**Exercise 1.7**

Consider the drying time data for Exercise 1.1 on page 13. Compute the sample variance and sample standard deviation.

Drying time data for Exercise 1.1 on page 13:

3.4 2.5 4.8 2.9 3.6

2.8 3.3 5.6 3.7 2.8

4.4 4.0 5.2 3.0 4.8

**Solution**

**Part (a) – Calculation of Sample Variance**

We’ll first calculate the sample variance. Let x1,x2,...,xn denote n observations. The formula for the sample variance, s2, is given by the formula:

For this data set, we have n = 15 observations as shown above: x1 = 3.4, x2 = 2.5, …, x15 = 4.8. The first step to computing the sample variance is to compute the sample mean, , using the formula below:

Using R software, we compute the sample mean as follows:



The sample mean of the 15 observations is . With this, we can calculate the sample variance utilizing the formula presented above. In R, this is done with the following code:



From this, the sample variance of the 15 observations is .

**Part (b) – Calculation of Sample Standard Deviation**

The formula for the sample standard deviation, s, is given by the formula:

In R, this can be calculated in two different ways. The first, taking the square root of the sample variance, is shown below:



Alternatively, we can use the sd function, which directly calculates the sample standard deviation as shown below:



In both instances, the sample standard deviation is determined to be 0.9709102.

**Summary**

In this exercise we calculated the sample variance and sample standard deviation for 15 observations of the drying time of a specific brand of latex paint. We found the sample variance to be and the sample standard deviation to be 0.9709102. Both of these values represent a measure of spread or variability in the data.