

Chapter 8 FRQ Answers

1. a) We are 90% confident the interval from 19.10 to 20.74 captures the true mean contents of a "20 oz." bottle of water.
- b) If we were to collect many samples of 50 "20 oz." water bottles and construct a confidence interval for the mean contents in the same manner, 90% of the intervals would capture the true mean contents.
- c) The average contents for the sample was 19.92 oz. Since 20 oz. is in the interval, we do not have evidence to suggest the population mean is less or greater than 20 oz.
2. There are more than 500 adults. This may not be a random sample though. While the 50 addresses were randomly selected, the homes were called in the late-morning. They only reached people who are home at this time of day. Also, we do not know the count of successes and failures, so we cannot check the normal condition.

3. State: We wish to construct a 90% confidence interval for the true proportion of adults who can roll their tongue.
- Plan: We have a random sample, the number of successes and failures are both greater than 10 ($68 > 10$ and $232 > 10$), and there are more than 3000 adults. We can construct a 90% confidence interval for the true proportion.
- Do: $95\%CI = 0.23 \pm 1.645 \sqrt{\frac{0.23(0.77)}{300}} = (0.18691, 0.26643)$
- Conclude: We are 90% confident the interval from 0.19 to 0.27 captures the true proportion of adults who can roll their tongue.

4.

$$1.96 * \sqrt{\frac{.5(.5)}{n}} \leq 0.02 \Rightarrow \sqrt{\frac{.5(.5)}{n}} \leq 0.0102 \Rightarrow \frac{0.25}{n} \leq 0.000104$$

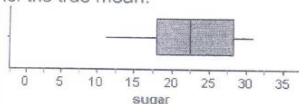
$$n \geq 2401$$

5. a) $t^* = 1.330$ b) $t^* = 1.984$ c) $t^* = 2.756$

6. μ = the mean amount of sugar for this manufacturer's soft drinks at a 95% confidence level.

$10(8) = 80$. We'll assume there are more than 80 soft drinks produced by the manufacturer.

This is a random sample, however the sample size is less than 30. A boxplot of the sample data does not suggest strong skewness or outliers, so we can construct a 95% confidence interval for the true mean.



$$95\%CI : 22.5 \pm 2.365 \frac{7.191}{\sqrt{8}} = (16.488, 28.512)$$

We are 95% confident the interval from 16.488 to 28.512 captures the true mean amount of sugar for this manufacturer's soft drinks.

7.

$$1.96 * \frac{4}{\sqrt{n}} \leq 0.5 \Rightarrow \frac{4}{\sqrt{n}} \leq 0.2551 \Rightarrow 15.68 \leq \sqrt{n}$$

$$n \geq 245.86$$