Math 741 Assignment 3 (Hand-In)

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5.3.24

solution: Given $\hat{p}_A = 0.52, \hat{p}_B = 0.48$, then the interval esitmation for A and B are

$$(\hat{p}_A - 0.05, \hat{p}_A + 0.05) = (0.48, 0.57)_A, (\hat{p}_B - 0.05, \hat{p}_B + 0.05) = (0.43, 0.53)_B$$

If two candidates are tied, both of them will need to have 50% of sample favors. Since 0.50 lies in both $(0.48, 0.57)_A, (0.43, 0.53)_B$. It makes sense to claim that the two candidates are tied.

5.3.26

solution: Given $\hat{p} = \frac{X}{n} \leq 0.4$. A 99% of confidence interval gives $z_{\alpha/2} = z_{0.005} = 2.576$. By Theorem 5.3.1, we can obtain margin of error is

$$z_{\alpha/2}\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = 0.05 \Rightarrow \frac{\hat{p}(1-\hat{p})}{n} = (\frac{0.05}{2.576})^2$$

$$\Rightarrow n = \hat{p}(1-\hat{p})/(\frac{0.05}{2.576})^2 \Rightarrow n \geq 0.4 \cdot 0.6/(\frac{0.05}{2.576})^2 \approx 637.03$$

i.e. the smallest of n is 638.