**Multiple Choice Practice Chapter 9: Testing a Claim**

1. The time that it takes an untrained rat to run a standard maze has a Normal distribution with mean 65 seconds and standard deviation 15 seconds. The researchers want to use a test of hypotheses to determine whether training significantly improves the rats’ completion times. An appropriate alternative hypothesis would have the form

A. *H*a: μ > 65.

B. *H*a: < 65.

C. *H*a: μ < 65.

2. A researcher collects infant mortality data from a random sample of villages in a certain country. It is claimed that the mean death rate in this country is the same as that of a neighboring country, which is known to be 17 deaths per 1000 live births. To test this claim using a test of hypotheses, what should the null and alternative hypotheses be?

A. *H*0: μ = 17, *H*a: μ ≠ 17

B. *H*0: μ ≠ 17, *H*a: μ = 17

C. *H*0: μ = 17, *H*a: μ > 17

3. A social psychologist reports that “in our sample, ethnocentrism was significantly higher

(*P* < 0.05) among church attendees than among non-attendees.” Which of the following statements best describes what this means.

A. Ethnocentrism was at least 5% higher among church attendees than among non-attendees.

B. The probability that the true mean is 17 is less that 0.05.

C. If there were actually no difference in ethnocentrism between church attendees and non-attendees, then the chance that we would have observed a difference at least as extreme as the one we did is less than 5%.

4. Which of the following *P*-values obtained from a test of hypotheses constitutes the *least* amount of evidence against the null hypothesis?

A. 0.107

B. 0.207

C. 0.017

5. Suppose we conduct a test of hypotheses and find that the test results are significant at the α = 0.025 level. Which of the following statements then must be true?

A. The results are significant at level α = 0.05.

B. The results are not significant at level α = 0.01.

C. The test results are important.

6. A noted psychic is tested for ESP. The psychic is presented with 400 cards, all face down, and asked to determine if each card is marked with one of four symbols: a star, a cross, a circle, or a square. The psychic is correct in 120 of the 400 cases. Let *p* represent the probability that the psychic correctly identifies the symbol on the card in a random trial. Suppose we wish to see if there is evidence to suggest that the psychic is doing significantly better than he would be if he were just guessing. To do so, we test *H*0: *p* = 0.25 against *H*a: *p* > 0.25. Which of the following is closest to the *P*-value of the test?

A. 0.0104.

B. 0.0146.

C. 0.9896.

7. Suppose that we are conducting a *t-*test for a population mean *μ*. We originally do a one-sided test but then decide that a two-sided test might be more appropriate (typically, we use a two-sided test unless there is some reason to believe that an effect in a particular direction exists). Which of the following accurately describes how the results of the test will change?

A. The test statistic will have a larger value, but the *P-*value will not change.

B. The test statistic will not change, but the *P*-value of the test will be smaller.

C. The test statistic will not change, but the *P*-value of the test will be larger.

8. The Department of Health plans to test the lead level in a public park. The park will be closed if the lead level exceeds the allowed limit. Otherwise, the park will be kept open. The department conducts the test using soil samples gathered at randomly selected locations. Which of the following decisions would constitute making a Type I error in this situation?

A. Keeping the park open when the average lead level exceeds the allowed limit.

B. Closing the park when the average lead level is acceptable.

C. Closing the park when the average lead level exceeds the allowed limit.

9. Two species of sunfish, pumpkinseeds and bluegills, are common in Puffer’s Pond. For many years, the proportion of bluegills was 0.42, but a local ecologist suspects that a newly-introduced predator is increasing that proportion. He collects 50 sunfish with a net and finds that 27 of them are bluegills. Assuming that we can treat his net sample as a simple random sample, which of the following is the correct check of the Large Counts condition for a one-sample *z*-test of 

A. 

B. both of which are ≥ 10.

C.  both of which are ≥ 10.

10. In a test of hypotheses, the probability that a false null hypothesis is rejected is also known as the

A. probability of committing a Type II error.

B. power of the test.

C. significance level of the test.

11. Which of the following will cause the power of a test to increase?

A. Increasing the sample size

B. Decreasing the significance level α of the test

C. Increasing the probability of committing a Type II error.

12. Which one of the following sample data sets would satisfy the Normal/Large sample condition for performing a one-sample *t*-procedure?

A. A sample of 38 prices for new houses in Sonoma County, California that is moderately skewed to the right but has no outliers.

B. A sample of diameters for 14 oak trees in Cumberland County, Maine that is somewhat skewed toward larger trees.

C. A sample of 60 hold time lengths for calls to a customer service line that are roughly symmetric except for one high outlier.

13. A city school board claims that the mean number of school days missed due to illness by the city’s schoolteachers is 5 per year. The teacher’s union thinks it actual mean is lower than that. A random sample of 28 city school teachers missed an average of 4.5 days last year, with a sample standard deviation of 0.9 days. The distribution of the number of days missed in the sample is roughly symmetric with no outliers. A test of *H*0: μ = 5 and Ha: μ < 5 produces a *P*-value in which of the following intervals?

A. Between 0.0025 and 0.005.

B. Between 0.001 and 0.0025.

C. between 0.005 and 0.01.

14. An advertisement for Food Chain, a regional supermarket chain, claimed that the chain has had consistently lower prices than its regional competitors. As part of a survey conducted by an independent price-checking company, the average weekly grocery bill (based on the prices of approximately 95 commonly purchased items) was recorded for Food Chain and one of its leading competitors during 8 randomly selected weeks. We wish to conduct a test of

*H*0: μ*d* = 0 vs. *H*a: μ*d* < 0, where μ*d* = the mean difference between the weekly Food Chain bill and the weekly bill at the competing chain. Which of the following is the correct Normal/Large Sample condition for conducting this test of significance?

A. The distributions of weekly bills at each of the chains should be approximately Normally distributed.

B. The distribution of differences between weekly bills at the two chains should be approximately Normally distributed.

C. Both the distributions at each of the chains and the distribution of differences between weekly bills should be approximately Normally distributed.

15. We would like to test the null hypothesis *H*0: μ = 50 against *H*a: μ ≠ 50. The 95% confidence interval for *μ* is found to be (51.3, 54.7). Assuming all conditions for a one-sample t procedure have been met, which of the following must be *true*?

A. The *P*-value of the test is greater than 0.05.

B. The *P*-value of the test is less than 0.05.

C. The *P*-value of the test could be either greater than or at most 0.05. It can’t be determined without knowing the sample size.

16. Does taking garlic tablets twice a day provide significant health benefits? A researcher conducted a study of 50 adult subjects who took garlic tablets twice a day for a period of six months. At the end of the study, 100 variables related to the health of the subjects were measured for each subject, and the means were compared to known means for these variables in the population of all adults. Four of these 100 variables were significantly better (in the sense of statistical significance) at the 5% level for the group taking the garlic tablets compared to the population as a whole. One variable was significantly better at the 1% level for the group taking the garlic tablets compared to the population as a whole. Which of the following is an appropriate conclusion to draw from these results?

A. There is good statistical evidence that taking garlic tablets twice a day provides some health benefits.

B. There is good statistical evidence that taking garlic tablets twice a day provides benefits in the case of the variable that was significant at the 1% level. However, we should be somewhat cautious about making claims for the variables that were significant at the 5% level.

C. Neither (A) nor (B) is true.

17. A kitchen stove manufacturer is testing a shipment of oven thermostats to see if they keep an oven at 350 Fº. Which of the following tests has the greatest power?

A. 

B. 

C. 