

## Chapter 7: Answers

### Section 7-2

- The confidence level (such as 95%) was not provided.
- $\hat{p} = 0.26$  is the sample proportion;  $\hat{q} = 0.74$  (found from evaluating  $1 - \hat{p}$ );  $n = 1910$  is the sample size;  $E = 0.03$  is the margin of error;  $p$  is the population proportion, which is unknown. The value of  $\alpha$  is 0.05.
- 1.28                      7. 1.645                      9.  $0.125 \pm 0.061$
- $0.0268 < p < 0.133$
- a. 0.530      b.  $E = 0.0309$       c.  $0.499 < p < 0.561$   
d. We have 95% confidence that the interval from 0.499 to 0.561 actually does contain the true value of the population proportion.
- a. 0.430      b.  $E = 0.0162$       c.  $0.414 < p < 0.446$   
d. We have 90% confidence that the interval from 0.414 to 0.446 actually does contain the true value of the population proportion.
- a. 0.930      b.  $0.914 < p < 0.946$   
c. Yes. The true proportion of girls with the XSORT method is substantially greater than the proportion of (about) 0.5 that is expected when no method of gender selection is used.
- a. 0.5      b. 0.439      c.  $0.363 < p < 0.516$   
d. If the touch therapists really had an ability to select the correct hand by sensing an energy field, their success rate would be significantly greater than 0.5, but the sample success rate of 0.439 and the confidence interval suggest that they do not have the ability to select the correct hand by sensing an energy field.
- a. 124      b.  $24.7\% < p < 33.3\%$   
c. Yes. Because all values of the confidence interval are less than 0.5, the confidence interval shows that the percentage of women who purchase books online is very likely less than 50%.  
d. No. The confidence interval shows that it is possible that the percentage of women who purchase books online could be less than 25%.  
e. Nothing.
- a. 236  
b.  $0.402 < p < 0.516$  (using  $x = 236$ :  $0.403 < p < 0.516$ ).  
c.  $0.431 < p < 0.487$   
d. The 95% confidence interval is wider than the 80% confidence interval. A confidence interval must be wider in order to be more confident that it captures the true value of the population proportion. (See Exercise 4.)
- $0.0168 < p < 0.143$  (Tech:  $0.0169 < p < 0.143$ ). No, the confidence interval limits contain the value of 0.13, so the claimed rate of 13% could be the true percentage for the population of brown M&Ms.
- a.  $0.0276\% < p < 0.0366\%$  (using  $x = 135$ :  $0.0276\% < p < 0.0367\%$ ).  
b. No, because 0.0340% is included in the confidence interval.
- 752                      31. 339
- a. 1537      b. 1449
- a. 271      b. 139 (Tech: 138)

c. No. A sample of students at the nearest college is a convenience sample, not a simple random sample, so it is very possible that the results would not be representative of the population of adults.

- $\hat{p} = 18/34$ , or 0.529. CI:  $36.2\% < p < 69.7\%$ . Greater height does not appear to be an advantage for presidential candidates. If greater height is an advantage, then taller candidates should win substantially more than 50% of the elections, but the confidence interval shows that the percentage of elections won by taller candidates is likely to be anywhere between 36.2% and 69.7%.
- a. 178      b. 176
- $81.4\% < p < 101.9\%$ . The upper confidence interval limit is greater than 100%. Given that the percentage cannot exceed 100%, change the upper limit to 100%.
- $p > 0.831$  (Tech:  $p > 0.832$ ). Because we have 95% confidence that  $p$  is greater than 0.831, we can safely conclude that more than 75% of adults know what Twitter is.

### Section 7-3

- a.  $233.4 \text{ sec} < \mu < 256.65 \text{ sec}$   
b. Best point estimate of  $\mu$  is 245.025 sec. The margin of error is  $E = 11.625 \text{ sec}$ .
- We have 95% confidence that the limits of 233.4 sec and 256.65 sec contain the true value of the mean of the population of all duration times.
- Neither the normal nor the  $t$  distribution applies.
- $t_{\alpha/2} = 2.708$
- $8.104 \text{ km} < \mu < 11.512 \text{ km}$  (Tech:  $8.103 \text{ km} < \mu < 11.513 \text{ km}$ ). Because the sample size is greater than 30, the confidence interval yields a reasonable estimate of  $\mu$ , even though the data appear to be from a population that is not normally distributed.
- $3315.1 \text{ thousand dollars} < \mu < 22,480.9 \text{ thousand dollars}$  (Tech:  $3313.5 \text{ thousand dollars} < \mu < 22,482.5 \text{ thousand dollars}$ ). The \$1 salary of Jobs is an outlier that is very far away from the other values, and that outlier has a dramatic effect on the confidence interval.
- $98.08^\circ\text{F} < \mu < 98.32^\circ\text{F}$ . Because the confidence interval does not contain  $98.6^\circ\text{F}$ , it appears that the mean body temperature is not  $98.6^\circ\text{F}$ , as is commonly believed.
- $-6.8 \text{ mg/dL} < \mu < 7.6 \text{ mg/dL}$ . Because the confidence interval includes the value of 0, it is very possible that the mean of the changes in LDL cholesterol is equal to 0, suggesting that the garlic treatment did not affect LDL cholesterol levels. It does not appear that garlic is effective in reducing LDL cholesterol.
- $4.7 \text{ million dollars} < \mu < 28.0 \text{ million dollars}$ . The data appear to have a distribution that is far from normal, so the confidence interval might not be a good estimate of the population mean. The population is likely to be the list of box office receipts for each day of the movie's release. Because the values are from the first 14 days of release, the sample values are not a simple random sample, and they are likely to be the largest of all such values, so the confidence interval is not a good estimate of the population mean.