

**21.12.** (a) The population proportion  $p$  is the proportion of all American adults who want stricter laws covering the sale of firearms. This is a parameter; it describes the entire population of American adults (all 255 million of us).

(b) The sample proportion is

$$\hat{p} = \frac{697}{1041} \approx 0.67.$$

A 95% confidence interval for  $p$  (the population proportion) is

$$\begin{aligned} \hat{p} \pm 1.96\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} &\implies 0.67 \pm 1.96\sqrt{\frac{0.67(1-0.67)}{1041}} \\ &\implies 0.67 \pm 0.03 \\ &\implies (0.64, 0.70). \end{aligned}$$

**Interpretation:** We are 95% confident the population proportion of all American adults who want stricter laws covering the sale of firearms is between 0.64 and 0.70.

(c) The margin of error in our 95% confidence interval is 0.03, which is different than 0.04 (what Gallup cited).

- Gallup must have used a sampling design different than a SRS.
- Remember, the confidence interval formula above is only for simple random samples.

**21.14.** (a) The population proportion  $p$  is the proportion of all American adults who worry about having their information stolen by computer hackers. This is a parameter; it describes the entire population of American adults (all 255 million of us).

(b) The sample proportion is

$$\hat{p} = \frac{723}{1019} \approx 0.71.$$

A 95% confidence interval for  $p$  (the population proportion) is

$$\begin{aligned} \hat{p} \pm 1.96\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} &\implies 0.71 \pm 1.96\sqrt{\frac{0.71(1-0.71)}{1019}} \\ &\implies 0.71 \pm 0.03 \\ &\implies (0.68, 0.74). \end{aligned}$$

**Interpretation:** We are 95% confident the population proportion of all American adults who worry about having their information stolen by computer hackers is between 0.68 and 0.74.

**21.36.** (a) A 95% for the population mean seated systolic blood pressure  $\mu$  is

$$\begin{aligned} \bar{x} \pm z^* \left( \frac{s}{\sqrt{n}} \right) &\implies 114.9 \pm 1.96 \left( \frac{9.3}{\sqrt{27}} \right) \\ &\implies 114.9 \pm 3.5 \\ &\implies (111.4, 118.4). \end{aligned}$$

**Interpretation:** We are 95% confident the population mean seated systolic blood pressure (among all healthy white males in this population) is between 111.4 and 118.4.

(b) The confidence interval formula above requires the 27 males to be a **SRS** from the population of all healthy white males.

**21.38.** A 99% confidence interval for the population mean increase in credit card charges  $\mu$  is

$$\begin{aligned}\bar{x} \pm z^* \left( \frac{s}{\sqrt{n}} \right) &\implies 346 \pm 2.58 \left( \frac{112}{\sqrt{200}} \right) \\ &\implies 346 \pm 20.43 \\ &\implies (325.57, 366.43).\end{aligned}$$

**Interpretation:** We are 99% confident that the population mean increase in credit card charges (among all bank customers who charge at least \$2500 per year) is between \$325.57 and \$366.43.