

The arithmetic average of a set of measurements is a very common and useful measure of center. This measure is often referred to as the **arithmetic mean**, or simply the **mean**, of a set of measurements. To distinguish between the mean for the sample and the mean for the population, we will use the symbol \bar{x} (x -bar) for a sample mean and the symbol μ (Greek lowercase mu) for the mean of a population.

Definition The **arithmetic mean** or **average** of a set of n measurements is equal to the sum of the measurements divided by n .

Since statistical formulas often involve adding or “summing” numbers, we use a shorthand symbol to indicate the process of summing. Suppose there are n measurements on the variable x —call them x_1, x_2, \dots, x_n . To add the n measurements together, we use this shorthand notation:

$$\sum_{i=1}^n x_i \quad \text{which means } x_1 + x_2 + x_3 + \dots + x_n$$

The Greek capital sigma (Σ) tells you to add the items that appear to its right, beginning with the number below the sigma ($i = 1$) and ending with the number above ($i = n$). However, since the typical sums in statistical calculations are almost always made on the total set of n measurements, you can use a simpler notation:

$$\Sigma x_i \quad \text{which means “the sum of all the } x \text{ measurements”}$$

Using this notation, we write the formula for the sample mean:

NOTATION

$$\text{Sample mean: } \bar{x} = \frac{\Sigma x_i}{n}$$

$$\text{Population mean: } \mu$$

EXAMPLE

2.1

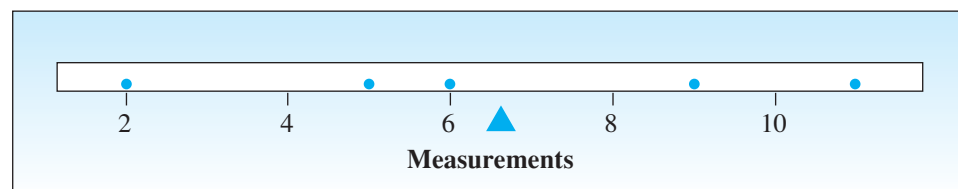
Draw a dotplot for the $n = 5$ measurements 2, 9, 11, 5, 6. Find the sample mean and compare its value with what you might consider the “center” of these observations on the dotplot.

Solution The dotplot in Figure 2.2 seems to be centered between 6 and 8. To find the sample mean, calculate

$$\bar{x} = \frac{\Sigma x_i}{n} = \frac{2 + 9 + 11 + 5 + 6}{5} = 6.6$$

FIGURE 2.2

Dotplot for Example 2.1



The statistic $\bar{x} = 6.6$ is the balancing point or fulcrum shown on the dotplot. It does seem to mark the center of the data.