Lesson #42 · Topic 3B · Practice

Answer Key

1. a. No, the large counts condition is not satisfied since $n\hat{p} = 2 < 10$.

   b. Yes, the conditions have been met because the students were randomly selected, $40 \leq 10\%(530)$ and $40(0.65) = 26 \geq 10$ and $40(1 - 0.65) = 14 \geq 10$.
   The parameter is defined as p =the true proportion of all seniors at Paige's school who plan to attend a 4-year university after graduation and the confidence level is 90%.

2. a. Type of study: Observational study
   Variable: Whether U.S. college students prefer writing over typing class notes. (Categorical)

   b. One-sample z -interval for p at a 95% confidence level.
   p = true proportion of all college students who prefer writing over typing class notes.

   c. $\underline{\text{Random}}$: The students were randomly selected
   $\underline{10\%:}$ 1,000 is less than or equal to 10% of all U.S. college students
   $\underline{\text{Large Counts:}}$ $1{,}000(0.638) = 638 \geq 10$; $1{,}000(1 - 0.638) = 362 \geq 10$

   d. $\hat{p} \pm z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = 0.638 \pm 1.96 \sqrt{\frac{(0.638)(0.362)}{1000}} = (0.608, 0.668)$

   e. We are 95% confident that the interval from 0.608 to 0.668 captures the true proportion of all college students who prefer writing over typing class notes.

3. a. at least 4,269 people

   b. Decrease

   c. at least 4,023 people; yes, my prediction in part (b) is correct since 4,023 < 4,269

4. a. CLASSIFY:
Type of study: Observational study
Variable: Whether a lamella meets the thickness requirement (Categorical)

CHOOSE:
one-sample z -interval for p at a 90% confidence level
p = true proportion of all lamellas that meet the thickness requirement.

CHECK:
$\underline{\text{Random}}$: the 800 lamellas in the sample were randomly selected
$\underline{10\%}$: 800 is less than or equal to10% of all the lamellas manufactured by this company
$\underline{\text{Large Counts}}$: 800(0.983) = 786.4 $\geq$ 10; 800(1 $-$ 0.983) = 13.6 $\geq$ 10

CALCULATE:
$$\hat{p} \pm z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = 0.983 \pm 1.645 \sqrt{\frac{(0.983)(0.017)}{800}} = (0.975, 0.991)$$

CONCLUDE:
We are 90% confident that the interval from 0.975 to 0.991 captures the true proportion of all lamellas that meet the thickness requirement.

b. No, the interval of plausible values for p given by the confidence interval includes values that are below 0.98.

5. a. We do not know how many men and how many women were in the sample of 8,100 adults, which we would need to calculate the standard errors.

b. Wider because the sample size is smaller. The sample of men is a subset of the total adult sample.

6. D

7. B