Math 423 – Prof. Richard B. Goldstein – Walpole – 8th ed – Chapter 9 Answers

9.4 $n = 30, \bar{x} = 780$, and $\sigma = 40$. Also, $z_{0.02} = 2.054$. So, a 96% confidence interval for the population mean can be calculated as

$$780 - (2.054)(40/\sqrt{30}) < \mu < 780 + (2.054)(40/\sqrt{30}),$$

or $765 < \mu < 795$.

9.15 $n = 12, \bar{x} = 48.50, s = 1.5$, and $t_{0.05} = 1.796$ with 11 degrees of freedom. A 90% confidence interval for the population mean is

$$48.50 - (1.796)(1.5/\sqrt{12}) < \mu < 48.50 + (1.796)(1.5/\sqrt{12}),$$

or $47.722 < \mu < 49.278$.

9.37 $n_1 = 100, n_2 = 200, \bar{x}_1 = 12.2, \bar{x}_2 = 9.1, s_1 = 1.1$, and $s_2 = 0.9$. It is known that $z_{0.01} = 2.327$. So

$$(12.2 - 9.1) \pm 2.327\sqrt{1.1^2/100 + 0.9^2/200} = 3.1 \pm 0.30,$$

or $2.80 < \mu_1 - \mu_2 < 3.40$. The treatment appears to reduce the mean amount of metal removed.

9.38 $n_1 = 12, n_2 = 10, \bar{x}_1 = 85, \bar{x}_2 = 81, s_1 = 4, s_2 = 5$, and $s_p = 4.478$ with $t_{0.05} = 1.725$ with 20 degrees of freedom. So

$$(85 - 81) \pm (1.725)(4.478)\sqrt{1/12 + 1/10} = 4 \pm 3.31,$$

which yields $0.69 < \mu_1 - \mu_2 < 7.31$.

9.44 $n = 8, \bar{d} = -1112.5, s_d = 1454$, with $t_{0.005} = 3.499$ with 7 degrees of freedom. So,

$$-1112.5 \pm (3.499)\frac{1454}{\sqrt{8}} = -1112.5 \pm 1798.7,$$

which yields $-2911.2 < \mu_D < 686.2$.

9.53 $n = 1000, \hat{p} = \frac{228}{1000} = 0.228, \hat{q} = 0.772$, and $z_{0.005} = 2.575$. So,

$$0.228 \pm (2.575)\sqrt{\frac{(0.228)(0.772)}{1000}} = 0.228 \pm 0.034,$$

which yields $0.194 < p < 0.262$.

9.60 $n = \frac{(2.575)^2(0.228)(0.772)}{(0.05)^2} = 467$ when round up.

9.71 $s^2 = 0.815$ with $v = 4$ degrees of freedom. Also, $\chi^2_{0.025} = 11.143$ and $\chi^2_{0.975} = 0.484$. So,

$$\frac{(4)(0.815)}{11.143} < \sigma^2 < \frac{(4)(0.815)}{0.484}, \quad \text{which yields} \quad 0.293 < \sigma^2 < 6.736.$$

Since this interval contains 1, the claim that $\sigma^2$ seems valid.

9.77 $s_1^2 = 1.00, s_2^2 = 0.64, f_{0.01}(11, 9) = 5.19$, and $f_{0.01}(9, 11) = 4.63$. So,

$$\frac{1.00/0.64}{5.19} < \frac{\sigma_1^2}{\sigma_2^2} < (1.00/0.64)(4.63), \text{ or } 0.301 < \frac{\sigma_1^2}{\sigma_2^2} < 7.234,$$

which yields $0.549 < \frac{\sigma_1}{\sigma_2} < 2.690$.