SOLUTIONS FOR HWK #8

6.5-1  (a) $\hat{p} = 0.037$.

(b)

\[
\hat{p} = 0.037 \pm z_{0.05} \sqrt{\frac{(0.037)(0.963)}{642}} = 0.037 \pm (1.96)(0.007) = 0.037 \pm 0.015
\]

$\hat{p} \in [0.022, 0.052]$.

(e)

\[
\hat{p} \leq 0.037 + z_{0.05} \sqrt{\frac{(0.037)(0.963)}{642}} = 0.037 + (1.645)(0.007) = 0.0497
\]

6.5-2  $p = 0.71 \pm 1.645 \sqrt{\frac{(0.71)(0.29)}{260}}$ so $p \in [0.66, 0.76]$.

6.5-3  a) $\hat{p} = 0.69$; $p \in [0.6613, 0.7187]$.

Problem B1

1. 0.03 is contained in the confidence interval for $p$ so we cannot conclude that Mr. Smith’s claim is false.

2. The competitor’s claim is false since 0.06 is not contained even in two-sided CI. Using the CI for the upper bound we reject even the hypothesis $p = 0.05$!

6.5-13  $\hat{p}_1 = 0.4, \hat{p}_2 = 0.17$, $p_1 - p_2 = 0.4 - 0.17 \pm 1.645 \sqrt{\frac{0.4(0.6)}{2100} + \frac{0.17(0.83)}{1900}} = 0.23 \pm (1.645)(0.014) = 0.23 \pm 0.023$

$p_1 - p_2 \in [0.207, 0.253]$.

6.5-16  $\hat{p}_1 = 520/1300 = 0.40$, $\hat{p}_2 = 385/1100 = 0.35$;

the 95% CI for $p_1 - p_2$ is $0.40 - 0.35 \pm 1.96 \sqrt{\frac{(0.40)(0.60)}{1300} + \frac{(0.35)(0.65)}{1100}}$, or $[0.011, 0.089]$.

Problem B2

1) With probability 0.9 $p_1 - p_2 \in [0.207, 0.253]$: this is compatible with the hypothesis $H_0$ so we cannot reject this hypothesis with significance level 0.1.

2) Since 0 $\notin [0.011, 0.089]$ (the 95% CI for $p_1 - p_2$, we reject $H_0$ with significance level 0.05.
6.6-1  By the formula

\[ n \geq \frac{z_{\alpha/2}^2 \sigma^2}{\epsilon^2} \]  

(with \( \epsilon = 0.4 \))

\[ n \geq \frac{(1.96)^2(4.84)}{(0.4)^2} = 116.2. \]

Thus we may put \( n = 117. \)

6.6-4  As above, by formula (1),

\[ n \geq \frac{(1.96)^2(34.9)}{(0.5)^2} = 536.3. \]

Thus we may put \( n = 537. \)

6.6-7  (a) By the formula (6.6-3),

\[ n \geq \frac{(1.96)^2}{4 \cdot (0.03)^2} = 1067.11 \]

We may put \( n = 1068. \)

6.6-10 \[ n \geq \frac{(1.645)^2(0.394)(0.606)}{(0.04)^2} = 403.81. \]

We may take \( n = 404. \)

6.6-17  Use formula (6.6-2) with \( p^* = 0.15. \)