

Homework 13 Solution

8.62

- (a) $24.8 - 21.3 \pm Z_{0.995} * \sqrt{\frac{7.1^2}{34} + \frac{8.1^2}{41}} = 3.5 \pm 4.52 = (-1.02, 8.02)$
- (b) We are 99% confident that the difference in mean molt time for normal males versus those split from their mates is between $(-1.02, 8.02)$.

8.70

- (a) $Z_{0.975} \sqrt{\frac{p(1-p)}{n}} = 0.05, p = 0.9: n = 138.29 = 139$
- (b) $Z_{0.975} \sqrt{\frac{p(1-p)}{n}} = 0.05, p = 0.5: n = 384.15 = 385$

8.80

$$26.6 \pm T_{21-1, 0.975} * \frac{7.4}{\sqrt{21}} = 26.6 \pm 3.37 = (23.23, 29.97)$$

8.90

(a)

$$S_p^2 = \frac{(15-1) * 42^2 + (15-1) * 45^2}{15 + 15 - 2} = 1894.5$$

$$\begin{aligned} CI &= 446 - 534 \pm t_{28, 0.975} * \sqrt{(\frac{1}{15} + \frac{1}{15}) S_p} \\ &= -88 \pm 32.55 \\ &= (-120.55, -55.45) \end{aligned}$$

(b)

$$\begin{aligned}S_p^2 &= \frac{(15-1) * 57^2 + (15-1) * 52^2}{15+15-2} = 2976.5 \\CI &= 548 - 517 \pm t_{28,0.975} * \sqrt{(\frac{1}{15} + \frac{1}{15})S_p} \\&= -31 \pm 40.8 \\&= (-9.8, 71.8)\end{aligned}$$

(c) We are 95% confident that there is a difference in the two mean verbal SAT scores achieved by the two groups. However, a difference is not seen in the math SAT scores under 95% confidence level.

(d) Independent samples; equal variance ($\sigma_1 = \sigma_2$)

8.95

$$\begin{aligned}s^2 &= 0.503 \\ \frac{(6-1)s^2}{\sigma^2} &\sim \chi_5^2 \\ \chi_{5,0.05}^2 &= 1.145 \\ \chi_{5,0.95}^2 &= 11.071 \\ \sigma^2 &\in [0.227, 2.196]\end{aligned}$$

We are 90% confident that σ^2 is within $[0.227, 2.196]$.