Chapter 10: Comparing Two Populations or Groups

1. Wilt and Bill, two basketball players, are having a free throw shooting contest. Wilt is known to make 75% of his free throws, and Bill is known to hit 85% of his free throws. Each of them takes 50 shots. Assuming that the shots are independent, what is the probability that Bill hits a higher percentage of his shots that Wilt?

A. 0.1038

B. 0.8962

C. 0.9938

2. For a simple random sample of 100 cars of a certain popular model in 20012, it was found that 20 had a certain minor defect in the brakes. For an independent SRS of 400 cars of the same model in 2009, it was found that 50 had the same defect. Let *p*1 and *p*2 be the proportions of all cars of this model in 2012 and 2009, respectively, that have the defect. A 90% confidence interval for *p*1 – *p*2 is (approximately)

A. 0.075 ± 0.085.

B. 0.075 ± 0.071.

C. 0.075 ± 0.043.

3. Which of the following set of values for *n*1, *n*2, , and  satisfies the Normal/Large counts condition for constructing a confidence interval for the difference of two proportions, . (Assume that the 10% condition has been satisfied.)

A. *n*1 = 100, *n*2 = 100,  = 0.08,  = 0.10

B. *n*1 = 100, *n*2 = 100, = 0.12, = 0.10.

C. *n*1 = 200, *n*2 = 200,  = 0.50,  = 0.04.

4. In a simple random sample of 100 households in 2000, 43 had some credit card debt. In another simple random sample of 150 households in 2012, 72 had some credit card debt. We want to construct a confidence interval for the difference in the proportion of households with credit card debt between 2012 and 2000. Which of the following is the correct standard error estimate for this interval?

A. 

B. 

C. .

5. In a simple random sample of 100 households in 2000, 43 had some credit card debt. In another simple random sample of 150 households in 2012, 72 had some credit card debt. Which of the following is the correct test statistic for testing the hypothesis , that there is no difference in the proportion of households with credit card debt in these two years?

A. .

B. 

C. 

6. In a simple random sample of 100 cars of a certain popular model in 2010, it was found that 20 had a certain minor defect in the brakes. For an independent SRS of 400 cars of the same model in 2011, it was found that 50 had the same defect. Let *p*1 and *p*2 be the proportions of all cars of this model in 2010 and 2011, respectively, that have the defect. We wish to test  against . Which of the following is closest to the *P*-value for this test?

A. 0.0418.

B. 0.0536.

C. 0.0268.

7. A manufacturer receives parts from two suppliers. An SRS of 400 parts from Supplier 1 contains 20 defective parts, while an independent SRS of 100 parts from Supplier 2 contains 10 defective parts. Let *p*1 and *p*2 be the proportions of defective parts made by Supplier 1 and Supplier 2, respectively. Is there evidence of a significant difference in the proportions of defective parts made by these two suppliers? To answer this question, you test the hypotheses  against . Which of the following is closest to the *P*-value of the test?

A. 0.9398

B. 0.0602.

C. 0.0301.

8. SAT scores of entering freshmen at Enormous State University are approximately Normally distribution with a mean of and standard deviation , while the SAT scores of entering freshmen at the University of Modest Dimensions are approximately Normally distribution with mean and standard deviation . Independent random samples of 100 freshmen are selected from each university. Which of the following is closest to the probability that the sample mean from Enormous State University exceeds the sample mean from the University of Modest Dimensions?

A. 0.1446.

B. 0.0475.

C. 0.8554.

9. Simple random samples are taken from two large populations, designated Population 1 and Population 2. Which of the following describes a situation in which the conditions for performing a two-sample *t*-test for the difference of two means for these populations have not been satisfied?

A.  The distribution of Sample 1 is symmetric and unimodal with no outliers, and the distribution of sample 2 is skewed left.

B.  The distributions of both samples are symmetric and unimodal with no outliers.

C.  The distribution of Sample 1 is symmetric and unimodal with no outliers, and the distribution of Sample 2 is skewed left with no outliers.

10. A sports physiologist wishes to compare the effects of two stepping heights (low and high) on heart rate in a step-aerobics workout. A sample of 50 adults in roughly similar physical condition was randomly divided into two groups of 25 subjects each. Group 1 did a standard step-aerobics workout using the low stepping height. The sample mean heart rate at the end of Group 1’s workout was beats per minute (bpm), with a sample standard deviation of bpm. Group 2 did the same workout but used the high stepping height. The sample mean heart rate at the end of Group 2’s workout was bpm, with a sample standard deviation of  bpm. Assume that conditions for inference have been met. Let  and represent the mean heart rates we would observe for the entire population of interest if all members of the population did the workout using the low and high stepping height, respectively. Suppose that the researcher wishes to test the hypotheses *versus* Which of the following is a correct expression for test statistic for this test?

A. 

B. .

C. 

11. A sportswriter wishes to see if a football filled with helium travels farther, on average, than a football filled with air. To test this hypothesis, the writer uses 18 male subjects, randomly divided into two groups of 9 subjects each. Group 1 kicks a football filled with helium to the recommended pressure, while Group 2 kicks a football filled with air to the same pressure. The sample mean yardage for Group 1 was  = 30 yards, with a sample standard deviation of *s*1 = 8 yards. The sample mean yardage from Group 2 was  = 26 yards, with a sample standard deviation of *s*2 = 6 yards. Let  represent the mean yardage observed for the entire population if all members of the population kicked a helium-filled football and an air-filled football, respectively. Assuming that conditions for a two-sample *t* procedure are have been satisfied and using the conservative value for the number of degrees of freedom, which of the following is a 90% confidence interval for ?

A. 4 ± 5.5 yards.

B. 4 ± 6.2 yards.

C. 4 ± 7.7 yards.

12. Some agricultural researchers have conjectured that stem-pitting disease in peach-tree seedlings might be controlled through weed and soil treatments. An experiment was conducted to compare seedling growth with soil and weeds treated with one of two herbicides. In a field containing 10 seedlings, 5 were randomly selected and assigned to be treated with Herbicide A. The remaining 5 seedlings were treated with Herbicide B. Soil and weeds for each seedling were treated with the appropriate herbicide. At the end of the study period, the height (in centimeters) was recorded for each seedling. A 90% confidence interval for the difference  in mean seedling height for the two herbicides was found to be (0.2, 14.6). From this result, which of the following statements is correct?

A. The *P*-value for a test of  against would be greater than 0.10, since the interval doesn’t contain 0.

B. A 95% confidence interval would not include 0 either, since we would be even more confident that a significant difference exists between the two groups.

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

13. A drug company is testing a new medication for Attention Deficit Disorder (ADD). They have 40 eighth-grade volunteers who have been diagnosed with ADD. Which of the following experiments would call for matched pairs *t-*test?

A. Twenty randomly-selected students are treated with the new medication, twenty are treated with an established medication for ADD. After four weeks the students’ are tested for ADD symptoms.

B. The students are divided into groups of two according to their academic achievement (the highest achievers are in one group, the next two in the second group, etc.). One randomly-selected member of each group is given the new medication and the other is treated with the established mediation. After four weeks, the students are tested for ADD symptoms.

C. Neither of these experiments calls for a matched-pairs t-test.