Stat310 HW8 Solutions (100'):

(8')

6.5–4 **(a)** $\overline{x} - \overline{y} = 1511.714 - 1118.400 = 393.314$;

(b) $s_x^2 = 49,669.905$, $s_y^2 = 15,297.600$, $r = \lfloor 8.599 \rfloor = 8$, $t_{0.025}(8) = 2.306$, so the confidence interval is $[179.148, 607.480]$.

(8')

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

(b)

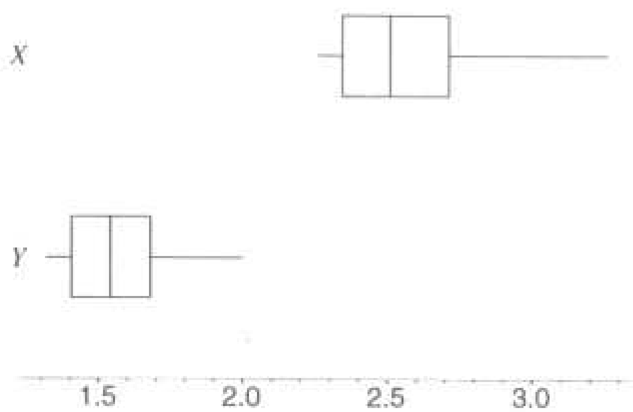


Figure 6.5–8: Box-and-whisker diagrams, wedge on (X) and wedge off (Y)

(c) Yes.

(10’)

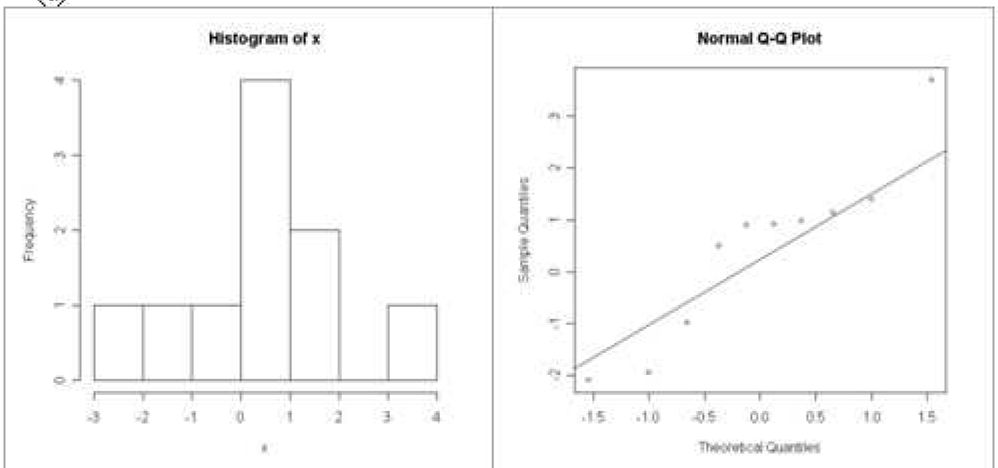
6.5-11

(a) $\overline{x_1 - x_2} = 0.447$, $s_x^2 = 2.991$, $0.447 \pm 1.833 \times \sqrt{2.991/10} = [-0.56, 1.45]$

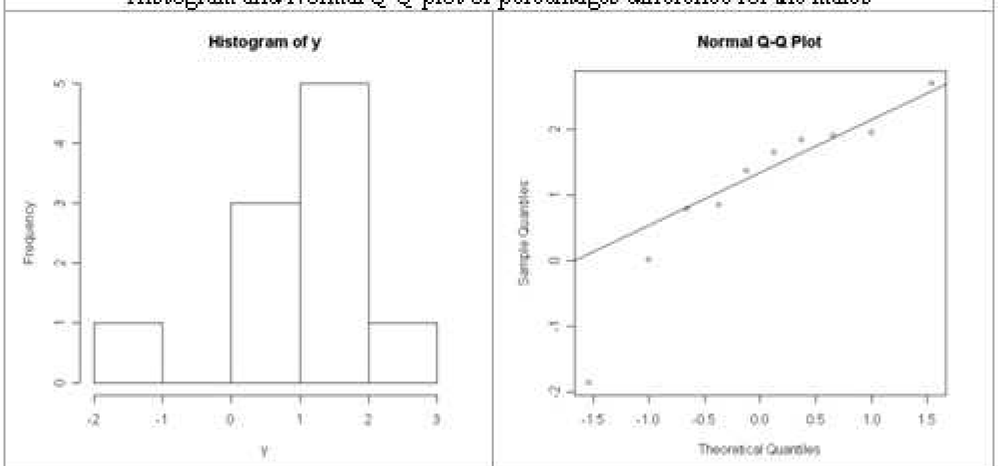
(b) $\overline{y_1 - y_2} = 1.115$, $s_y^2 = 1.665$, $1.115 \pm 1.833 \times \sqrt{1.665/10} = [0.37, 1.86]$

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

(d)



Histogram and Normal Q-Q plot of percentages difference for the males



Histogram and Normal Q-Q plot of percentages difference for the females

(8’)

6.5–12 **(a)** $\overline{d} = 0.07875$;

(b) $[\overline{d} - 1.7140.25492/\sqrt{24}, \infty) = [-0.0104, \infty)$;

(c) not necessarily.

(8')

6.6–2 For these 9 weights, $\bar{x} = 20.90$, $s = 1.858$.

(a) A point estimate for σ 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

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

(8', 8', 8')

6.6–8 **(a)** $s_x^2/s_y^2 = 0.0040/0.0076 = 0.5263$;

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

6.6–10 A 90% confidence interval for σ_X^2/σ_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 σ_X/σ_Y is given by the square roots of these values, namely [0.383, 0.976].

6.6–12 **(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')

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

(8', 10')

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

(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) $\frac{0.045}{\sqrt{\frac{(0.58)(0.42)}{500}}} = 2.04$ corresponds to an approximate 96% confidence level.

(8')

6.7–18 **(a)** $\widehat{p}_A = 170/460 = 0.37$, $\widehat{p}_B = 141/440 = 0.32$,

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

(b) yes, the interval includes zero.