H7.1. $\mu_0 = 70$ inches $\sigma = 3$ inches $n = 20 < 30$ $H_0: \mu = 70$ $H_a: \mu \neq 70$

$\bar{x}$ = mean of data = 72.31 inches

$z = \frac{72.31 - 70}{\frac{3}{\sqrt{20}}} \approx 3.444$

p-value $= P(z > 3.444) + P(z < -3.444) \approx 0.0006$

$0.0006 < 0.05$, so we reject H_0 at 5% significance level

2. $H_0: \mu \geq 30$ mpg $H_a: \mu < 30$ mpg $n = 10$ $df = n - 1 = 9$

$\bar{x}$ through calculation is 26.4 mpg,

so s^2 is $\frac{\sum (x_i - \bar{x})^2}{n-1} = 15.156$, so $s \approx \sqrt{15.156} \approx 3.518$

since σ^2 is unknown, we use T-test

$t = \frac{26.4 - 30}{\frac{3.518}{\sqrt{10}}} \approx \frac{-3.6}{1.1125} \approx -3.236$

$t_{-3.236, 9} < 0.05$

So reject H_0 in 5% significance level

4. $H_0: p \leq 0.72$ $H_a: p > 0.72$ since $np > 5$, use Z-test

$z_{obs} = \frac{\hat{p} - 0.72}{\sqrt{0.72(1-0.72)/n}}$ as $\hat{p} = \frac{42}{50} = 0.84$ and n is 50

so $z_{obs} = \frac{0.12}{0.0635} \approx 1.89$

$P(z > 1.89) = 1 - 0.9706 = 0.0294$

$0.0294 < 0.05$ so reject H_0 in 5% significance interval

5. (a). $n = 100$, $\hat{p} = 0.56$

$se = \sqrt{\frac{0.5 \times 0.5}{100}} = 0.05$, $z = \frac{0.56 - 0.5}{se} = \frac{0.06}{0.05} = 1.2$

p-value $= P(z > 1.2) \approx 0.1151 > 0.05$, so not reject H_0 in 5% significance interval

(b). $n = 120$, $\hat{p} = \frac{68}{120} \approx 0.567$, $se \approx 0.0456$

$z = \frac{0.067}{0.0456} \approx 1.46$, pvalue $= P(z > 1.46) \approx 0.0721 > 0.05$

so not reject H_0 in 5% significance interval.

(c) $n = 110$, $\hat{p} = \frac{62}{110} \approx 0.5636$ $se \approx 0.0477$

$z = \frac{0.0636}{0.0477} \approx 1.33$, p-value $= P(z > 0.0912) > 0.05$

so not reject H_0 in 5% significance interval

5. (d). $n = 330$, $\hat{p} = \frac{186}{330} \approx 0.5636$

$se \approx 0.0275$, $z = \frac{0.0636}{0.0275} \approx 2.31$

p-value $= P(Z > 2.31) \approx 0.0104 < 0.05$

So reject H_0 in 5% significance interval.

B3. $\sigma = 0.05$ $H_0 = \mu_A = \mu_B$ $H_a = \mu_A \neq \mu_B$

through calculation $\bar{x}_A = 6.267$ and $\bar{x}_B = 6.285$

So $se = \sqrt{\frac{0.5^2}{10} + \frac{0.5^2}{10}} \approx 0.02236$

So $z = \frac{(\bar{x}_A - \bar{x}_B) - 0}{se} = \frac{-0.018}{0.02236} \approx -0.805$

p-value $= 2P(Z > |-0.805|) \approx 0.421 > 0.05$

So not reject H_0 in 5% significance level