ⌈Σ+⌉ ⌈6⌉ ⌈Σ+⌉ ⌈6⌉ ⌈Σ+⌉ ⌈6⌉ ⌈Σ+⌉ ⌈4⌉ ⌈Σ+⌉ ⬛ ⌈x̄,ȳ⌉

Using the weighted average function:

⬛ ⌈CLΣ⌉ ⌈6⌉ ⌈INPUT⌉ ⌈1⌉ ⌈8⌉ ⌈Σ+⌉ ⌈4⌉ ⌈INPUT⌉ ⌈1⌉ ⌈Σ+⌉ ⬛ ⌈x̄w⌉

Answer: The weighted average number of telephone calls is 5.78. In many cases, using the weighted average function will save a great deal of keystrokes and time.

Example 2: The ages of people attending a movie premier were as follows: 30 people were 25 years old, 20 people were 30 years old and 10 people were 45 years old. What is the weighted average age of those attending the movie?

Solution: ⬛ [cLΣ] [2] [5] [INPUT] [3] [0] [Σ+] [3] [0] [INPUT] [2] [0] [Σ+] [4] [5] [INPUT] [1] [0] [Σ+] ⬛ [x̄w]

Answer: The average age is 30 years.

Example 3: There is a 40% chance that the economy will grow by 4% over the next year and a 60% chance that it will grow by 2% over the next year. What is the expected growth rate?

Solution: The expected growth rate can be found by computing the weighted average, with the weights being the probability of each outcome.

⬛ [cLΣ] [4] [INPUT] [0] [·] [4] [Σ+] [2] [INPUT] [0] [·] [6] [Σ+] ⬛ [x̄w]

Answer: The weighted average growth rate is 2.8%.

Example 4: Demand per day for newspapers at a local sales location is shown in the table below. Determine the weighted average sales per day.

Demand	Days
25	10
26	15
27	25
28	20
29	10
30	5

Solution: ⬛ [cLΣ] [2] [5] [INPUT] [1] [0] [Σ+] [2] [6] [INPUT] [1] [5] [Σ+] [2] [7] [INPUT] [2] [5] [Σ+]
[2] [8] [INPUT] [2] [0] [Σ+] [2] [9] [INPUT] [1] [0] [Σ+] [3] [0] [INPUT] [5] [Σ+] ⬛ [x̄w]

Answer: The weighted average demand is 27.24 newspapers per day.