

Chapter 10: Two-Sample Tests

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 1) True or False: For all two-sample tests, the sample sizes must be equal in the two groups. 1) _____
A) True B) False
- 2) The t test for the difference between the means of 2 independent populations assumes that the respective 2) _____
A) populations are approximately normal. B) sample sizes are equal.
C) sample variances are equal. D) All of the above.
- 3) True or False: When you test for differences between the means of two independent 3) _____
populations, you can only use a two-tail test.
A) True B) False

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

SCENARIO 10-4

Two samples each of size 25 are taken from independent populations assumed to be normally distributed with equal variances. The first sample has a mean of 35.5 and standard deviation of 3.0 while the second sample has a mean of 33.0 and standard deviation of 4.0.

- 4) Referring to Scenario 10-4, the pooled (i.e., combined) variance is _____. 4) _____
- 5) Referring to Scenario 10-4, the computed t statistic is _____. 5) _____
- 6) Referring to Scenario 10-4, there are _____ degrees of freedom for this test. 6) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 7) If we are testing for the difference between the means of 2 independent populations presuming 7) _____
equal variances with samples of $n_1 = 20$ and $n_2 = 20$, the number of degrees of freedom is equal
to
A) 18. B) 19. C) 39. D) 38.
- 8) In testing for differences between the means of two independent populations, the null 8) _____
hypothesis is
A) $H_0: \mu_1 - \mu_2 = 2$. B) $H_0: \mu_1 - \mu_2 < 2$.
C) $H_0: \mu_1 - \mu_2 > 0$. D) $H_0: \mu_1 - \mu_2 = 0$.

- 9) Given the following information, calculate the degrees of freedom that should be used in the pooled-variance t test. 9) _____
- $s_1^2 = 4$ $s_2^2 = 6$
 $n_1 = 16$ $n_2 = 25$
- A) $df = 41$ B) $df = 16$ C) $df = 25$ D) $df = 39$

SCENARIO 10-1

Are Japanese managers more motivated than American managers? A randomly selected group of each were administered the Sarnoff Survey of Attitudes Toward Life (SSATL), which measures motivation for upward mobility. The SSATL scores are summarized below.

	American	Japanese
Sample Size	211	100
Sample Mean SSATL Score	65.75	79.83
Sample Std. Dev.	11.07	6.41

- 10) Referring to Scenario 10-1, judging from the way the data were collected, which test would likely be most appropriate to employ? 10) _____
- A) Pooled-variance t test for the difference between two means
 B) Paired t test
 C) F test for the ratio of two variances
 D) Z test for the difference between two proportions
- 11) Referring to Scenario 10-1, give the null and alternative hypotheses to determine if the mean SSATL score of Japanese managers differs from the mean SSATL score of American managers. 11) _____
- A) $H_0: \mu_A - \mu_J \leq 0$ versus $H_1: \mu_A - \mu_J > 0$ B) $H_0: \mu_A - \mu_J = 0$ versus $H_1: \mu_A - \mu_J \neq 0$
 C) $H_0: \bar{X}_A - \bar{X}_J = 0$ versus $H_1: \bar{X}_A - \bar{X}_J \neq 0$ D) $H_0: \mu_A - \mu_J \geq 0$ versus $H_1: \mu_A - \mu_J < 0$
- 12) Referring to Scenario 10-1, what is the value of the test statistic? 12) _____
- A) -11.8092 B) 96.4471 C) -1.9677 D) -14.08
- 13) Referring to Scenario 10-1, find the p -value if we assume that the alternative hypothesis was a two-tail test. 13) _____
- A) Smaller than 0.01 B) Between 0.05 and 0.10
 C) Greater than 0.10 D) Between 0.01 and 0.05

SCENARIO 10-3

A real estate company is interested in testing whether the mean time that families in Gotham have been living in their current homes is less than families in Metropolis. Assume that the two population variances are equal. A random sample of 100 families from Gotham and a random sample of 150 families in Metropolis yield the following data on length of residence in current homes.

Gotham: $\bar{X}_G = 35$ months, $S_G^2 = 900$ Metropolis: $\bar{X}_M = 50$ months, $S_M^2 = 1050$

- 14) Referring to Scenario 10-3, which of the following represents the relevant hypotheses tested by the real estate company? 14) _____
- A) $H_0 : \bar{X}_G - \bar{X}_M \geq 0$ versus $H_1 : \bar{X}_G - \bar{X}_M < 0$
 - B) $H_0 : \mu_G - \mu_M \geq 0$ versus $H_1 : \mu_G - \mu_M < 0$
 - C) $H_0 : \mu_G - \mu_M = 0$ versus $H_1 : \mu_G - \mu_M \neq 0$
 - D) $H_0 : \mu_G - \mu_M \leq 0$ versus $H_1 : \mu_G - \mu_M > 0$
- 15) Referring to Scenario 10-3, what is the estimated standard error of the difference between the 2 sample means? 15) _____
- A) 8.01
 - B) 16.00
 - C) 5.61
 - D) 4.06
- 16) Referring to Scenario 10-3, what is a point estimate for the mean of the sampling distribution of the difference between the 2 sample means? 16) _____
- A) -10
 - B) -22
 - C) -15
 - D) 0
- 17) Referring to Scenario 10-3, what is(are) the critical value(s) of the relevant hypothesis test if the level of significance is 0.05? 17) _____
- A) $t \cong Z = \pm 1.96$
 - B) $t \cong Z = -1.96$
 - C) $t \cong Z = -2.080$
 - D) $t \cong Z = -1.645$
- 18) Referring to Scenario 10-3, what is(are) the critical value(s) of the relevant hypothesis test if the level of significance is 0.01? 18) _____
- A) $t \cong Z = -2.33$
 - B) $t \cong Z = \pm 1.96$
 - C) $t \cong Z = -2.080$
 - D) $t \cong Z = -1.96$
- 19) Referring to Scenario 10-3, what is the test statistic for the difference between sample means? 19) _____
- A) -1.96
 - B) -3.69
 - C) -2.33
 - D) -8.75
- 20) Referring to Scenario 10-3, suppose $\alpha = 0.10$. Which of the following represents the result of the relevant hypothesis test? 20) _____
- A) The null hypothesis is not rejected.
 - B) Insufficient information exists on which to make a decision.
 - C) The alternative hypothesis is rejected.
 - D) The null hypothesis is rejected.

- 21) Referring to Scenario 10-3, suppose $\alpha = 0.05$. Which of the following represents the result of the relevant hypothesis test? 21) _____
- A) Insufficient information exists on which to make a decision.
 - B) The null hypothesis is rejected.
 - C) The null hypothesis is not rejected.
 - D) The alternative hypothesis is rejected.
- 22) Referring to Scenario 10-3, suppose $\alpha = 0.01$. Which of the following represents the result of the relevant hypothesis test? 22) _____
- A) Insufficient information exists on which to make a decision.
 - B) The null hypothesis is not rejected.
 - C) The null hypothesis is rejected.
 - D) The alternative hypothesis is rejected.
- 23) Referring to Scenario 10-3, suppose $\alpha = 0.10$. Which of the following represents the correct conclusion? 23) _____
- A) There is enough evidence that the mean amount of time families in Gotham have been living in their current homes is less than families in Metropolis.
 - B) There is not enough evidence that the mean amount of time families in Gotham have been living in their current homes is not less than families in Metropolis.
 - C) There is not enough evidence that the mean amount of time families in Gotham have been living in their current homes is less than families in Metropolis.
 - D) There is enough evidence that the mean amount of time families in Gotham have been living in their current homes is not less than families in Metropolis.
- 24) Referring to Scenario 10-3, suppose $\alpha = 0.05$. Which of the following represents the correct conclusion? 24) _____
- A) There is enough evidence that the mean amount of time families in Gotham have been living in their current homes is not less than families in Metropolis.
 - B) There is not enough evidence that the mean amount of time families in Gotham have been living in their current homes is not less than families in Metropolis.
 - C) There is enough evidence that the mean amount of time families in Gotham have been living in their current homes is less than families in Metropolis.
 - D) There is not enough evidence that the mean amount of time families in Gotham have been living in their current homes is less than families in Metropolis.
- 25) Referring to Scenario 10-3, suppose $\alpha = 0.01$. Which of the following represents the correct conclusion? 25) _____
- A) There is enough evidence that the mean amount of time families in Gotham have been living in their current homes is less than families in Metropolis.
 - B) There is not enough evidence that the mean amount of time families in Gotham have been living in their current homes is not less than families in Metropolis.
 - C) There is enough evidence that the mean amount of time families in Gotham have been living in their current homes is not less than families in Metropolis.
 - D) There is not enough evidence that the mean amount of time families in Gotham have been living in their current homes is less than families in Metropolis.

SCENARIO 10-15

The table below presents the summary statistics for the starting annual salaries (in thousands of dollars) for individuals entering the public accounting and financial planning professions.

Sample I (public accounting): $\bar{X}_1 = 60.35$, $S_1 = 3.25$, $n_1 = 12$

Sample II (financial planning): $\bar{X}_2 = 58.20$, $S_2 = 2.48$, $n_2 = 14$

Test whether the mean starting annual salaries for individuals entering the public accounting professions is higher than that of financial planning assuming that the two population variances are the same.

- 26) Referring to Scenario 10-15, which of the following represents the relevant hypotheses tested? 26) _____
- A) $H_0: \mu_1 - \mu_2 \neq 0$ versus $H_1: \mu_1 - \mu_2 = 0$ B) $H_0: \mu_1 - \mu_2 \leq 0$ versus $H_1: \mu_1 - \mu_2 > 0$
C) $H_0: \mu_1 - \mu_2 \geq 0$ versus $H_1: \mu_1 - \mu_2 < 0$ D) $H_0: \mu_1 - \mu_2 = 0$ versus $H_1: \mu_1 - \mu_2 \neq 0$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 27) Referring to Scenario 10-15, what is(are) the critical value(s) of the relevant hypothesis test if the level of significance is 0.05? 27) _____

- 28) Referring to Scenario 10-15, what is(are) the critical value(s) of the relevant hypothesis test if the level of significance is 0.10? 28) _____

- 29) Referring to Scenario 10-15, what is the value of the test statistic? 29) _____

- 30) Referring to Scenario 10-15, what is the smallest level of significance at which the null hypothesis will still not be rejected? 30) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 31) Referring to Scenario 10-15, suppose $\alpha = 0.10$. Which of the following represents the result of the relevant hypothesis test? 31) _____
- A) The alternative hypothesis is rejected.
B) Insufficient information exists on which to make a decision.
C) The null hypothesis is rejected.
D) The null hypothesis is not rejected.

- 32) Referring to Scenario 10-15, suppose $\alpha = 0.01$. Which of the following represents the result of the relevant hypothesis test? 32) _____
- A) The alternative hypothesis is rejected.
B) The null hypothesis is rejected.
C) Insufficient information exists on which to make a decision.
D) The null hypothesis is not rejected.

- 33) Referring to Scenario 10-15, suppose $\alpha = 0.10$. Which of the following represents the correct conclusion? 33) _____
- A) There is enough evidence that the mean starting annual salaries for individuals entering the public accounting professions is not higher than that of financial planning.
 - B) There is not enough evidence that the mean starting annual salaries for individuals entering the public accounting professions is not higher than that of financial planning.
 - C) There is not enough evidence that the mean starting annual salaries for individuals entering the public accounting professions is higher than that of financial planning.
 - D) There is enough evidence that the mean starting annual salaries for individuals entering the public accounting professions is higher than that of financial planning.
- 34) Referring to Scenario 10-15, suppose $\alpha = 0.01$. Which of the following represents the correct conclusion? 34) _____
- A) There is not enough evidence that the mean starting annual salaries for individuals entering the public accounting professions is higher than that of financial planning.
 - B) There is enough evidence that the mean starting annual salaries for individuals entering the public accounting professions is higher than that of financial planning.
 - C) There is enough evidence that the mean starting annual salaries for individuals entering the public accounting professions is not higher than that of financial planning.
 - D) There is not enough evidence that the mean starting annual salaries for individuals entering the public accounting professions is not higher than that of financial planning.
- 35) Referring to Scenario 10-15, what additional assumption is needed for the test to be valid? 35) _____
- A) The two population sizes have to be equal.
 - B) The two sample sizes have to be equal.
 - C) The two population means have to be the same.
 - D) The population distributions of the two annual salaries have to be normal.
- 36) The t test for the mean difference between 2 related populations assumes that the 36) _____
- A) population of differences is approximately normal or sample sizes are large enough.
 - B) population sizes are equal.
 - C) sample variances are equal.
 - D) All of the above.
- 37) In what type of test is the variable of interest the difference between the values of the observations rather than the observations themselves? 37) _____
- A) A test for the difference between the means of 2 related populations
 - B) A test for the equality of variances from 2 independent populations
 - C) A test for the difference between the means of 2 independent populations
 - D) All of the above.
- 38) True or False: A Marine drill instructor recorded the time in which each of 11 recruits completed an obstacle course both before and after basic training. To test whether any improvement occurred, the instructor would use a t -distribution with 11 degrees of freedom. 38) _____
- A) True
 - B) False

SCENARIO 10-5

To test the effectiveness of a business school preparation course, 8 students took a general business test before and after the course. The results are given below.

<u>Student</u>	<u>Exam Score Before Course (1)</u>	<u>Exam Score After Course (2)</u>
1	530	670
2	690	770
3	910	1,000
4	700	710
5	450	550
6	820	870
7	820	770
8	630	610

39) Referring to Scenario 10-5, the number of degrees of freedom is 39) _____
 A) 7. B) 14. C) 8. D) 13.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

SCENARIO 10-6

To investigate the efficacy of a diet, a random sample of 16 male patients is selected from a population of adult males using the diet. The weight of each individual in the sample is taken at the start of the diet and at a medical follow-up 4 weeks later. Assuming that the population of differences in weight before versus after the diet follow a normal distribution, the *t*-test for related samples can be used to determine if there was a significant decrease in the mean weight during this period. Suppose the mean decrease in weights over all 16 subjects in the study is 3.0 pounds with the standard deviation of differences computed as 6.0 pounds.

40) Referring to Scenario 10-6, there are _____ degrees of freedom for this test. 40) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

41) In testing for differences between the means of two related populations, the null hypothesis is 41) _____
 A) $H_0: \mu_D > 0$. B) $H_0: \mu_D = 0$. C) $H_0: \mu_D = 2$. D) $H_0: \mu_D < 0$.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

42) In testing for the differences between the means of two related populations, you 42) _____
 assume that the differences follow a _____ distribution.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

43) True or False: A researcher is curious about the effect of sleep on students' test performances. He chooses 60 students and gives each two tests: one given after two hours' sleep and one after eight hours' sleep. The test the researcher should use would be a related samples test. 43) _____
 A) True B) False

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

50) Referring to Scenario 10-5, the calculated value of the test statistic is _____. 50) _____

51) Referring to Scenario 10-5, the p -value of the test statistic is _____. 51) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

52) True or False: Referring to Scenario 10-5, in examining the differences between related samples we are essentially sampling from an underlying population of difference "scores."
 A) True B) False 52) _____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

SCENARIO 10-7

A buyer for a manufacturing plant suspects that his primary supplier of raw materials is overcharging. In order to determine if his suspicion is correct, he contacts a second supplier and asks for the prices on various identical materials. He wants to compare these prices with those of his primary supplier. The data collected is presented in the table below, with some summary statistics presented (all of these might not be necessary to answer the questions which follow). The buyer believes that the differences are normally distributed and will use this sample to perform an appropriate test at a level of significance of 0.01.

<u>Material</u>	<u>Primary Supplier</u>	<u>Secondary Supplier</u>	<u>Difference</u>
1	\$55	\$45	\$10
2	\$48	\$47	\$1
3	\$31	\$32	-\$1
4	\$83	\$77	\$6
5	\$37	\$37	\$0
6	\$55	\$54	\$1
Sum:	\$309	\$292	\$17
Sum of Squares:	\$17,573	\$15,472	\$139

53) Referring to Scenario 10-7, the hypotheses that the buyer should test are a null hypothesis that _____ versus an alternative hypothesis that _____. 53) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

54) Referring to Scenario 10-7, the test to perform is a _____
 A) paired t test for the mean difference.
 B) Z test for the difference between two proportions.
 C) pooled-variance t test for differences between two means.
 D) separate-variance t test for differences between two means. 54) _____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

55) Referring to Scenario 10-7, the decision rule is to reject the null hypothesis if _____. 55) _____

56) Referring to Scenario 10-7, the calculated value of the test statistic is _____. 56) _____

57) Referring to Scenario 10-7, the p -value of the test statistic is _____. 57) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

58) True or False: Referring to Scenario 10-7, the null hypothesis should be rejected. 58) _____
A) True B) False

59) Referring to Scenario 10-7, the buyer should decide that the primary supplier is 59) _____
A) overcharging because there is insufficient evidence to prove otherwise.
B) not overcharging because there is strong evidence to prove otherwise.
C) overcharging because there is strong evidence that this is the case.
D) not overcharging because there is insufficient evidence to prove otherwise.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

60) Referring to Scenario 10-7, if the buyer had decided to perform a two-tail test, the 60) _____
 p -value would have been _____.

61) Referring to Scenario 10-7, what is the 99% confidence interval estimate for the mean 61) _____
difference in prices?

62) Referring to Scenario 10-7, what is the 95% confidence interval estimate for the mean 62) _____
difference in prices?

63) Referring to Scenario 10-7, what is the 90% confidence interval estimate for the mean 63) _____
difference in prices?

64) *The Wall Street Journal* recently ran an article indicating differences in perception of 64) _____
sexual harassment on the job between men and women. The article claimed that
women perceived the problem to be much more prevalent than did men. One question
asked to both men and women was: "Do you think sexual harassment is a major
problem in the American workplace?" Some 24% of the men compared to 62% of the
women responded "Yes." Suppose that 150 women and 200 men were interviewed.
Construct a 99% confidence interval estimate of the difference between the proportion
of women and men who think sexual harassment is a major problem in the American
workplace.

65) *The Wall Street Journal* recently ran an article indicating differences in perception of sexual harassment on the job between men and women. The article claimed that women perceived the problem to be much more prevalent than did men. One question asked to both men and women was: "Do you think sexual harassment is a major problem in the American workplace?" Some 24% of the men compared to 62% of the women responded "Yes." Suppose that 150 women and 200 men were interviewed. Construct a 90% confidence interval estimate of the difference between the proportion of women and men who think sexual harassment is a major problem in the American workplace. 65) _____

66) A powerful women's group has claimed that men and women differ in attitudes about sexual discrimination. A group of 50 men (group 1) and 40 women (group 2) were asked if they thought sexual discrimination is a problem in the United States. Of those sampled, 11 of the men and 19 of the women did believe that sexual discrimination is a problem. Construct a 95% confidence interval estimate of the difference between the proportion of men and women who believe that sexual discrimination is a problem. 66) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

67) When testing $H_0: \pi_1 - \pi_2 = 0$ versus $H_1: \pi_1 - \pi_2 \neq 0$, the observed value of the Z test statistic was found to be -2.13. The p-value for this test is 67) _____
 A) 0.9668. B) 0.9834. C) 0.0332. D) 0.0166.

68) When testing $H_0: \pi_1 - \pi_2 \geq 0$ versus $H_1: \pi_1 - \pi_2 < 0$, the observed value of the Z test statistic was found to be -2.13. The p-value for this test is 68) _____
 A) 0.9668. B) 0.0166. C) 0.9834. D) 0.0332.

69) *The Wall Street Journal* recently published an article indicating differences in perception of sexual harassment on the job between men and women. The article claimed that women perceived the problem to be much more prevalent than did men. One question asked of both men and women was: "Do you think sexual harassment is a major problem in the American workplace?" 24% of the men compared to 62% of the women responded "Yes." Assuming W designates women's responses and M designates men's, what hypothesis should *The Wall Street Journal* test in order to show that its claim is true? 69) _____
 A) $H_0: \pi_W - \pi_M \geq 0$ versus $H_1: \pi_W - \pi_M < 0$
 B) $H_0: \pi_W - \pi_M \neq 0$ versus $H_1: \pi_W - \pi_M = 0$
 C) $H_0: \pi_W - \pi_M = 0$ versus $H_1: \pi_W - \pi_M \neq 0$
 D) $H_0: \pi_W - \pi_M \leq 0$ versus $H_1: \pi_W - \pi_M > 0$

70) *The Wall Street Journal* recently ran an article indicating differences in perception of sexual harassment on the job between men and women. The article claimed that women perceived the problem to be much more prevalent than did men. One question asked to both men and women was: "Do you think sexual harassment is a major problem in the American workplace?" Some 24% of the men compared to 62% of the women responded "Yes." Suppose that 150 women and 200 men were interviewed. What is the value of the test statistic? 70) _____
 A) 7.106 B) 2.33 C) 7.173 D) 6.635

- 71) A powerful women's group has claimed that men and women differ in attitudes about sexual discrimination. A group of 50 men (group 1) and 40 women (group 2) were asked if they thought sexual discrimination is a problem in the United States. Of those sampled, 11 of the men and 19 of the women did believe that sexual discrimination is a problem. Assuming W designates women's responses and M designates men's, which of the following are the appropriate null and alternative hypotheses to test the group's claim? 71) _____
- A) $H_0: \pi_M - \pi_W \neq 0$ versus $H_1: \pi_M - \pi_W = 0$
 - B) $H_0: \pi_M - \pi_W = 0$ versus $H_1: \pi_M - \pi_W \neq 0$
 - C) $H_0: \pi_M - \pi_W \geq 0$ versus $H_1: \pi_M - \pi_W < 0$
 - D) $H_0: \pi_M - \pi_W \leq 0$ versus $H_1: \pi_M - \pi_W > 0$

- 72) A powerful women's group has claimed that men and women differ in attitudes about sexual discrimination. A group of 50 men (group 1) and 40 women (group 2) were asked if they thought sexual discrimination is a problem in the United States. Of those sampled, 11 of the men and 19 of the women did believe that sexual discrimination is a problem. If the p -value turns out to be 0.035 (which is not the real value in this data set), then 72) _____
- A) at $\alpha = 0.04$, you should reject H_0 .
 - B) at $\alpha = 0.05$, you should fail to reject H_0 .
 - C) at $\alpha = 0.03$, you should reject H_0 .
 - D) None of the above would be correct statements.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 73) If you wish to determine whether there is evidence that the proportion of items of interest is higher in Group 1 than in Group 2, and the test statistic for $Z = +2.07$ where the difference is defined as Group 1's proportion minus Group 2's proportion, the p -value is equal to _____. 73) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 74) True or False: In testing the difference between two proportions using the normal distribution, you may use a two-tail Z test. 74) _____
- A) True
 - B) False

SCENARIO 10-9

The following EXCEL output contains the results of a test to determine whether the proportions of satisfied customers at two resorts are the same or different.

Hypothesized Difference	0
Level of Significance	0.05
Group 1	
Number of Items of Interest	160
Sample Size	200
Group 2	
Number of Items of Interest	172
Sample Size	250
Intermediate Calculations	
Group 1 Proportion	0.8
Group 2 Proportion	0.688
Difference in Two Proportions	0.112
Average Proportion	0.737777778
Z Test Statistic	2.684103363
Two-Tail Test	
Lower Critical Value	-1.959963985
Upper Critical Value	1.959963985
p-Value	0.007272462

- 75) Referring to Scenario 10-9, allowing for 1% probability of committing a Type I error, what are the decision and conclusion on testing whether there is any difference in the proportions of satisfied customers in the two resorts? 75) _____
- A) Reject the null hypothesis; there is enough evidence to conclude that there is significant difference in the proportions of satisfied guests at the two resorts.
 - B) Reject the null hypothesis; there is not enough evidence to conclude that there is significant difference in the proportions of satisfied guests at the two resorts.
 - C) Do not reject the null hypothesis; there is not enough evidence to conclude that there is significant difference in the proportions of satisfied guests at the two resorts.
 - D) Do not reject the null hypothesis; there is enough evidence to conclude that there is significant difference in the proportions of satisfied guests at the two resorts.
- 76) Referring to Scenario 10-9, if you want to test the claim that "Resort 1 (Group 1) has a higher proportion of satisfied customers compared to Resort 2 (Group 2)", the p -value of the test will be 76) _____
- A) $0.00727/2$.
 - B) $1 - (0.00727/2)$.
 - C) $2 * (0.00727)$.
 - D) 0.00727 .
- 77) Referring to Scenario 10-9, if you want to test the claim that "Resort 1 (Group 1) has a lower proportion of satisfied customers compared to Resort 2 (Group 2)," you will use 77) _____
- A) a t test for the difference between two proportions.
 - B) a Z test for the difference between two proportions.
 - C) an F test for the ratio of two variances.
 - D) an F test for the difference between two proportions.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

78) Referring to Scenario 10-9, construct a 99% confidence interval estimate of the difference in the population proportion of satisfied customers between the two resorts. 78) _____

79) Referring to Scenario 10-9, construct a 95% confidence interval estimate of the difference in the population proportion of satisfied guests between the two resorts. 79) _____

80) Referring to Scenario 10-9, construct a 90% confidence interval estimate of the difference in the population proportion of satisfied customers between the two resorts. 80) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

SCENARIO 10-11

The dean of a college is interested in the proportion of graduates from his college who have a job offer on graduation day. He is particularly interested in seeing if there is a difference in this proportion for accounting and economics majors. In a random sample of 100 of each type of major at graduation, he found that 65 accounting majors and 52 economics majors had job offers. If the accounting majors are designated as "Group 1" and the economics majors are designated as "Group 2," perform the appropriate hypothesis test using a level of significance of 0.05.

81) Referring to Scenario 10-11, the hypotheses the dean should use are 81) _____
A) $H_0: \pi_1 - \pi_2 \neq 0$ versus $H_1: \pi_1 - \pi_2 = 0$. B) $H_0: \pi_1 - \pi_2 = 0$ versus $H_1: \pi_1 - \pi_2 \neq 0$.
C) $H_0: \pi_1 - \pi_2 \geq 0$ versus $H_1: \pi_1 - \pi_2 < 0$. D) $H_0: \pi_1 - \pi_2 \leq 0$ versus $H_1: \pi_1 - \pi_2 > 0$.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

82) Referring to Scenario 10-11, the null hypothesis will be rejected if the test statistic is _____.
_____.

83) Referring to Scenario 10-11, the value of the test statistic is _____. 83) _____

84) Referring to Scenario 10-11, the p -value of the test is _____. 84) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

85) True or False: Referring to Scenario 10-11, the null hypothesis should be rejected. 85) _____
A) True B) False

86) True or False: Referring to Scenario 10-11, the same decision would be made with this test if the level of significance had been 0.01 rather than 0.05. 86) _____
A) True B) False

- 87) True or False: Referring to Scenario 10-11, the same decision would be made with this test if the level of significance had been 0.10 rather than 0.05. 87) _____
A) True B) False

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 88) Referring to Scenario 10-11, construct a 99% confidence interval estimate of the difference in proportion between accounting majors and economic majors who have a job offer on graduation day. 88) _____

- 89) Referring to Scenario 10-11, construct a 95% confidence interval estimate of the difference in proportion between accounting majors and economic majors who have a job offer on graduation day. 89) _____

- 90) Referring to Table 10-11, construct a 90% confidence interval estimate of the difference in proportion between accounting majors and economic majors who have a job offer on graduation day. 90) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 91) True or False: A statistics professor wanted to test whether the grades on a statistics test were the same for upper and lower classmen. The professor took a random sample of size 10 from each, conducted a test and found out that the variances were equal. For this situation, the professor should use a t test with independent samples. 91) _____
A) True B) False

Answer Key

Testname: CH10-TWO-SAMPLE TESTS

- 1) B
- 2) A
- 3) B
- 4) 12.5
- 5) 2.50
- 6) 48
- 7) D
- 8) D
- 9) D
- 10) A
- 11) B
- 12) A
- 13) A
- 14) B
- 15) D
- 16) C
- 17) D
- 18) A
- 19) B
- 20) D
- 21) B
- 22) C
- 23) A
- 24) C
- 25) A
- 26) B
- 27) +1.7109
- 28) 1.3178
- 29) 1.9117
- 30) 0.0340
- 31) C
- 32) D
- 33) C
- 34) B
- 35) D
- 36) A
- 37) A
- 38) B
- 39) A
- 40) 15
- 41) B
- 42) normal
- 43) A
- 44) C
- 45) D
- 46) C
- 47) B
- 48) D
- 49) A
- 50) 2.175
- 51) 0.0331 (using Excel) or 'between 0.025 and 0.05' (using Table E.3 with 7 degrees of freedom)
- 52) A
- 53) $H_0: \mu_D \leq 0; H_1: \mu_D > 0$
- 54) A

Answer Key

Testname: CH10-TWO-SAMPLE TESTS

- 55) $t > 3.3649$
- 56) 1.628
- 57) 0.082 if using PHStat or 0.05 and 0.10 if using Table E.3
- 58) B
- 59) D
- 60) 0.16 if using PHStat or 0.01 and 0.2 if using Table E.3
- 61) $-\$4.18$ to $\$9.85$
- 62) $-\$1.64$ to $\$7.31$
- 63) $-\$0.67$ to $\$6.34$
- 64) 0.25 to 0.51
- 65) 0.30 to 0.46
- 66) -0.448 to -0.062 or 0.062 to 0.448
- 67) C
- 68) B
- 69) D
- 70) C
- 71) B
- 72) A
- 73) 0.0192
- 74) A
- 75) A
- 76) A
- 77) B
- 78) 0.0071 to 0.2169
- 79) 0.0322 to 0.1918
- 80) 0.0450 to 0.1790
- 81) B
- 82) $Z > 1.96$ or < -1.96
- 83) $Z = 1.866$
- 84) 0.0621
- 85) B
- 86) A
- 87) B
- 88) -0.05 to 0.31
- 89) -0.01 to 0.27
- 90) 0.02 to 0.24
- 91) A