Stat310 HW8 Solutions (100’):

(8’)

6.5–4 (a) \( \bar{x} - \bar{y} = 1511.714 - 1118.400 = 393.314 \); 
(b) \( s_x^2 = 49,669.905, \quad s_y^2 = 15,297.600, \quad r = [8.599] = 8, \quad t_{0.025}(8) = 2.306 \), so the confidence interval is \([179.148, 607.480]\).

(8’)

6.5–8 (a) \( \bar{x} = 2.584, \quad \bar{y} = 1.564, \quad s_x^2 = 0.1042, \quad s_y^2 = 0.0428, \quad s_p = 0.2711, \quad t_{0.025}(18) = 2.101 \).
Thus a 95% confidence interval for \( \mu_x - \mu_y \) is \([0.7653, 1.2747]\).

(b) \[
\begin{align*}
\text{X} \\
\text{Y}
\end{align*}
\]

Figure 6.5–8: Box-and-whisker diagrams, wedge on (X) and wedge off (Y)

(c) Yes.
(10')

(a) \( x - \overline{x} = 0.447, \ s_x^2 = 2.991, \ 0.447 \pm 1.633 \times \sqrt{2.991/10} = [-0.56, 1.45] \)

(b) \( y - \overline{y} = 1.115, \ s_y^2 = 1.665, \ 1.115 \pm 1.833 \times \sqrt{1.665/10} = [0.37, 1.86] \)

(c) For males, No, for females, Yes

(8')

6.5–12

(a) \( \bar{d} = 0.07875; \)

(b) \( |\bar{d} - 1.7410.25492/\sqrt{24}, \infty| = |0.0104, \infty|; \)

(c) not necessarily.
For these 9 weights, $\bar{x} = 20.90$, $s = 1.858$.
(a) A point estimate for $\sigma$ is $s = 1.858$.

(b) \[
\left[ \frac{1.858\sqrt{8}}{\sqrt{17.54}}, \frac{1.858\sqrt{8}}{\sqrt{2.180}} \right] = [1.255, 3.560]
\]

or \[
\left[ \frac{1.858\sqrt{8}}{\sqrt{21.595}}, \frac{1.858\sqrt{8}}{\sqrt{2.623}} \right] = [1.131, 3.245];
\]

(c) \[
\left[ \frac{1.858\sqrt{8}}{\sqrt{15.51}}, \frac{1.858\sqrt{8}}{\sqrt{2.733}} \right] = [1.334, 3.179]
\]

or \[
\left[ \frac{1.858\sqrt{8}}{\sqrt{19.110}}, \frac{1.858\sqrt{8}}{\sqrt{3.298}} \right] = [1.202, 2.894].
\]

(a) \[
s_x^2/s_y^2 = 0.0040/0.0076 = 0.5263;
\]

(b) \[
\left[ \frac{1}{F_{0.025}(9, 8)} \frac{s_x^2}{s_y^2}, F_{0.025}(8, 9) \frac{s_x^2}{s_y^2} \right] = \left[ \left( \frac{1}{4.36} \right)(0.5263), 4.10(0.5263) \right] = [0.121, 2.158].
\]

A 90% confidence interval for $\sigma_x^2/\sigma_y^2$ is \[
\left[ \frac{1}{F_{0.05}(15, 12)} \left( \frac{s_x}{s_y} \right)^2, F_{0.05}(12, 15) \left( \frac{s_x}{s_y} \right)^2 \right] = \left[ \frac{1}{2.62} \left( \frac{0.197}{0.318} \right)^2, 2.48 \left( \frac{0.197}{0.318} \right)^2 \right].
\]

So a 90% confidence interval for $\sigma_x/\sigma_y$ is given by the square roots of these values, namely $[0.383, 0.976]$.

(a) \[
\left[ \frac{1}{3.115} \left( \frac{604.489}{329.258} \right), 3.115 \left( \frac{604.489}{329.258} \right) \right] = [0.589, 5.719];
\]

(b) $[0.77, 2.39]$. 

(8', 8', 8')

(8')
(8')

\[ 6.7-2 \quad \left[ 0.71 - 1.645 \sqrt{\frac{(0.71)(0.29)}{200}}, \quad 0.71 + 1.645 \sqrt{\frac{(0.71)(0.29)}{200}} \right] = [0.66, 0.76]. \]

(8', 10')

6.7–8 (a) \( \hat{p} = \frac{388}{1022} = 0.3796; \)

(b) \( 0.3796 \pm 1.645 \sqrt{\frac{(0.3796)(0.6204)}{1022}} \) or \( [0.3546, 0.4046] \).

6.7–10 (a) \( 0.58 \pm 1.645 \sqrt{\frac{(0.58)(0.42)}{500}} \) or \( [0.544, 0.616] \);

(b) \( \frac{0.045}{\sqrt{(0.58)(0.42)}} = 2.04 \) corresponds to an approximate 96% confidence level.

(8')

6.7–18 (a) \( \hat{p}_a = \frac{170}{460} = 0.37, \quad \hat{p}_b = \frac{141}{440} = 0.32; \)

\[ 0.37 - 0.32 \pm 1.96 \sqrt{\frac{(0.37)(0.63)}{460} + \frac{(0.32)(0.68)}{440}} \) or \( [-0.012, 0.112]; \)

(b) yes, the interval includes zero.