

**Elab 14.19**

You are going to simulate a situation in which you measure the heights of 10 people. To do this, use `rnorm` to generate a sample of size  $N = 10$  from a population in which the mean is 68 inches and the standard deviation is 3 inches.

Write a function that generates this random sample and returns the *sample mean*. (That is, the mean of the random sample rather than the mean of the population.) Consider this sample mean the output of a single trial.

Generate many trials — say, 1000 — to construct a distribution for the sample mean of  $N = 10$  cases.

- 1 What is the mean of this distribution?
- 2 What is the standard deviation of this distribution?
- 3 What is the shape of this distribution?

Now modify your simulation so that your random sample simulates measuring the heights of  $N = 100$  people. Repeat this trial many times.

- 4 What is the mean of this distribution?
- 5 What is the standard deviation of this distribution?
- 6 What is the shape of this distribution?

Now modify your function so that the output is the sample standard deviation with a sample size of  $N = 10$ . (Note: Read the previous sentence again. The statistic you are asked to calculate is the sample standard deviation, not the sample mean.)

- 7 What is the mean of this distribution?
- 8 What is the standard deviation of this distribution?
- 9 What is the shape of this distribution?

Repeat the above calculation of the distribution of the sample standard deviation with  $N = 100$ .

- 10 What is the mean of this distribution?
- 11 What is the standard deviation of this distribution?
- 12 What is the shape of this distribution?