Stat 345 Solutions - Section 8.5

Problem 8-42

When estimating a population proportion, the general form of the confidence interval will be

$$(\hat{p} - z_{\alpha/2}\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}, \hat{p} + z_{\alpha/2}\sqrt{\frac{\hat{p}(1-\hat{p})}{n}})$$

Here, $\hat{p} = 823/1000 = 0.823$, $n = 1000$, and $z_{0.05/2} = 1.96$ since we want to construct a 95% CI. Thus, we have

$$(0.823 - (1.96)\sqrt{\frac{(0.823)(1-0.823)}{1000}} \quad , \quad 0.823 + (1.96)\sqrt{\frac{(0.823)(1-0.823)}{1000}})$$
$$(0.799 \quad , \quad 0.847).$$

Problem 8-44
(a)

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Test and CI for One Proportion
Test of p = 0.5 vs p not = 0.5

Sample   X   N  Sample p          95% CI
1       18  50  0.360000  (0.226953, 0.493047)
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(b)
Use formula (8.26), $n = (\frac{1.96}{.02})^2(0.36)(0.64) = 2213$ (round up).
(c)
Use formula (8.27),$n = (\frac{1.96}{.02})^2(0.25) = 2401$

Problem 8.45 $n = (\frac{2.576}{.05})^2(0.25) = 664$ (round up)

Problem 8-48

When estimating a population proportion, the general form of the confidence interval will be

$$(\hat{p} - z_{\alpha/2}\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}, \hat{p} + z_{\alpha/2}\sqrt{\frac{\hat{p}(1-\hat{p})}{n}})$$

Here, $\hat{p} = 13/300 = 0.043$, $n = 300$, and $z_{0.05/2} = 1.96$ since we want to construct a 95% CI. Thus, we have

$$(0.043 - (1.96)\sqrt{\frac{(0.043)(1-0.043)}{300}} \quad , \quad 0.043 + (1.96)\sqrt{\frac{(0.043)(1-0.043)}{300}})$$
$$(0.020 \quad , \quad 0.066).$$