**CHAPTER 10 SOLUTIONS**

a) Because *N*  100 is greater than 30, the results of the Central Limit Theorem indicate that the normal curve gives a good approximation of the sampling distribution of means.

b) The 90 percent confidence interval for the mean height of American males is (67.51, 68.49).

c) The 90 percent refers to the process of constructing the confidence intervals. That is, if the process of randomly selecting a sample of 100 American males and constructing the confidence interval for the mean height based on each sample selected were repeated a large number of times, 90 percent of those times we would expect that the true population mean would be contained in the confidence interval.

d) No. That statement about the confidence interval is not correct. The confidence interval relates to the mean, not the individual scores in the distribution.

e) Longer

a) The 99 percent confidence interval for the mean IQ of all Americans is (102.42, 107.58).

b) If we repeated the process of selecting samples of 225 Americans randomly from this population and computed the mean IQ for each such sample selected, 99 percent of all of the intervals we would construct about these sample means would contain **.

c) No. That statement about the confidence interval is not correct. The confidence interval relates to the mean, not the individual scores in the distribution.

d) No. That statement about the confidence interval is not correct. The confidence interval relates to the mean, not the individual scores in the distribution.

a) The 90 percent confidence interval for the population mean is (89.53, 94.47).

b) Because 96 falls above the 90 percent confidence interval, we conclude that the population mean is statistically significantly lower than 96 at the **  .10 level.

c) Because 91.5 falls within the 90 percent confidence interval, we conclude that the population mean is not statistically significantly different from 91.5 at the **  .10 level.

* 1. The 95 percent confidence interval for the mean air-pollution index for Pittsburgh is (14.02, 15.98). Because 14 falls below that confidence interval, we conclude that the mean air-pollution index for Pittsburgh is statistically significantly higher than 14.

a) *H*0: ** = 600 and *H*1: ** > 600

b) According to the Central Limit Theorem, the sampling distribution of the mean for samples of size *N* = 400 is normally distributed.

c) *z* = 3

d) One-tailed (right-tailed)

e) *p*  .001

f) The employees who are given the training (*M* = 603, *SD* = 20) sort statistically significantly more mail, on average, than 600 letters, *z* = 3, *p* < .001.

g) The employees who are given the training sort only approximately .15 standard deviations more than 600 letters, a very small effect indicating that the training probably has little practical value.

h) The town should probably not pay for training that, while statistically significantly increasing performance, does not practically significantly increase performance.

i) A confidence interval would not be used to answer this one-tailed question.

* 1. Students in this district who participate in Project Advance (*M* = 56, *SD* = 12) do not score statistically significantly higher than 55 on the college-readiness test, *z* = .5, *p* = .3085.

a) Adults following the diet (*M* = 185, *SD* = 50) had statistically significantly lower levels of cholesterol, *z* = -2.12, *p* = .02.

b) The cholesterol level of adults following the diet was approximately .3 standard deviations lower than 200mg per dl, a small to moderate effect, supporting the results of the hypothesis test.

a) The 95 percent confidence interval for the mean scholastic aptitude test score for all current first-year students is (99.54, 103.46).

b) Because 100 is contained in the confidence interval, it is a plausible value of the mean, and no statistically significant difference is detected.

c) Not necessary. The result is not statistically significant.

d) (2) shorter (narrower) than the 95 percent confidence interval

e) (1) longer

f) (1) longer

* 1. The students at the university (*M* = 106, *SD* = 15) have a statistically significantly higher mean than 100 on the test of general intelligence because the 90 percent confidence interval is (101.89, 110.11) and all of these values are larger than 100. Furthermore, the students at the university score .4 standard deviations higher than 100, a small to moderate effect that corroborates the results of the hypothesis test.
  2. Eighth grade students in Seattle taught using the new curriculum (*M* = 95, *SD* = 10) scored statistically significantly higher than 92 on the Stanford Secondary School Comprehension Test, *z* = 6, *p* < .0005. (Note that although when we use the R command **pnorm(95, mean = 92, sd = 10/400^0.5, lower.tail = F)**, R uses scientific notation and reports *p* as 9.865876e-10, or about .000000000987. Because this value is so small, we write instead *p* < .0005. According to the table, the most precise estimate of *p* is *p* < .0002.) Furthermore, the students taught using the new curriculum score .3 standard deviations higher than those who were not, a small to moderate effect that corroborates the result of the hypothesis test. A 95 percent confidence interval could not have been used to determine whether there would be an improvement in reading comprehension in general if the entire population of eighth-graders in Seattle were taught using the new curriculum because the question is directional and confidence intervals are non-directional.
  3. The mean price of all such textbooks (*M* = $76.40, *SD* = $7.50) is statistically significantly lower than $79, *z* = -2.19, *p* = .03. The mean price of all such textbooks is approximately .35 standard deviations lower than $79, a small to moderate effect.
  4. The *z*c is found by finding the score that has area .025 to its right, or area .975 to its left. One way to do that is to use the R command **qnorm(0.975, mean = 0, sd = 1)**.

The result is *z* = 1.96 to two decimal places.

* 1. The power would have been greater for the one-tailed situation in which the research question was whether the students had a higher mean on this test, because the one-tailed hypothesis was in the correct direction. The smaller the *p*-value, the greater the power of the test. In the two-tailed version, the *p*-value was .02. In the one-tailed version it would be .01, which is more likely to be statistically significant.

a) According to the values in Table 10.2, *N* = 31.

b) Solve to see that *N* = 88.