9.4 Describing by Sampling

▶ Use a randomly chosen sample to describe a population.

▶ Determine whether a sample is representative of a population.

▶ Determine a sample size to obtain valid inferences.

Inferring from a Sample

You can best describe any population when you have data for the entire population. Every 10 years, the U.S. Census Bureau attempts to do this. It is costly. The 2010 Census cost the United States $13.1 billion!

A complete census is often unpractical. So, governments, researchers, and businesses attempt to describe populations by taking a **representative sample.** You can be assured that a sample is representative if it is *randomly chosen* and *large enough.*

Study Tip

To obtain smaller margins of error, increase the size of the sample.

Inferring from a Sample

If a sample is randomly taken from a population, then the sample mean can be used to estimate the population mean, given the following limitations.

Estimated mean of population

Margin of error

90%, 95%, or 99% confidence level

EXAMPLE 1 **Estimating a Population Mean by Sampling**

The histogram shows the distribution of the shoulder heights of a sample of 40 male black bears in Great Smoky Mountains National Park. Use a 90% confidence level and a 95% confidence level to estimate the population mean shoulder height.

Male Black Bears

Mean = 80 cm
SD = 12 cm

Shoulder height (cm)

Shoulder height
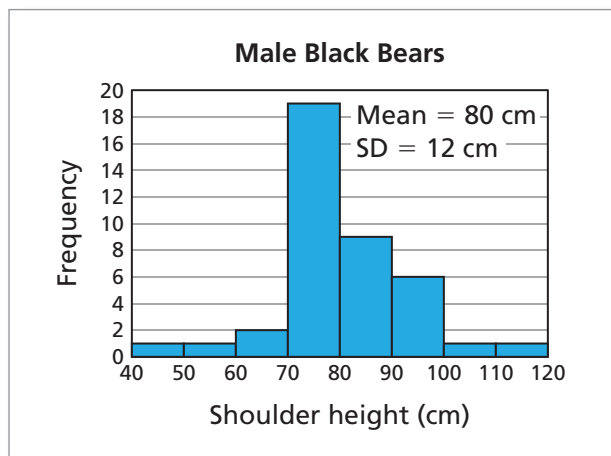
SOLUTION

Using a confidence interval calculator, you can obtain the following.

- **90% Confidence level:** The population mean is 80 cm ± 3.1 cm.
- **95% Confidence level:** The population mean is 80 cm ± 3.7 cm.

✓ **Checkpoint**

Help at *Math*.and**Y☺U**.com

Use the *Confidence Interval Calculator* at *Math.andYou.com* and a 99% confidence level to estimate the population mean shoulder height.