

Section 10.3

Question 1

$$n_1 = 24 \quad \bar{x}_1 = 32.73 \quad s_1 = 4$$

$$n_2 = 26 \quad \bar{x}_2 = 25.93 \quad s_2 = 3$$

$$\bar{x}_1 - \bar{x}_2 = 6.8$$

$$E = tc \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} = 2.03022$$

$$CI = ((\bar{x}_1 - \bar{x}_2) - E, (\bar{x}_1 - \bar{x}_2) + E)$$

$$= 6.8 - 2.03 < \mu_1 - \mu_2 < 6.8 + 2.03$$

$$= 4.8 < \mu_1 - \mu_2 < 8.8$$

Question 5

$$n_1 = 24$$

$$n_2 = 20$$

$$\bar{X}_1 = 380$$

$$\bar{X}_2 = 411$$

$$s_1 = 58.9$$

$$s_2 = 33.2$$

98% C.I.

$$CI : (\bar{X}_1 - \bar{X}_2) - E < \mu_1 - \mu_2 < (\bar{X}_1 - \bar{X}_2) + E$$

$$= -65.34 < \mu_1 - \mu_2 < 3.34$$

Question 8

$$n_1 = 25$$

$$n_2 = 15$$

$$\bar{x}_1 = 70$$

$$\bar{x}_2 = 67$$

$$s_1 = 1.9$$

$$s_2 = 2.3$$

90% CL

(a)

CI = 1.8 to 4.2 miles per hour

(b)

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} = \frac{70 - 67}{\sqrt{\frac{1.9^2}{25} + \frac{2.3^2}{15}}} = 4.255$$

$$p = 0.001$$

Reject the null hypothesis;

= higher than

(c) New CI = 1.47, to 4.53 miles per hour

Section 10.4

Question 1

$$n = 21, \bar{d} = 25.4, s_d = 13.5 \quad 90\% \text{ CL}$$

$$df = 20, t_c = 1.725$$

$$CI = \bar{d} \pm 1.725 \left(\frac{13.5}{\sqrt{21}} \right)$$

$$= 25.4 \pm 5.0817$$

$$= 20.3 < \mu_d < 30.5$$

Question 3

(a) Confidence interval

$$\bar{d} = -1.717$$

$$t_c = 3.365$$

$$n = 6$$

$$\text{std error} = 0.5828$$

$$CI = -1.717 \pm 3.365(0.5828)$$

$$= -3.68 \text{ to } 0.24$$

$$(b) \quad t = \frac{\bar{d}}{\text{std. error}} = \frac{-1.717}{0.5828} = -2.946$$

$$p\text{-value} = 0.016$$

$$\alpha = 0.1$$

Reject null hypothesis

We can conclude that the ~~the~~ mean mileage increases

Question 4

$$(a) \quad \bar{d} = 10.5 \quad \text{std. error} = 4.9678$$

$$n = 8$$

$$t_c = 1.895$$

$$CI = 10.5 \pm 1.895(4.9678)$$

$$= 1.1 \text{ bites to } 19.9 \text{ bites}$$

$$(b) \quad t = \frac{\bar{d}}{\text{std. error}} = \frac{10.5}{4.9678} = \frac{2.1}{2.1}$$

$$p\text{-value} = 0.0724$$

$$\alpha = 0.01$$

The mean numbers of bites are equal

Question 5

(a) $\bar{d} = -3.67$
std. error $= 7.9425$
 $n = 9$
 $t_c = \cancel{3.25} 3.355$

$$\begin{aligned} CI &= \bar{d} \pm t_c (\text{std. error}) \\ &= -3.67 \pm \cancel{3.25}^{3.355} (7.9425) \\ &= -30.3 \text{ to } 23 \end{aligned}$$

(b) Test statistic $= \frac{-3.67}{7.9425} = -0.462$

P-value $= 0.3283$

the course makes no improvement

Section 10.5

Question 1

$$X_1 = 241$$

$$X_2 = 267$$

$$n_1 = 594$$

$$n_2 = 708$$

$$(a) \quad P_1 = \frac{241}{594}, \quad P_2 = \frac{267}{708}$$

$$P_1 - P_2 = \frac{241}{594} - \frac{267}{708} = 0.0286 \\ = 0.03$$

(b)

$$C.I. \pm (P_1 - P_2) \pm Z_{\frac{\alpha}{2}} \sqrt{\frac{P_1(1-P_1)}{n_1} + \frac{P_2(1-P_2)}{n_2}}$$

$$= -0.02 \text{ to } 0.07$$

(c)

$$Z_{stat} = \frac{P_1 - P_2}{\sqrt{\frac{P_1(1-P_1)}{n_1} + \frac{P_2(1-P_2)}{n_2}}} = 1.05$$

$$P\text{-value} = 0.2919$$

$$\alpha = 0.02$$

The store brand are same

Question 2

$$X_1 = 368$$

$$X_2 = 275$$

97% CL

$$n_1 = 408$$

$$n_2 = 296$$

(a)

$$C.I. = -0.07 \text{ to } 0.02$$

$$(b) \quad Z_{stat} = -1.26 \quad P\text{-value} = 0.1036 \quad \alpha = 0.025$$

West coast that are mailed within 72 hours is not lower

Question 3

$$P_1 = 0.42$$
$$n_1 = 655$$

$$P_2 = 0.36$$
$$n_2 = 430$$

98% CL

$$CI = (P_1 - P_2) \pm Z_c \sqrt{\frac{P_1 Q_1}{n_1} + \frac{P_2 Q_2}{n_2}}$$

$$= (0.42 - 0.36) \pm 2.33 \sqrt{\frac{0.42 \times 0.58}{655} + \frac{0.36 \times 0.64}{430}}$$

$$= -0.01 < P_1 - P_2 < 0.13$$

Question 4

$$E = 0.07$$

$$Z_c = 1.64$$

90% CL

$$P_1 = P_2 = 0.5$$

$$E = Z_c \sqrt{\frac{P_1 Q_1 + P_2 Q_2}{n}}$$

$$\left(\frac{E}{Z_c}\right)^2 = \frac{P_1 Q_1 + P_2 Q_2}{n}$$

$$n = \left(\frac{Z_c}{E}\right)^2 (P_1 Q_1 + P_2 Q_2)$$

$$= \left(\frac{1.64}{0.07}\right)^2 \left(\frac{(0.5)(0.5) + (0.5)(0.5)}{0.42(0.58) + 0.36(0.64)}\right)$$

$$= \cancel{261} 275$$

Question 5

$$P_1 = 0.33$$
$$n_1 = 100$$

$$P_2 = 0.22$$
$$n_2 = 100$$

$$Z = 1.7419$$

$$P(P_1 \geq P_2) = 0.0408$$

Question 6

$$P_1 = 0.66$$
$$n_1 = 110$$

$$P_2 = 0.82$$
$$n_2 = 100$$

98% CL

$$CI = -0.2979 < P_1 - P_2 < -0.0221$$

Section 11.1

Question 1

$$\chi^2 = 30.144$$

Question 2

$$\chi^2 = 3.816$$

Question 3

$$\chi^2 = 41.638$$

Question 4

$$\chi^2 = 2.167$$

Question 5

(a) $df = 5$, $\chi^2 = 11.07$

(b) $df = 3$, $\chi^2 = 11.34$

(c) $df = 100$, $\chi^2 = 144.29$