

We can analytically define the mean and the weighted mean (average) as below.

Mean of a set of n values $x_1, x_2, x_3, \dots, x_n$

$$\text{mean} = \frac{x_1 + x_2 + x_3 + \dots + x_n}{n}$$

Example: Express the mean of $x_1, x_2, x_3, x_4,$ and x_5 .

$$\text{mean} = \frac{x_1 + x_2 + x_3 + x_4 + x_5}{5}$$

Suppose we have a set of n values $x_1, x_2, x_3, \dots, x_n$, where x_1 has frequency f_1 , x_2 has the frequency f_2 , and so forth. Then we can calculate the mean as follows:

$$\text{mean} = \frac{f_1x_1 + f_2x_2 + f_3x_3 + \dots + f_nx_n}{f_1 + f_2 + f_3 + \dots + f_n}$$

Note that the denominator gives us the total number of data values, including repetitions.

Example: Suppose we have the following frequency table.

Value	Frequency
x_1	f_1
x_2	f_2
x_3	f_3
x_4	f_4
x_5	f_5

Then we can express the mean of these values as follows:

$$\text{mean} = \frac{f_1x_1 + f_2x_2 + f_3x_3 + f_4x_4 + f_5x_5}{f_1 + f_2 + f_3 + f_4 + f_5}$$

Suppose we have a set of n values $x_1, x_2, x_3, \dots, x_n$, where x_1 has weight w_1 , x_2 has the weight w_2 , and so forth. Then we can calculate the *weighted mean* as follows:

$$\text{weighted mean} = \frac{w_1x_1 + w_2x_2 + w_3x_3 + \dots + w_nx_n}{w_1 + w_2 + w_3 + \dots + w_n}$$

Example: The GPA example that we did in class was an example of a weighted mean. The grades were the data values, and the number of credits for the respective courses were the weights.

Example: Suppose we have the following table.

Value	Weight
x_1	w_1
x_2	w_2
x_3	w_3
x_4	w_4
x_5	w_5

Then we can express the mean of these values as follows:

$$\text{weighted mean} = \frac{w_1x_1 + w_2x_2 + w_3x_3 + w_4x_4 + w_5x_5}{w_1 + w_2 + w_3 + w_4 + w_5}$$

The *median* of an ordered set of values is the middle value in the ordered list. You need to sort the list before you look for the median. If there are an odd number of data values in the list (counting repetitions), then the median is the middle value. If there are an even number of data values in the list (counting repetitions), then the median is the mean of the two middle values in the ordered list. See the footnote at the bottom of the page on page 8.