**Chapter 11 Practice Test**

1. To determine if having children within the first two years of marriage *increases* the divorce rate, where *p* = proportion of marriages that end in divorce, which one of the following sets of hypotheses should we test?

a.  b.  c.  d.  e. 

2. One effect of the pesticide DDT upon birds is to inhibit the production of the enzyme carbonic anhydrase, which controls calcium metabolism. It is believed that this causes eggshells to be thinner and weaker than normal and makes the eggs more prone to breakage. An experiment was conducted where 16 sparrow hawks were fed a mixture of 3 ppm dieldrin and 15 ppm DDT (a combination often found in contaminated prey). The first egg laid by each bird was measured, and the mean shell thickness was found to be 0.19 mm. A “normal” eggshell has a mean thickness of 0.2 mm. Which of the following are the appropriate null and alternative hypotheses?

a.  b.  c.  d.  e. 

3. In testing hypotheses, which of the following would be strong evidence against the null hypothesis?

a. Using a small level of significance b. Using a large level of significance

c. Obtaining data with a small *P*-value d. Obtaining data with a large *P*-value

e. Obtaining data with a low test statistic

4. In a statistical test of hypotheses, we say the data are statistically significant at level  if

a.  = 0.05. b.  is small. c. the *P*-value is less than . d. the *P*-value is larger than .

e. the sample statistic resulting from the data is more than two standard errors away from the mean.

5. I conduct a statistical test of hypotheses and find that the null hypothesis is statistically significant at level  = 0.05. I may conclude that

a. the test would also be significant at level  = 0.10. b. the test would also be significant at level  = 0.01.

c. the P-value is less than .05. d. both (A) and (C) are true. e. both (B) and (C) are true.

6. A test of significance produces a P-value of 0.024. Which of the following conclusions is appropriate?

a. Accept *H*a at the  = 0.05 level b. Reject *H*a at the  = 0.01 level c. Fail to reject *H*0 at the  = 0.05 level d. Reject *H*0 at the  = 0.05 level e. Accept *H*0 at the  = 0.01 level

7. If we reject the null hypothesis when, in fact, it is true, we have

a. committed a Type I error. b. committed a Type II error.

c. a probability of being correct that is equal to the *P*-value.

d. a probability of being correct that is equal to 1 – *P*-value.

e. set the  level too high.

8. A Type II error is

a. rejecting the null hypothesis when it is true. b. failing to reject the null hypothesis when it is false. c. incorrectly specifying the null hypothesis. d. incorrectly specifying the alternative hypothesis.

e. more serious than a Type I error.

9. A researcher plans to conduct a test of hypotheses at the  = 0.01 significance level. She designs her study to have a power of 0.90 at a particular alternative value of the parameter of interest. The probability that the researcher will commit a Type I error is

a. 0.01. b. 0.10. c. 0.89. d. 0.90.

e. equal to the *P*-value and cannot be determined until the data have been collected.

10. A researcher plans to conduct a test of hypotheses at the  = 0.01 significance level. She designs her study to have a power of 0.90 at a particular alternative value of the parameter of interest. The probability that the researcher will commit a Type II error for the particular alternative value of the parameter at which she computed the power is

a. 0.01. b. 0.10. c. 0.89. d. 0.90.

e. equal to the 1 – (*P*-value) and cannot be determined until the data have been collected.

11. In testing hypotheses, if the consequences of incorrectly rejecting the null hypothesis are very serious, we should

a. use a very large level of significance. b. use a very small level of significance.

c. insist that the *P*-value be smaller than the level of significance.

d. insist that the level of significance be smaller than the *P*-value.

e. consult with an expert in the field you're studying for an interpretation of the *P*-value index.

12. Which of the following will increase the power of a statistical test of significance.

a. Increase the Type II error probability. b. Increase the sample size.

c. Reject the null hypothesis only if the *P*-value is smaller than the level of significance.

d. Decrease the  level. e. All of the above.

13. You construct a 95% confidence interval for a mean and find it to be 1.1 ± 0.8. Which of the following is true?

a. A test of the hypotheses *H*0:  = 1.2, *H*a:   1.2 would reject *H0* at the 0.05 level.

b. A test of the hypotheses *H*0:  = 1.1, *H*a:   1.1 would reject *H0* at the 0.05 level.

c. A test of the hypotheses *H*0:  = 0, *H*a:   0 would reject *H0* at the 0.05 level.

d. All three tests above would reject *H0* at the 0.05 level.

e. A test of hypothesis cannot be performed from only a confidence interval.

14. I wish to test the hypothesis  based on an SRS of size *n* from a Normal population. I calculate a 95% confidence interval for  and find it to be 1.33 to 4.67. Which of the following is true?

a. I would reject at level .05. b. I would reject **at level .05. c. The *P*-value is .05.

d. A mistake has almost certainly been made. The confidence interval must contain ** = 5 at least 95% of the time. e. None of these.

15. A small company consists of 25 employees. As a service to the employees, the company arranges for each employee to have a complete physical for free. Among other variables, the weight of each employee is measured. The mean weight of the 25 employees is found to be 165 pounds with a standard deviation of 20 pounds. It is believed that a mean weight of 160 pounds would be normal for this group. To see if there is evidence that the mean weight of the population of all employees of the company is significantly higher than 160 pounds, the hypotheses *H*0: ** = 160 vs. *H*a: ** > 160 are tested. You obtain a *P*-value of less than 0.1056. Which of the following is true?

a. At the 5% significance level, you have proved that *H*0 is true.

b. You have failed to obtain any evidence for *H*a.

c. At the 5% significance level, you have failed to prove that *H*0 is true, and a larger sample size is needed to do so. d. Only 10.56% of the employees weigh less than 160 pounds.

e. None of the above. A significance test is inappropriate in this setting.

16. An engineer designs an improved light bulb. The previous design had an average lifetime of 1200 hours. The new bulb had a lifetime of 1201 hours, using a sample of 2000 bulbs. Although the difference is quite small, the effect was statistically significant. The explanation is that

a. new designs typically have more variability than standard designs.

b. the sample size is very large. c. the mean of 1200 is large.

d. the new bulbs last longer than the old bulb. e. all of the above.