Midterm Review ; Math 3080-1
Spring 2007

§9.1 , #3

The test statistic is

$$\frac{\bar{X}-\bar{Y}-5000}{\sqrt{\frac{s_1^2}{m}+\frac{s_2^2}{n}}} \simeq 1.76$$

Use normal approximation [discuss applicability for n = 45] to obtain :

$$P\text{-value} = 1-0.9608 = 0.0392$$

$$\gtrsim 0.01 \Rightarrow \underline{\text{do}}\ \underline{\text{not}}\ \text{reject}.$$

§9.2, #25

Assume that the underlying populations are [at least nearly] normal. Then, the C.I. is :

$$\underbrace{\bar{X}-\bar{Y}}_{\substack{91.5-88.3 \\ =3.2}} \pm t_{\frac{\alpha}{2},\nu}\underbrace{\sqrt{\frac{s_1^2}{m}+\frac{s_2^2}{n}}}_{\sqrt{\frac{5.5^2}{28}+\frac{7.8^2}{31}} \simeq 1.74}$$

$$\nu = \frac{\left(s_1^2/m + s_2^2/n\right)^2}{\frac{(s_1^2/m)^2}{m-1} + \frac{(s_2^2/n)^2}{n-1}} \simeq 54.$$

$\Rightarrow$ for a 95% C.I., $t_{\frac{\alpha}{2},\nu} \simeq t_{0.025,54} = 2.009$

95% C.I. is: -0.288 to 6.688

Also, 90% C.I. is: 0.28 to 6.12

the 2nd does not suggest a difference; the 1st does. [discuss]

$\boxed{\S 9.3, \#43}$ a) Normal plot relatively OK; not great though.

b) Assuming normal population [see (a)],

$\bar{D} = -38.6$ $\quad s_D \simeq 23.18$ $\quad n = 15$

95% confidence lower bound is

$$\bar{D} - t_{0.05,14}\frac{23.18}{\sqrt{15}} \simeq -51.48.$$

$\boxed{\S 9.4,\ \#47}$ $\quad m = 200 \quad \# = 30 \Rightarrow \hat{p}_1 = 30/200 = 0.15$

$n = 600 \quad \# = 180 \Rightarrow \hat{p}_2 = 180/600 = 0.3$

$$\hat{p} = \frac{30+180}{200+600} \cong 0.2625.$$

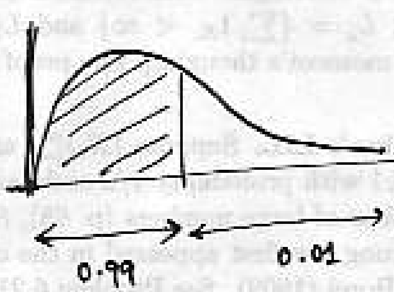
The test statistic is

$$\frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}\hat{q}\left[\frac{1}{m}+\frac{1}{n}\right]}} \simeq -4.2$$

Pvalue [normal approx.] $\simeq 0 \Rightarrow$ reject H_0.

$\boxed{\S 9.5,\ \#57}$ $\quad$ (a) $F_{0.05,5,8} = 3.69$

(e) $\nu_1 = 10 \quad \nu_2 = 12 \quad 99^{th}$ percentile $\simeq 4.30$

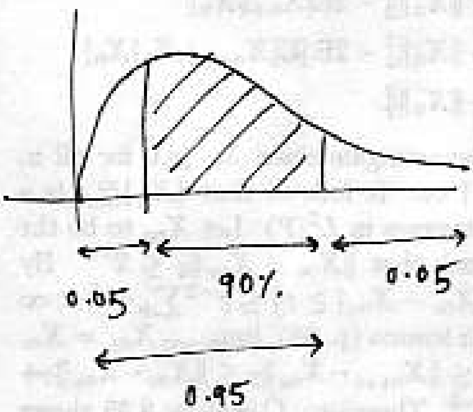


$\boxed{\S 9.5, \ \#63}$

Recall the form of the 90% CI is

$$\text{from } \frac{S_1^2}{b S_2^2} \text{ to } \frac{S_1^2}{a S_2^2}, \text{ where}$$

$$P\{a \le F \le b\} = 0.90.$$



$$a = F_{0.95,4,4} = \frac{1}{F_{0.05,4,4}} \cong 0.156$$

$$b = F_{0.05,4,4} = 6.39$$

So the 90% C.I. is from 0.338 to 13.85.