

Pledge: *I pledge my honor that I have abided by the Stevens Honor System.*

7.71: p. 468

(a)

There does not seem to be any outliers or any skewness to the samples, therefore, the use of t-procedures is appropriate in this case; however, they do not seem to be normal.

(b)

	Sample size	Mean	Std. Dev.
Neutral	14	0.571	0.730
Sad	17	2.12	1.24

(c)

Consider μ_1 to be the mean of the Neutral group, and μ_2 to be the mean of the Sad group.

$$H_0 : \mu_1 = \mu_2$$

$$H_a : \mu_1 < \mu_2$$

(d)

$$\begin{aligned} \text{Test Statistic} &= \frac{0.571 - 2.118}{\sqrt{\frac{0.730^2}{14} - \frac{1.244^2}{17}}} \\ &= -4.30 \\ df &= 26 \\ p\text{-value} &= 0.0001 \end{aligned}$$

From these results we can reject the null hypothesis accepting the alternative, the p-value is far smaller than the significance level of 0.05. Furthermore, one can say that there is a significant difference in mean price between the two groups.

(e)

$$95\% \text{ CI} = (0.571 - 2.12) \pm t_{\alpha/2} * \sqrt{\frac{0.730^2}{14} - \frac{1.244^2}{17}}$$

For 95% confidence interval: $(-2.285, -0.808)$

7.89: p. 472

(a)

Let μ_1 is the mean of the Breast-fed group, and μ_2 is the mean of the formula group.

$$H_0 : \mu_1 = \mu_2$$

$$H_a : \mu_1 > \mu_2$$

$$\begin{aligned}
 s_{combined} &= \sqrt{\frac{22 * 1.7^2 + 18 * 1.8^2}{40}} \\
 &= 1.7457 \\
 t &= \frac{13.3 - 12.4}{1.7457 * \sqrt{\frac{1}{23} + \frac{1}{19}}} \\
 &= 1.66
 \end{aligned}$$

With these, $p - value = 0.053$, therefore, if provided with a significant level of $\alpha = 0.05$, then it would be concluded that there is no difference between the mean hemoglobin found in breast-fed vs. formula infants. The null hypothesis would fail to be rejected.

(b)

For 95% confidence interval: $(-0.2021, 2.0021)$

(c)

The assumptions required to make part (a) and (b) work is that both samples are considered to be SRS and normal.

7.102: p. 480

(a)

$$F = \frac{s_2^2}{s_1^2} = \frac{9.1}{3.5} = 2.6$$

(b)

$$F(15, 10, 0.05) = 2.845$$

(c)

We accept H_0 as $2.6 < 2.845$, therefore, we can conclude that the two standard deviations are equal.

7.122: p. 482

(a)

$$\bar{x}_1 = 49.692$$

$$s_1 = 2.3179$$

$$\bar{x}_2 = 50.545$$

$$s_2 = 1.9244$$

$$df = 17$$

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} = -0.90$$

$$p - value = 0.3831$$

(b)

$$\bar{d} = -0.853$$

$$s = 1.2691$$

$$t = \frac{\bar{d} - \mu_d}{\frac{s_d}{\sqrt{n}}} = -2.13$$

$$p\text{-value} = 0.0625$$

(c)

The calculated test statistic values and p-values are different between parts (a) and (b), therefore, this could lead to the accidental acceptance or rejection of H_0 .

8.71: p. 524

(a)

$$\hat{p}_F = \frac{48}{60} = 0.8$$

$$SE_F = \sqrt{\frac{0.8*0.2}{60}} = 0.05164$$

$$\hat{p}_M = \frac{52}{132} = 0.39$$

$$SE_F = \sqrt{\frac{0.39*0.60}{132}} = 0.04252$$

(b)

For 90% confidence interval: (0.2960, 0.5161)

With this, one can assume that the mean difference of the ratio of male to female references falls between these two values.

(c)

$$H_0 : \hat{p}_F = \hat{p}_M$$

$$p = \frac{p_F * n_F + p_M * n_M}{n_F + n_M} = 0.5101$$

$$SE = \sqrt{p(1-p)\left(\frac{1}{n_F} + \frac{1}{n_M}\right)} = 0.0778$$

$$z = \frac{p_F - p_M}{SE} = 5.217$$

$$P(z > 5.21) \approx 0$$

We reject H_0 stating that there is a significant difference.