

## Section 7.5 — Examples

**Problem:** A sample of 16 measurements is taken from a distribution with mean 12 and standard deviation 3.

1. What can we say about the approximate sampling distribution of  $\bar{x}$ ? If we know that the population is normal, what can we say about the approximate sampling distribution of  $\bar{x}$ ?
2. Suppose that the population is normal. What is the probability that we see a measurement for  $\bar{x}$  above 15?
3. Still supposing the population is normal, if we add up the measurements, what is the probability that we see a value greater than 204?

**Problem:** A machine, when functioning correctly, makes parts with a mean diameter of 10 cm and standard deviation 0.2 cm (which are distributed normally). To check to make sure the machine is functioning correctly, 50 parts are randomly collected and their mean  $\bar{x}$  is computed.

1. In what range would we expect to see about 95% of the measurements for a single part? In what range would we expect to see about 95% of the computed averages (if we were to repeat the process)?
2. What is the probability that the mean of the sample is between 9.96 and 10.04?
3. How many parts should we collect and average if we want only a 3% chance that we see a value below 9.9 if the machine is in working order?