# Post-Class Solutions Due 5 Mar

## 4.4

⑤ $\bar{w} = 0.127$ $\quad t_{0.05}(9) = 1.833$

$s_w = 0.2719$ $\quad$ critical region is $t \geq 1.833$

$$t = \frac{\bar{w} - 0}{s_w/\sqrt{n}} \Rightarrow \frac{0.127}{0.2719/\sqrt{10}} \Rightarrow 1.477$$

Since $t = 1.477 < 1.833$ fail to reject $H_0$.

⑦ critical region:

$\chi^2 \leq \chi^2_{1-\alpha}(r)$

$\chi^2 \leq \chi^2_{1-0.05}(19)$

$\chi^2 \leq 10.12$

Test statistic:

$$\chi^2 = \frac{(n-1)s^2}{\sigma_0^2}$$

$$= \frac{(20-1)(0.065)^2}{(0.095)^2}$$

$$= \cancel{0.845}\ 8.89$$

a) $8.89 \leq 10.12$, reject $H_0$

$\therefore$ company was successful

b) Using Table IV:

$0.025 < p < 0.05$

4.5

③ a) Test Statistic:

$$t = \frac{\bar{x} - \bar{y}}{\sqrt{\frac{(n-1)S_x^2 + (m-1)S_y^2}{n+m-2}}\sqrt{\frac{1}{n} + \frac{1}{m}}}$$

critical region:

$t \leq -t_{0.05}(n+m-2)$

$t \leq -t_{0.05}(14+14-2)$

$t \leq -t_{0.05}(26)$

$t \leq -1.706$

b) $\bar{x} = 100.214$

$\bar{y} = 114.214$

$S_x = 24.586$

$S_Y = 18.145$

$n = m = 14$

Plugging into test statistic above:

$t = -1.714$

since $t \leq -1.706$, reject $H_0$.

$S_x^2 =$

$S_Y^2 =$

c) Using table, $0.025 < \text{p-value} < 0.05$

e) Reject if $\frac{S_x^2}{S_Y^2} \geq F_{\alpha/2}(n-1, m-1)$ $\quad H_0: \sigma_x^2/\sigma_Y^2 = 1 \; H_1: \sigma_x^2/\sigma_Y^2 \neq 1$

$1.8359 \geq 3.28$ ∴ Fail to reject $H_0: \sigma_x = \sigma_y$

⑤ a) $\frac{S_x^2}{S_Y^2} = \frac{4.80}{5.81} = 0.84 < 2.53 = F_{0.01}(24, 28)$

$\frac{S_Y^2}{S_x^2} = \frac{5.81}{4.88} = 1.19 < 2.91 = F_{0.01}(28, 24)$

Fail to reject $H_0: \sigma_x = \sigma_Y$

b) reject if

$$\bar{x} - \bar{y} \geq t_\alpha(n+m-2)\sqrt{\frac{(n-1)S_x^2 + (m-1)S_Y^2}{n+m-2}}\sqrt{\frac{1}{n} + \frac{1}{m}}$$

$$33.80 - 31.66 \geq t_{0.01}(25+29-2)\sqrt{\frac{(24)(4.88) + (28)(5.81)}{25+29-2}}\sqrt{\frac{1}{25} + \frac{1}{29}}$$

$2.14 \geq 2.326 \cdot 2.3196 \cdot 0.2729$

$2.14 \geq 1.472$ ∴ reject $H_0$

(7) CI: $\left[\hat{p}_1 - \hat{p}_2 - z_{\alpha/2}\sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}},\ \hat{p}_1 - \hat{p}_2 + z_{\alpha/2}\sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}}\right]$

$p_1 = \frac{124}{894} = 0.139$

$p_2 = \frac{70}{700} = 0.100$

$z_{\alpha/2} = 1.96$

$n_1 = 894$

$n_2 = 700$

$[0.007, 0.071]$

this result agrees w/ hypothesis test

(i.e. $|z| \geq z_{\alpha/2}$, reject $H_0$)