Lesson #34 · Topic 3A · Practice

Answer Key

1. a. For one sample of 200 college students in the simulation, the proportion who received scholarships is 0.03.

   b. Approximately normal because $200(0.07) = 14$ and $200(1 - 0.07) = 186$ are both ≥ 10 .

   c. Mean = 0.07. For many, many samples of size 200, the average proportion of college students who received a scholarship is 0.07.

   d. Standard deviation = 0.018. When taking samples of size 200, the sample proportion of college students who received scholarships typically varies by 0.018 from the mean of 0.07.

   e. 10% condition. $200 \leq 10\%(\text{all college students})$.

2. a. i. No, because $10(0.4) = 4$ and $10(0.6) = 6$ are both not ≥ 10 .
   ii. Yes, because $30(0.4) = 12$ and $30(0.6) = 18$ are both ≥ 10 .
   iii. Yes, because $100(0.4) = 40$ and $100(0.6) = 60$ are both ≥ 10 .

   b. The sampling distribution of $\hat{p}$ is more normal as the sample size (n) increases.

   c. i. No, because $50(0.06) = 3$ is not ≥ 10 .
   ii. Yes, because $50(0.48) = 24$ and $50(0.52) = 26$ are both ≥ 10 .
   iii. No, because $50(1 - 0.96) = 2$ not ≥ 10 .

   d. The sampling distribution of $\hat{p}$ is more normal as the proportion (p) gets closer to 0.5.

3. a. The 10% condition, or that the the sample size must be less than 10% of the population size.

   b. 0.048

   c. 0.024. This standard deviation is one half of the standard deviation when $n = 100$.

   d. 0.016. This standard deviation is one third of the standard deviation when $n = 100$.

   e. The standard deviation is divided by $\sqrt{k}$, or multiplied by $\frac{1}{\sqrt{k}}$.

4. a. The shape is approximately normal because $80(0.188) = 15.04$ and $80(0.812) = 64.96$ are both ≥ 10 . The mean is 0.188 and the standard deviation is 0.0437.

   b. $P(\hat{p} \leq 0.15) = 0.1923$

   c. $X =$ number of schools that require uniforms. $P(X \leq 12) = \text{binomcdf}(n = 80, p = 0.188, x = 12) = 0.238$

5. a. The sampling distribution is approximately normal because $50(0.32) = 16 \geq 10$ and $50(0.68) = 34 \geq 10$, with a mean of 0.32 and a standard deviation of 0.066. $P(\hat{p} \geq 0.46) = 0.017$.

   b. Yes, because 0.017 < 0.05, we do have convincing evidence that this company has a higher employee engagement rate than the national rate.

6. C

7. C