HW#6 Solutions

7.8

$$SE_1 = \frac{.400}{\sqrt{9}} = .133$$
$$SE_2 = \frac{.220}{\sqrt{6}} = .090$$
$$SE_{y_1 - y_2} = \sqrt{.133^2 + .090^2} = .16$$

7.11

- Is the mean of the concentration of soluble ferulic acid in corn seedlings grown in the dark the same as the mean of the concentration of soluble ferulic acid in corn seedlings grown in the light.
- $$SE_{y_1 - y_2} = \sqrt{\frac{13^2}{4} + \frac{13^2}{4}} = 9.192$$
$$df = 6$$
$$(92 - 115) \pm (2.447)(9.192)$$
$$CI: (-45.5, -.5)$$
- $$df = 6$$
$$(92 - 115) \pm (1.943)(9.192)$$
$$CI: (-40.9, -5.1)$$

7.14

- Let 1 denote antibiotic and 2 denote control
$$SE_{y_1 - y_2} = \sqrt{\frac{10^2}{10} + \frac{8^2}{10}} = 4.050$$
$$df = 17$$
$$(25 - 23) \pm (1.740)(4.050)(-5.0, 9.0)$$
- We are 90% confident that the population mean prothrombin time for rats treated with an antibiotic is smaller than the control rats by an amount that might be as much as 5 seconds or later than that for the control rats by an amount that might be as large as 9 seconds.

7.16

- Let 1 denote successful and let 2 denote unsuccessful.
$$SE_{y_1 - y_2} = \sqrt{\frac{.283^2}{22} + \frac{.262^2}{17}} = .08763$$
$$df = 40$$
$$(8.498 - 8.440) \pm (2.021)(.08763)$$
$$CI: (-.12, .24)$$
- We are 95% confident that the population mean head width of all females who mate successfully is smaller than that for rejected females by an amount that might be as much as .12 mm or is larger than that for rejected females by an amount that might be as large as .24

7.19

- Let 1 denote caffeine and let 2 denote decaf

$$SE_{y_1-y_2}=\sqrt{3.7^2+3.4^2}=5.02$$
$$df=17$$
$$(7.3-5.9)\pm(1.740)(5.02)$$
$$CI:(-7.33,10.13)$$

- We are 90% confidant that the population mean heart rate increase of individuals given caffeine is less than that of individuals given decaf by an amount that might be as much as 7.33 or is greater than that of individuals given decaf by an amount that might be as large as 10.13.

7.21

- Let 1 denote red and 2 denote green

$$SE_{y_1-y_2}=\sqrt{.36^2+.36^2}=.509$$
$$df=40$$
$$(8.36-8.94)\pm(2.021)(.509)$$
$$CI:(-1.6,0.45)$$

- We are 90% confidant that the population mean height of the plants grown in red light is less than that of the plants grown in green light by an amount that might be as much as 1.6 or is greater than that of the plants grown in green light by an amount that might be as large as .45.

7.27

$$H_o:\mu_{HS}=\mu_{HH}$$
$$H_1:\mu_{HS}\neq\mu_{HH}$$
$$SE_{y_1-y_2}=\sqrt{\frac{17.8^2}{33}+\frac{19.1^2}{51}}=4.09$$
$$t_s=\frac{18.3-13.9}{4.09}=1.07$$
$$df=71.9 \text{ using the long formula}$$
$$df=32 \text{ using the conservative choice of } min(n_1, n_2)$$
$$df=82 \text{ using } n_1+n_2-2$$
$$\text{¿any case,}$$
$$.20<p-value<.40$$
$$\text{thus the } p-\text{value is greater than } \alpha\text{, thus we do not reject } H_0$$

7.31

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$$H_0: \text{means thymus weight is the same at } 14 \text{ as at } 15 \text{ days}$$
$$H_1: \text{mean thymus weigh is not the same at } 14 \text{ as at } 15 \text{ days}$$
$$SE_{y_1-y_2}=\sqrt{\frac{2.86^2}{6}+\frac{3.52^2}{5}}=1.962$$
$$t_s=(78.42-80.44)/1.962=-1.03$$
$$df=n_1+n_2-2=9$$
$$\text{long formula gives } df=7.8$$

Table 4 gives $t_{.20}$=.889, therefore our p-value is greater than .4, thus we do not reject H_0. Therefore we say that there is insufficient evidence to conclude that the weights are different between t14 and 15 days.

- Because we do not reject H_0, we conclude that any difference in the observed sample means can be attributed to chance.

7.37

- H_0: *mean number of colonies is the same for the control as the soap*
  H_1: *mean number of colonies is different for the control than the soap*

$$SE_{y_1-y_2}=\sqrt{5.5^2+8.6^2}=10.21$$
$$t_s=(41.8-32.4)/10.21=.92$$

Using table 4 and df=10 we see that $t_{.20}$=.879 and $t_{.10}$=1.372 therefore .20 < p-value < .40 so that we do not reject H_0.

- There is insufficient evidence to conclude that the mean number of colonies differers for control and soap.

7.45

Yes, because 0 is outside of the confidence interval, we know that the p-value is less than .05 so the p-value is less than .10. Thus, we reject they hypothesis that the two means are the same.