

# Statistics chapter 12 solutions

[Science](#), [Statistics](#)



## CHAPTER 12: TESTS FOR TWO OR MORE SAMPLES WITH CATEGORICAL DATA

1. When testing for independence in a contingency table with 3 rows and 4 columns, there are \_\_\_\_\_ degrees of freedom. a) 5 b) 6 c) 7 d) 12

ANSWER: b TYPE: MC DIFFICULTY: Easy KEYWORDS: chi-square test of independence, degrees of freedom

2. If we use the [pic] method of analysis to test for the differences among 4 proportions, the degrees of freedom are equal to: a) 3. b) 4. c) 5. d) 1. ANSWER: a TYPE: MC DIFFICULTY: Easy

KEYWORDS: chi-square test for difference in proportions, degrees of freedom

3. If we wish to determine whether there is evidence that the proportion of successes is higher in group 1 than in group 2, the appropriate test to use is a) the Z test. b) the [pic]test. c) both of the above d) none of the above

ANSWER: a TYPE: MC DIFFICULTY: Easy KEYWORDS: chi-square test for

difference in proportions

4. If we wish to determine whether there is evidence that the proportion of successes is the same in group 1 as in group 2, the appropriate test to use is a) the Z test. b) the [pic]test. c) both of the above d) none of the above ANSWER: TYPE: MC DIFFICULTY: Easy

KEYWORDS: chi-square test for difference in proportions

5. In testing a hypothesis using the [pic] test, the theoretical frequencies are based on the a) null hypothesis. b) alternative hypothesis. c) normal distribution. d) none of the above. ANSWER: a TYPE: MC DIFFICULTY: Easy KEYWORDS: chi-square

test for difference in proportions, properties

TABLE 12-1 A study published in the American Journal of Public Health was conducted to determine whether the use of seat belts in motor vehicles depends on ethnic status in San Diego County.

A sample of 792 children treated for injuries sustained from motor vehicle accidents was obtained, and each child was classified according to (1) ethnic status (Hispanic or non-Hispanic) and (2) seat belt usage (worn or not worn) during the accident. The number of children in each category is given in the table below.

	Hispanic	Non-Hispanic	Total
Seat belts worn	31	148	179
Seat belts not worn	283	330	613
Total	314	488	802

Referring to Table 12-1, which test would be used to properly analyze the data in this experiment? a) test for independence. b) test for difference between proportions. c) ANOVA F test for interaction in a 2 x 2 factorial design. d) test for goodness of fit. ANSWER: a TYPE: MC DIFFICULTY: Moderate KEYWORDS: chi-square test of independence 7. Referring to Table 12-1, the calculated test statistic is a) -0.9991. b) -0.1368. c) 48.1849. d) 72.8063. ANSWER: c TYPE: MC DIFFICULTY: Easy KEYWORDS: chi-square test of independence, test statistic 8.

Referring to Table 12-1, at 5% level of significance, the critical value of the test statistic is a) 3.8415. b) 5.9914. c) 9.4877. d) 13.2767. ANSWER: a TYPE: MC DIFFICULTY: Easy KEYWORDS: chi-square test of independence, critical value 9. Referring to Table 12-1, at 5% level of significance, there is sufficient evidence to conclude that the a) use of seat belts in motor vehicles is related to ethnic status in San Diego County. b) use of seat belts in motor vehicles depends on ethnic status in San Diego County. c) use of seat belts in motor vehicles is associated with ethnic status in San Diego County. ) all of the above ANSWER: d TYPE: MC DIFFICULTY: Moderate KEYWORDS: chi-square test of independence, decision, conclusion TABLE 12-2 Many companies use well-known celebrities as spokespersons in their TV advertisements. A study was conducted to determine whether brand

awareness of female TV viewers and the gender of the spokesperson are independent. Each in a sample of 300 female TV viewers was asked to identify a product advertised by a celebrity spokesperson. The gender of the spokesperson and whether or not the viewer could identify the product was recorded. The numbers in each category are given below.

	Male Celebrity	Female Celebrity	Total
Identified product	41	61	102
Could not identify	109	89	198
Total	150	150	300

Referring to Table 12-2, which test would be used to properly analyze the data in this experiment? a) test for independence. b) test for difference between proportions. c) ANOVA F test for main treatment effect. d) test for goodness of fit. ANSWER: a TYPE: MC DIFFICULTY: Moderate

KEYWORDS: chi-square test of independence 11. Referring to Table 12-2, the calculated test statistic is a) -0.1006. b) 0.00. c) 5.9418. d) 6.1194.

ANSWER: c TYPE: MC DIFFICULTY: Easy KEYWORDS: chi-square test of independence, test statistic 12. Referring to Table 12-2, at 5% level of significance, the critical value of the test statistic is a) 3.8415. b) 5.9914. c) 9.4877. d) 13.2767. ANSWER: a TYPE: MC DIFFICULTY: Easy KEYWORDS:

chi-square test of independence, critical value 13. Referring to Table 12-2, the degrees of freedom of the test statistic are a) 1. b) 2. c) 4. ) 299.

ANSWER: a TYPE: MC DIFFICULTY: Easy KEYWORDS: chi-square test of independence, degrees of freedom 14. Referring to Table 12-2, at 5% level of significance, the conclusion is that a) brand awareness of female TV viewers and the gender of the spokesperson are independent. b) brand awareness of female TV viewers and the gender of the spokesperson are not independent. c) brand awareness of female TV viewers and the gender of the spokesperson are related. d) both (b) and (c) ANSWER: d TYPE: MC

DIFFICULTY: Moderate KEYWORDS: chi-square test of independence, decision, conclusion TABLE 12-3

A computer used by a 24-hour banking service is supposed to randomly assign each transaction to one of 5 memory locations. A check at the end of a day's transactions gave the counts shown in the table to each of the 5 memory locations, along with the number of reported errors. | Memory Location: | 1 | 2 | 3 | 4 | 5 | | Number of Transactions: | 82 | 100 | 74 | 92 | 102 | | Number of Reported Errors: | 11 | 12 | 6 | 9 | 10 |

The bank manager wanted to test whether the proportion of errors in transactions assigned to each of the 5 memory locations differ. 15. Referring to Table 12-3, which test would be used to properly analyze the data in this experiment? a) test for independence b) test for difference between proportions c) ANOVA F test for main treatment effect d) test for goodness of fit ANSWER: b TYPE: MC DIFFICULTY: Moderate KEYWORDS: chi-square test for difference in proportions 16. Referring to Table 12-3, the degrees of freedom of the test statistic is a) 4. b) 8. c) 10. d) 448. ANSWER: a TYPE: MC DIFFICULTY: Easy

KEYWORDS: chi-square test for difference in proportions, degrees of freedom 17. Referring to Table 12-3, the critical value of the test statistic at 1% level of significance is a) 7. 7794. b) 13. 2767. c) 20. 0902. d) 23. 2093. ANSWER: b TYPE: MC DIFFICULTY: Easy KEYWORDS: chi-square test for difference in proportions, critical value 18. Referring to Table 12-3, the calculated value of the test statistic is a) -0. 1777. b) -0. 0185. c) 1. 4999. d) 1. 5190. ANSWER: c TYPE: MC DIFFICULTY: Moderate KEYWORDS: chi-square test for difference in

proportions, test statistic 19. Referring to Table 12-3, at 1% level of significance ) there is sufficient evidence to conclude that the proportions of errors in transactions assigned to each of the 5 memory locations are all different. b) there is insufficient evidence to conclude that the proportions of errors in transactions assigned to each of the 5 memory locations are all different. c) there is sufficient evidence to conclude that the proportion of errors in transactions assigned to each of the 5 memory locations are not all the same. d) there is insufficient evidence to conclude that the proportion of errors in transactions assigned to each of the 5 memory locations are not all the same.

ANSWER: d TYPE: MC DIFFICULTY: Moderate KEYWORDS: chi-square test for difference in proportions, decision, conclusion 20. Moving companies are required by the government to publish a Carrier Performance Report each year. One of the descriptive statistics they must include is the annual percentage of shipments on which a \$50 or greater claim for loss or damage was filed. Suppose two companies, Econo-Move and On-the-Move, each decide to estimate this figure by sampling their records, and they report the data shown in the following table.

	Econo-Move	On-the-Move	Total
Shipments sampled	900	750	1650
Number of shipments with a claim \$50 or greater	162	60	222

The owner of On-the-Move is hoping to use these data to show that the company is superior to Econo-Move with regard to the percentage of claims filed. Which test would be used to properly analyze the data in this experiment? a) test for independence b) test for goodness of fit ) ANOVA F test for main treatment effect d) test for the difference between proportions ANSWER: d TYPE: MC DIFFICULTY: Moderate KEYWORDS: Z test

for difference in two proportions 21. The Wall Street Journal recently ran an article indicating differences in the 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. 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? a)  $H_0: p_W - p_M \leq 0$  versus  $H_1: p_W - p_M < 0$  b)  $H_0: p_W - p_M \leq 0$  versus  $H_1: p_W - p_M > 0$  c)  $H_0: p_W - p_M = 0$  versus  $H_1: p_W - p_M \leq 0$  d)  $H_0: (W - M) \leq 0$  versus  $H_1: (W - M) > 0$  ANSWER: b TYPE: MC DIFFICULTY: Easy KEYWORDS: Z test for difference in two proportions, form of hypothesis

22. 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. For a 0.01 level of significance, what is the critical value for the rejection region? a) 7.173 b) 7.106 c) 6.635 d) 2.33 ANSWER: d TYPE: MC DIFFICULTY: Moderate KEYWORDS: Z test for difference in two proportions, critical value

23.

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? a) 7. 173 b) 7. 106 c) 6. 635 d) 2. 33

ANSWER: a TYPE: MC DIFFICULTY: Moderate

KEYWORDS: Z test for difference in two proportions, test statistic 24. 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 conclusion should be reached? a) Using a 0. 1 level of significance, there is sufficient evidence to conclude that women perceive the problem of sexual harassment on the job as being much more prevalent than do men. b) There is insufficient evidence to conclude with at least 99% confidence that women perceive the problem of sexual harassment on the job as being much more prevalent than do men. c) There is no evidence of a significant difference between the men and women in their perception. d) More information is needed to draw any conclusions from the data set. ANSWER: a TYPE: MC



DIFFICULTY: Moderate KEYWORDS: Z test for difference in two proportions, decision, conclusion 5. 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. Which of the following are the appropriate null and alternative hypotheses to test the group's claim? a)  $H_0: p_W - p_M \leq 0$  versus  $H_1: p_W - p_M < 0$  b)  $H_0: p_W - p_M \leq 0$  versus  $H_1: p_W - p_M > 0$  c)  $H_0: p_W - p_M = 0$  versus  $H_1: p_W - p_M \leq 0$  )  $H_0: (W - (M \leq 0$  versus  $H_1: (W - (M > 0$

ANSWER: c TYPE: MC DIFFICULTY: Moderate KEYWORDS: Z test for difference in two proportions, form of hypothesis 26. 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. Find the value of the test statistic. a)  $Z = -2.55$  b)  $Z = -0.85$  c)  $Z = -1.05$  d)  $Z = -1.20$

ANSWER: a TYPE: MC DIFFICULTY: Moderate KEYWORDS: Z test for difference in two proportions, test statistic 27. 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 a) at  $\alpha = 0.05$ , we should fail to reject  $H_0$ . b) at  $\alpha = 0.04$ , we should reject  $H_0$ . c) at  $\alpha = 0.03$ , we should reject  $H_0$ . d) None of the above would be correct statements. ANSWER: b TYPE: MC DIFFICULTY: Moderate KEYWORDS: Z test for difference in two proportions, decision, conclusion

TABLE 12-4 A few years ago, Pepsi invited consumers to take the "Pepsi Challenge." Consumers were asked to decide which of two sodas, Coke or Pepsi, they preferred in a blind taste test. Pepsi was interested in determining what factors played a role in people's taste preferences. One of the factors studied was the gender of the consumer.

Below are the results of analyses comparing the taste preferences of men and women, with the proportions depicting preference for Pepsi. Males:  $n = 109$ ,  $p_M = 0.422018$  Females:  $n = 52$ ,  $p_F = 0.25$   $p_M - p_F = 0.172018$   $Z = 2.11825$  28. Referring to Table 12-4, to determine if a difference exists in the taste preferences of men and women, give the correct alternative hypothesis that Pepsi would test. a)  $H_1: p_M > p_F$  b)  $H_1: p_M < p_F$  c)  $H_1: p_M - p_F > 0$  d)  $H_1: p_M - p_F = 0$  ANSWER: c TYPE: MC DIFFICULTY: Easy KEYWORDS: Z test for difference in two proportions, form of hypothesis

29. Referring to Table 12-4, suppose Pepsi wanted to test to determine if the males preferred Pepsi more than the females. Using the test statistic given, compute the appropriate p-value for the test. a) 0.0171 b) 0.0340 c) 0.2119 d) 0.4681 ANSWER: a TYPE: MC DIFFICULTY: Moderate KEYWORDS: Z test for difference in two proportions, p-value

30. Referring to Table 12-4, suppose Pepsi wanted to test to determine if the males preferred Pepsi less than the females. Using the test statistic given, compute the appropriate p-

value for the test. a) 0. 0170 b) 0. 0340 c) 0. 9660 d) 0. 9830 ANSWER: d  
 TYPE: MC DIFFICULTY: Moderate

KEYWORDS: Z test for difference in two proportions, p-value 31. Referring to Table 12-4, suppose that the two-tailed p-value was really 0. 0734. State the proper conclusion. a) At  $[pic] = 0. 05$ , there is sufficient evidence to indicate the proportion of males preferring Pepsi differs from the proportion of females preferring Pepsi. b) At  $[pic] = 0. 10$ , there is sufficient evidence to indicate the proportion of males preferring Pepsi differs from the proportion of females preferring Pepsi. c) At  $[pic] = 0. 05$ , there is sufficient evidence to indicate the proportion of males preferring Pepsi equals the proportion of females preferring Pepsi. ) At  $[pic] = 0. 08$ , there is insufficient evidence to indicate the proportion of males preferring Pepsi differs from the proportion of females preferring Pepsi. ANSWER: b TYPE: MC DIFFICULTY: Moderate

KEYWORDS: Z test for difference in two proportions, decision, conclusion  
 TABLE 12-5 The following Excel output contains the results of a test to determine if the proportions of satisfied guests at two resorts are the same or different. | Hypothesized Difference | 0 | | Level of Significance | 0. 5 | | Group 1 | | Number of Successes | 163 | | Sample Size | 227 | | Group 2 | | Number of Successes | 154 | | Sample Size | 262 | | Group 1 Proportion | 0. 18061674 | | Group 2 Proportion | 0. 58778626 | | Difference in Two Proportions | 0. 130275414 | | Average Proportion | 0. 648261759 | | Test Statistic | 3. 00875353 | | Two-Tailed Test | | Lower Critical Value |-1. 59961082 | | Upper Critical Value | 1. 959961082 | | p-Value | 0. 002623357 |  
 32. Referring to Table 12-5, allowing for 0. 75% 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 guests in the two resorts? a.

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. b. 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. c. 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. d.

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. ANSWER: c TYPE: MC DIFFICULTY: Easy KEYWORDS: Z test for difference in two proportions, decision, conclusion 33. Referring to Table 12-5, if you want to test the claim that "Resort 1 (Group 1) has a higher proportion of satisfied guests than Resort 2 (Group 2)," the p-value of the test will be a) 0.00262. b)  $0.00262/2$ . c)  $2*(0.00262)$ . d)  $1-(0.00262/2)$ .

ANSWER: b

TYPE: MC DIFFICULTY: Moderate KEYWORDS: Z test for difference in two proportions, p-value 34. Referring to Table 12-5, if you want to test the claim that "Resort 1 (Group 1) has a lower proportion of satisfied guests than Resort 2 (Group 2)," you will use a) a t test for the difference in two proportions. b) a Z test for the difference in two proportions. c) a [pic] test for the difference in two proportions. d) a [pic] test for independence.

ANSWER: b TYPE: MC DIFFICULTY: Moderate KEYWORDS: Z test for difference in two proportions

TABLE 12-6 One criterion used to evaluate employees in the assembly section of a large factory is the number of defective pieces per 1,000 parts produced. The quality control department wants to find out whether there is a relationship between years of experience and defect rate. Since the job is repetitious, after the initial training period, any improvement due to a learning effect might be offset by a loss of motivation. A defect rate is calculated for each worker in a yearly evaluation. The results for 100 workers are given in the table below.

Years Since Training Period	< 1 Year	1 - 4 Years	5 - 9 Years	High	6	9	9
Defect Rate: Average	9	19	23	Low	7	8	10

5. Referring to Table 12-6, which test would be used to properly analyze the data in this experiment to determine whether there is a relationship between defect rate and years of experience? a) [pic]test for independence in a two-way contingency table b) [pic]test for equal proportions in a one-way table c) ANOVA F test for main treatment effect d) Z test for the difference in two proportions

ANSWER: a TYPE: MC DIFFICULTY: Moderate KEYWORDS: chi-square test of independence 36. Referring to Table 12-6, find the rejection region necessary for testing at the 0.5 level of significance whether there is a relationship between defect rate and years of experience. a) Reject  $H_0$  if [pic] > 16.919. b) Reject  $H_0$  if [pic] > 15.507. c) Reject  $H_0$  if [pic] > 11.143. d) Reject  $H_0$  if [pic] > 9.488.

ANSWER: d TYPE: MC DIFFICULTY: Easy KEYWORDS: chi-square test of independence, critical value 37. Referring to Table 12-6, what is the expected number of employees with less than 1 year of training time and a high defect rate? a) 4.

17 b) 4. 60 c) 5. 28 d) 9. 17 ANSWER: c TYPE: MC DIFFICULTY: Moderate  
KEYWORDS: chi-square test of independence, contingency table, properties

8. Referring to Table 12-6, what is the expected number of employees with 1 to 4 years of training time and a high defect rate? a) 12. 00 b) 8. 64 c) 6. 67 d) 6. 00 ANSWER: b TYPE: MC DIFFICULTY: Moderate KEYWORDS: chi-square

test of independence, contingency table, properties 39. Referring to Table 12-6, of the cell for 1 to 4 years of training time and a high defect rate, what is the contribution to the overall [pic] statistic for the independence test? a) 0. 36 b) 0. 1296 c) 0. 015 d) 0. 0144 ANSWER: c TYPE: MC DIFFICULTY:

Moderate KEYWORDS: chi-square test of independence, contingency table, properties 0. Referring to Table 12-6, a test was conducted to determine if a relationship exists between defect rate and years of experience. Which of the following p-values would indicate that defect rate and years of experience are dependent? Assume you are testing at [pic] = 0. 05. a) 0. 045 b) 0. 055 c) 0. 074 d) 0. 080 ANSWER: a TYPE: MC DIFFICULTY: Easy

KEYWORDS: chi-square test of independence, p-value, decision TABLE 12-7 A corporation randomly selects 150 salespeople and finds that 66% who have never taken a self-improvement course would like to take such a course.

The firm did a similar study 10 years ago in which 60% of a random sample of 160 salespeople wanted to take a self-improvement course. The groups are assumed to be independent random samples. Let  $p_1$  and  $p_2$  represent the true proportion of workers who would like to attend a self-improvement course in the recent study and the past study, respectively. 41. Referring to Table 12-7, if the firm wanted to test whether this proportion has changed from the previous study, which represents the relevant hypotheses? a)  $H_0$ :

$p_1 - p_2 = 0$  versus  $H_1: p_1 - p_2 \neq 0$  b)  $H_0: p_1 - p_2 = 0$  versus  $H_1: p_1 - p_2 = 0$  )  $H_0: p_1 - p_2 = 0$  versus  $H_1: p_1 - p_2 > 0$  d)  $H_0: p_1 - p_2 = 0$  versus  $H_1: p_1 - p_2 < 0$  ANSWER: a TYPE: MC DIFFICULTY: Easy KEYWORDS: chi-square test for difference in proportions, Z test for difference in two proportions 42. Referring to Table 12-7, if the firm wanted to test whether a greater proportion of workers would currently like to attend a self-improvement course than in the past, which represents the relevant hypotheses? a)  $H_0: p_1 - p_2 = 0$  versus  $H_1: p_1 - p_2 \neq 0$  b)  $H_0: p_1 - p_2 = 0$  versus  $H_1: p_1 - p_2 = 0$  c)  $H_0: p_1 - p_2 = 0$  versus  $H_1: p_1 - p_2 > 0$  )  $H_0: p_1 - p_2 = 0$  versus  $H_1: p_1 - p_2 < 0$  ANSWER: c TYPE: MC DIFFICULTY: Easy KEYWORDS: Z test for difference in two proportions, form of hypothesis 43. Referring to Table 12-7, what is the unbiased point estimate for the difference between the two population proportions? a) 0.06 b) 0.10 c) 0.15 d) 0.22 ANSWER: a TYPE: MC DIFFICULTY: Easy KEYWORDS: point estimate 44. Referring to Table 12-7, what is/are the critical value(s) when performing a Z test on whether population proportions are different if  $p = 0.05$ ? a) 1.645 b) 1.96 c) -1.96 d) 2.8 ANSWER: b TYPE: MC DIFFICULTY: Easy KEYWORDS: Z test for difference in two proportions, critical value 45. Referring to Table 12-7, what is/are the critical value(s) when testing whether population proportions are different if  $p = 0.10$ ? a) 1.645 b) 1.96 c) -1.96 d) 2.08 ANSWER: a TYPE: MC DIFFICULTY: Easy KEYWORDS: Z test for difference in two proportions, critical value 46. Referring to Table 12-7, what is/are the critical value(s) when testing whether the current population proportion is higher than before if  $p = 0.05$ ? a) 1.645 b) + 1.45 c) 1.96 d) + 1.96 ANSWER: b TYPE: MC

DIFFICULTY: Easy KEYWORDS: chi-square test for difference in proportions, critical value 47. Referring to Table 12-7, what is the estimated standard error of the difference between the two sample proportions? a) 0. 629 b) 0. 500 c) 0. 055 d) 0 ANSWER: c TYPE: MC DIFFICULTY: Moderate KEYWORDS: Z test for difference in two proportions, standard error 48. Referring to Table 12-7, what is the value of the test statistic to use in evaluating the alternative hypothesis that there is a difference in the two population proportions? ) 4. 335 b) 1. 96 c) 1. 093 d) 0 ANSWER: c TYPE: MC DIFFICULTY: Moderate KEYWORDS: Z test for difference in two proportions, chi-square test for difference in proportions, test statistic 49. Referring to Table 12-7, the company tests at the 0. 05 level to determine whether the population proportion has changed from the previous study. Which of the following is most correct? a) Reject the null hypothesis and conclude that the proportion of employees who are interested in a self-improvement course has changed over the intervening 10 years. ) Do not reject the null hypothesis and conclude that the proportion of employees who are interested in a self-improvement course has not changed over the intervening 10 years. c) Reject the null hypothesis and conclude that the proportion of employees who are interested in a self-improvement course has increased over the intervening 10 years. d) Do not reject the null hypothesis and conclude that the proportion of employees who are interested in a self-improvement course has increased over the intervening 10 years. ANSWER: b TYPE: MC DIFFICULTY: Moderate

KEYWORDS: Z test for difference in two proportions, chi-square test for difference in proportions, decision, conclusion 50. True or False: In testing



the difference between two proportions, we may use either a one-tailed chi-square test or two-tailed Z test. ANSWER: True TYPE: TF DIFFICULTY: Easy KEYWORDS: Z test for difference in two proportions, chi-square test for difference in proportions 51. True or False: The squared difference between the observed and theoretical frequencies should be large if there is no significant difference between the proportions.

ANSWER: False TYPE: TF DIFFICULTY: Easy KEYWORDS: chi-square test for difference in proportions, properties 52. True or False: A test for the difference between two proportions can be performed using the chi-square distribution. ANSWER: True TYPE: TF DIFFICULTY: Easy KEYWORDS: chi-square test for difference in proportions 53. True or False: A test for whether one proportion is higher than the other can be performed using the chi-square distribution. ANSWER: False TYPE: TF DIFFICULTY: Easy KEYWORDS: chi-square test for difference in proportions 54.

True or False: When using the [pic] tests for independence, one should be aware that expected frequencies that are too small will lead to too big a Type I error. ANSWER: True TYPE: TF DIFFICULTY: Difficult KEYWORDS: chi-square test of independence, properties, assumption 55. True or False: If we use the chi-square method of analysis to test for the difference between proportions, we must assume that there are at least 5 observed frequencies in each cell of the contingency table. ANSWER: False TYPE: TF DIFFICULTY: Moderate KEYWORDS: chi-square test of independence, properties, assumption 6. If we wish to determine whether there is evidence that the proportion of successes is higher in Group 1 than in Group 2, and the test

statistic for  $Z = +2.07$ , the p-value is equal to \_\_\_\_\_. ANSWER: 0.0192

TYPE: FI DIFFICULTY: Moderate KEYWORDS: Z test for difference in two proportions, p-value TABLE 12-8 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. Referring to Table 12-8, the hypotheses the dean should use are: a)  $H_0: p_1 - p_2 = 0$  versus  $H_1: p_1 - p_2 \neq 0$ . b)  $H_0: p_1 - p_2 \leq 0$  versus  $H_1: p_1 - p_2 > 0$ . c)  $H_0: p_1 - p_2 \geq 0$  versus  $H_1: p_1 - p_2 < 0$ . d)  $H_0: p_1 - p_2 = 0$  versus  $H_1: p_1 - p_2 < 0$ .

ANSWER: a TYPE: MC DIFFICULTY: Easy KEYWORDS: chi-square test for difference in proportions, Z test for difference in two proportions, form of hypothesis 58. Referring to Table 12-8, the null hypothesis will be rejected if the test statistic is \_\_\_\_\_. ANSWER:  $Z > 1.96$  or  $< -1.96$  or  $|Z| > 1.96$

TYPE: FI DIFFICULTY: Easy KEYWORDS: chi-square test for difference in proportions, Z test for difference in two proportions, critical value 59.

Referring to Table 12-8, the value of the test statistic is \_\_\_\_\_. ANSWER:  $Z = 1.866$  or  $|Z| = 1.866$  TYPE: FI DIFFICULTY: Moderate

KEYWORDS: chi-square test for difference in proportions, Z test for difference in two proportions, test statistic 60. Referring to Table 12-8, the p-value of

the test is \_\_\_\_\_. ANSWER: 0.0621 TYPE: FI DIFFICULTY: Moderate  
 KEYWORDS: chi-square test for difference in proportions, Z test for difference in two proportions, p-value 61. True or False: Referring to Table 12-8, the null hypothesis should be rejected. ANSWER: False TYPE: TF DIFFICULTY: Easy  
 KEYWORDS: chi-square test for difference in proportions, Z test for difference in two proportions, decision 62.

True or False: Referring to Table 12-8, the same decision would be made with this test if the level of significance had been 0.01 rather than 0.05. ANSWER: True TYPE: TF DIFFICULTY: Moderate KEYWORDS: chi-square test for difference in proportions, Z test for difference in two proportions, decision 63. True or False: Referring to Table 12-8, the same decision would be made with this test if the level of significance had been 0.10 rather than 0.05. ANSWER: False TYPE: TF DIFFICULTY: Moderate KEYWORDS: chi-square test for difference in proportions, Z test for difference in two proportions, decision TABLE 12-9

A quality control engineer is in charge of the manufacture of computer disks. Two different processes can be used to manufacture the disks. He suspects that the Kohler method produces a greater proportion of defects than the Russell method. He samples 150 of the Kohler and 200 of the Russell disks and finds that 27 and 18 of them, respectively, are defective. If Kohler is designated as "Group 1" and Russell is designated as "Group 2," perform the appropriate test at a level of significance of 0.01. 64. Referring to Table 12-9, the hypotheses that should be tested are: a)  $H_0: p_1 - p_2 = 0$  versus  $H_1: p_1 - p_2 > 0$  b)  $H_0: p_1 - p_2 \leq 0$  versus  $H_1: p_1 - p_2 = 0$  c)  $H_0: p_1 -$

$p_2$  versus  $H_1: p_1 - p_2 > 0$ . d)  $H_0: p_1 - p_2 \leq 0$  versus  $H_1: p_1 - p_2 < 0$ . ANSWER: c TYPE: MC DIFFICULTY: Easy KEYWORDS: Z test for difference in two proportions, form of hypothesis 65. Referring to Table 12-9, the null hypothesis will be rejected if the test statistic is \_\_\_\_\_. ANSWER:  $Z > 2.33$  TYPE: FI DIFFICULTY: Easy KEYWORDS: Z test for difference in two proportions, critical value 66. Referring to Table 12-9, the value of the test statistic is \_\_\_\_\_. ANSWER: 2.49 TYPE: FI DIFFICULTY: Moderate

KEYWORDS: Z test for difference in two proportions, test statistic 67. Referring to Table 12-9, the p-value of the test is \_\_\_\_\_. ANSWER: 0.0064 TYPE: FI DIFFICULTY: Moderate KEYWORDS: Z test for difference in two proportions, p-value 68. True or False: Referring to Table 12-9, the null hypothesis should be rejected. ANSWER: True TYPE: TF DIFFICULTY: Moderate KEYWORDS: Z test for difference in two proportions, decision 69. True or False: Referring to Table 12-9, the same decision would be made with this test if the level of significance had been 0.05 rather than 0.01. ANSWER: True TYPE: TF DIFFICULTY: Moderate

KEYWORDS: Z test for difference in two proportions, decision 70. True or False: Referring to Table 12-9, the same decision would be made if this had been a two-tailed test at a level of significance of 0.01. ANSWER: False TYPE: TF DIFFICULTY: Moderate KEYWORDS: Z test for difference in two proportions, decision TABLE 12-10 The director of transportation of a large company is interested in the usage of her van pool. She considers her routes to be divided into local and non-local. She is particularly interested in

learning if there is a difference in the proportion of males and females who use the local routes.

She takes a sample of a day's riders and finds the following:

	Male	Female	Total
Local	27	44	71
Non-Local	33	25	58
Total	60	69	129

| She will use this information to perform a chi-square hypothesis test using a level of significance of 0.05. Referring to Table 12-10, the test will involve \_\_\_\_\_ degree(s) of freedom. ANSWER: 1

TYPE: FI DIFFICULTY: Easy KEYWORDS: chi-square test for difference in proportions, degrees of freedom 72. Referring to Table 12-10, the overall or average proportion of local riders is \_\_\_\_\_.

ANSWER: 0.550 TYPE: FI DIFFICULTY: Easy KEYWORDS: chi-square test for difference in proportions, properties 73. Referring to Table 12-10, the expected cell frequency in the Male/Local cell is \_\_\_\_\_. ANSWER: 33.02 TYPE: FI DIFFICULTY: Moderate KEYWORDS: chi-square test for difference in proportions, contingency table, properties 74. Referring to Table 12-10, the expected cell frequency in the Female/Non-Local cell is \_\_\_\_\_.

ANSWER: 31.02 TYPE: FI DIFFICULTY: Moderate KEYWORDS: chi-square test for difference in proportions, contingency table, properties 75. Referring to Table 12-10, the critical value of the test is \_\_\_\_\_. ANSWER: 3.841 TYPE: FI DIFFICULTY: Easy KEYWORDS: chi-square test for difference in proportions, critical value 76. Referring to Table 12-10, the value of the test statistic is \_\_\_\_\_. ANSWER: 4.568 TYPE: FI DIFFICULTY: Moderate KEYWORDS: chi-square test for difference in proportions, test statistic 77. True or False: Referring to Table 12-10, the null hypothesis will be rejected.

ANSWER: True TYPE: TF DIFFICULTY: Moderate KEYWORDS: chi-square test for difference in proportions, decision 78. True or False: Referring to Table 12-10, the decision made suggests that there is a difference between the proportion of males and females who ride local versus non-local routes.

ANSWER: True TYPE: TF DIFFICULTY: Median KEYWORDS: chi-square test for difference in proportions, conclusion TABLE 12-11 Four surgical procedures are currently used to install pacemakers. If the patient does not need to return for follow-up surgery, the operation is called a "clear" operation.

A heart center wants to compare the proportion of clear operations for the 4 procedures, and collects the following numbers of patients from their own records:

Procedure	A	B	C	D	Total	Clear	Return
	27	41	21	7	96	11	15
	9	11	46		66	38	56
	38	56	30	18	142		

They will use this information to test for a difference among the proportion of clear operations using a chi-square test with a level of significance of 0.05. Referring to Table 12-11, the test will involve \_\_\_\_\_ degrees of freedom.

ANSWER: 3 TYPE: FI DIFFICULTY: Easy KEYWORDS: chi-square test for difference in proportions, degrees of freedom 80. Referring to Table 12-11, the overall or average proportion of clear operations is \_\_\_\_\_. ANSWER: 0.676 TYPE: FI DIFFICULTY: Easy KEYWORDS: chi-square test for difference in proportions, properties 81.

Referring to Table 12-11, the expected cell frequency for the Procedure A/Clear cell is \_\_\_\_\_. ANSWER: 25.69 TYPE: FI DIFFICULTY: Moderate KEYWORDS: chi-square test for difference in proportions, contingency table, properties 82. Referring to Table 12-11, the expected cell frequency for the

Procedure D/Return cell is \_\_\_\_\_. ANSWER: 5. 83 TYPE: FI DIFFICULTY: Moderate KEYWORDS: chi-square test for difference in proportions, contingency table, properties 83. Referring to Table 12-11, the critical value of the test is \_\_\_\_\_. ANSWER: 7. 815 TYPE: FI DIFFICULTY: Easy

KEYWORDS: chi-square test for difference in proportions, critical value 84. Referring to Table 12-11, the value of the test statistic is \_\_\_\_\_. ANSWER: 7. 867 TYPE: FI DIFFICULTY: Moderate KEYWORDS: chi-square test for difference in proportions, test statistic 85. True or False: Referring to Table 12-11, the null hypothesis will be rejected. ANSWER: True TYPE: TF DIFFICULTY: Moderate KEYWORDS: chi-square test for difference in proportions, decision 86. True or False: Referring to Table 12-11, the decision made suggests that the 4 procedures all have different proportions of clear operations.

ANSWER: False TYPE: TF DIFFICULTY: Moderate KEYWORDS: chi-square test for difference in proportions, conclusion 87. True or False: Referring to Table 12-11, the decision made suggests that the 4 procedures do not all have the same proportion of clear operations. ANSWER: True TYPE: TF DIFFICULTY: Moderate KEYWORDS: chi-square test for difference in proportions, conclusion TABLE 12-12 The director of admissions at a state college is interested in seeing if admissions status (admitted, waiting list, denied admission) at his college is independent of the type of community in which an applicant resides.

He takes a sample of recent admissions decisions and forms the following table: | | Admitted | Wait List | Denied | Total | | Urban | 45 | 21 | 17 | 83 | |

Rural | 33 | 13 | 24 | 70 | | Suburban | 34 | 12 | 39 | 85 | | Total | 112 | 46 | 80  
| 238 |

He will use this table to do a chi-square test of independence with a level of significance of 0.01. 88. Referring to Table 12-12, the test will involve \_\_\_\_\_ degrees of freedom. ANSWER: 4 TYPE: FI DIFFICULTY: Easy

KEYWORDS: chi-square test of independence, degrees of freedom 89.

Referring to Table 12-12, the critical value of the test is \_\_\_\_\_. ANSWER:

13. 277 TYPE: FI DIFFICULTY: Easy KEYWORDS: chi-square test of independence, critical value 90. Referring to Table 12-12, the expected cell frequency for the Admitted/Urban cell is \_\_\_\_\_. ANSWER: 39.06

TYPE: FI DIFFICULTY: Moderate KEYWORDS: chi-square test of independence, contingency table, properties 91. Referring to Table 12-12, the value of the test statistic is \_\_\_\_\_. ANSWER: 12.624 TYPE: FI DIFFICULTY: Moderate

KEYWORDS: chi-square test of independence, test statistic 92. True or False:

Referring to Table 12-12, the null hypothesis will be rejected. ANSWER: False

TYPE: TF DIFFICULTY: Moderate KEYWORDS: chi-square test of independence, decision 93. True or False: Referring to Table 12-12, the p-value of this test is greater than 0.01. ANSWER: True

TYPE: TF DIFFICULTY: Moderate KEYWORDS: chi-square test of independence, p-value 94. True or False: Referring to Table 12-12, the decision made suggests that admissions status at the college is independent of the type of community in which an applicant resides. ANSWER: True TYPE:

TF DIFFICULTY: Easy KEYWORDS: chi-square test of independence, conclusion 95. True or False: Referring to Table 12-12, the same decision



would be made with this test if the level of significance had been 0.005.

ANSWER: True TYPE: TF DIFFICULTY: Easy KEYWORDS: chi-square test of independence, decision 6. True or False: Referring to Table 12-12, the same decision would be made with this test if the level of significance had been 0.

05. ANSWER: False TYPE: TF DIFFICULTY: Easy KEYWORDS: chi-square test of independence, decision 97. True or False: Referring to Table 12-12, the null hypothesis claims that "there is no association between admission status at the college and the type of community in which an applicant resides."

ANSWER: True TYPE: TF DIFFICULTY: Easy KEYWORDS: chi-square test of independence, form of hypothesis, conclusion 98.

True or False: Referring to Table 12-12, the alternative hypothesis claims that "there is some connection between admission status at the college and the type of community in which an applicant resides." ANSWER: True TYPE:

TF DIFFICULTY: Easy KEYWORDS: chi-square test of independence, form of hypothesis, conclusion 99. True or False: The chi-square test of independence requires that the number of expected frequency in each cell to be at least 5. ANSWER: False TYPE: TF DIFFICULTY: Easy KEYWORDS: chi-square test of independence, assumption 100.

True or False: The chi-square test of independence requires that the number of expected frequency in each cell to be at least 1. ANSWER: True TYPE: TF

DIFFICULTY: Easy KEYWORDS: chi-square test of independence, assumption TABLE 12-13 Parents complain that children read too few story books and watch too much television nowadays. A survey of 1,000 children reveals the following information on average time spent watching TV and average time

spent reading story books: | | Average time spent reading story books | |  
Average time spent watching TV | Less than 1 hour | Between 1 and 2 hours |  
More than 2 hours | | Less than 2 hours | 90 | 85 | 130 | | More than 2 hours |  
655 | 32 | 8 | 101. Referring to Table 12-13, how many children in the survey  
spent less than 2 hours watching TV and more than 2 hours reading story  
books, on average? a) 8 b) 130 c) 175 d) 687 ANSWER: b

TYPE: MC DIFFICULTY: Easy KEYWORDS: contingency table, properties 102.  
Referring to Table 12-13, how many children in the survey spent less than 2  
hours watching TV and no more than 2 hours reading story books, on  
average? a) 8 b) 130 c) 175 d) 687 ANSWER: c TYPE: MC DIFFICULTY: Easy  
KEYWORDS: contingency table, properties 103. Referring to Table 12-13, if  
the null hypothesis of no connection between time spent watching TV and  
time spent reading story books is true, how many children watching less  
than 2 hours of TV and reading no more than 2 hours of story books, on  
average, can we expect? ) 35. 69 b) 227. 23 c) 262. 91 d) 969. 75 ANSWER:  
c TYPE: MC DIFFICULTY: Difficult KEYWORDS: chi-square test of  
independence, contingency table, properties 104. Referring to Table 12-13, if  
the null hypothesis of no connection between time spent watching TV and  
time spent reading story books is true, how many children watching less  
than 2 hours of TV and reading more than 2 hours of story books, on  
average, can we expect? a) 42. 09 b) 155. 25 c) 262. 92 d) 987. 75 ANSWER:  
a TYPE: MC DIFFICULTY: Moderate KEYWORDS: chi-square test of  
independence, contingency table, properties 105.

Referring to Table 12-13, to test whether there is any relationship between average time spent watching TV and average time spent reading story books, the value of the measured test statistic is a) -12. 59. b) 1. 61. c) 481. 49. d) 1, 368. 06. ANSWER: c TYPE: MC DIFFICULTY: Moderate KEYWORDS: chi-square test of independence, test statistic 106. Referring to Table 12-13, suppose we want to constrain the probability of committing a Type I error to 5% when testing whether there is any relationship between average time spent watching TV and average time spent reading story books.

The critical value will be a) 5. 991. b) 7. 378. c) 12. 592. d) 14. 449. ANSWER: a TYPE: MC DIFFICULTY: Easy KEYWORDS: chi-square test of independence, critical value 107. Referring to Table 12-13, we want to test whether there is any relationship between average time spent watching TV and average time spent reading story books. Suppose the value of the test statistic was 164 (which is not the correct answer) and the critical value was 19. 00 (which is not the correct answer), then we could conclude that a) there is a connection between time spent reading story books and time spent watching TV. ) there is no connection between time spent reading story books and time spent watching TV. c) more time spent reading story books leads to less time spent watching TV. d) more time spent watching TV leads to less time spent reading story books. ANSWER: a TYPE: MC DIFFICULTY: Moderate KEYWORDS: chi-square test of independence, decision, conclusion TABLE 12-14 Recent studies have found that American children are more obese than in the past. The amount of time children spend watching television has received much of the blame.

A survey of 100 ten-year-olds revealed the following with regards to weights and average number of hours a day spent watching television. We are interested in testing whether the average number of hours spent watching TV and weights are independent at 1% level of significance.

Weights	TV Hours	Total
More than 10 lbs. overweight	0-3	1
More than 10 lbs. overweight	3-6	9
More than 10 lbs. overweight	6+	20
More than 10 lbs. overweight	Total	30
Within 10 lbs. of normal weight	0-3	20
Within 10 lbs. of normal weight	3-6	15
Within 10 lbs. of normal weight	6+	15
Within 10 lbs. of normal weight	Total	50
More than 10 lbs. underweight	0-3	10
More than 10 lbs. underweight	3-6	5
More than 10 lbs. underweight	6+	5
More than 10 lbs. underweight	Total	20
Total	0-3	31
Total	3-6	29
Total	6+	40
Total	Total	100
Total		108

Referring to Table 12-14, if there is no connection between weights and average number of hours spent watching TV, we should expect how many children to be spending 3-6 hours, on average, watching TV and are more than 10 lbs. underweight? a) 5 b) 5.8 c) 6.2 d) 8 ANSWER: b TYPE: MC DIFFICULTY: Easy KEYWORDS: chi-square test of independence, contingency table, properties 109.

Referring to Table 12-14, if there is no connection between weights and average number of hours spent watching TV, we should expect how many children to be spending no more than 6 hours, on average, watching TV and are more than 10 lbs. underweight? a) 5.8 b) 6.2 c) 8 d) 12 ANSWER: d TYPE: MC DIFFICULTY: Moderate KEYWORDS: chi-square test of independence, contingency table, properties 110.

Referring to Table 12-14, how many children in the survey spend more than 6 hours watching TV and are more than 10 lbs. overweight? a) 1 b) 9 c) 20 d) 40 ANSWER: c TYPE: MC DIFFICULTY: Easy KEYWORDS: chi-square test of independence, contingency table, properties 111.

Referring to Table 12-14, how many children in the survey spend no more than 6 hours watching TV and are more than 10 lbs. underweight? a) 5 b) 10 c) 15 d) 20 ANSWER: c TYPE: MC DIFFICULTY: Easy KEYWORDS: chi-square test of independence,

contingency table, properties 112. Referring to Table 12-14, the value of the test statistic is a) 8. 532. b) 15. 483. c) 18. 889. d) 69. 744. ANSWER: c TYPE: MC DIFFICULTY: moderate KEYWORDS: chi-square test of independence, test statistic 113. Referring to Table 12-14, the critical value of the test will be a) 6. 635. b) 13. 277. c) 14. 860. d) 21. 666. ANSWER: b TYPE: MC DIFFICULTY: Easy KEYWORDS: chi-square test of independence, critical value 114.

Referring to Table 12-14, suppose the value of the test statistic was 30. 00 (which is not the correct value) and the critical value at 1% level of significance was 10. 00 (which is not the correct value), which of the following conclusions would be correct? a) We will accept the null and conclude that the average number of hours spent watching TV and weights are independent. b) We will reject the null and conclude that the average number of hours spent watching TV and weights are independent. c) We will accept the null and conclude that the average number of hours spent watching TV and weights are not independent. ) We will reject the null and conclude that the average number of hours spent watching TV and weights are not independent. ANSWER: d TYPE: MC DIFFICULTY: Moderate KEYWORDS: chi-square test of independence, decision, conclusion 115.

Referring to Table 12-14, which of the following statements is correct? a) We can accept the null for any level of significance greater than 0. 005 b) We can reject the null for any level of significance greater than 0. 005. c) We can accept the null for any level of significance smaller than 0. 005 d) We can reject the null for any level of significance smaller than 0. 05. ANSWER: b TYPE: MC DIFFICULTY: Difficult KEYWORDS: chi-square test of independence, decision 116. Referring to Table 12-14, the degrees of freedom of the test

statistic are a) 1. b) 2. c) 4. d) 9. ANSWER: c TYPE: MC DIFFICULTY: Easy  
 KEYWORDS: chi-square test of independence, degrees of freedom 117. True or False: Referring to Table 12-14, the test is always a one-tailed test. ANSWER: True TYPE: TF DIFFICULTY: Easy KEYWORDS: chi-square test of independence, properties Table 12-15 According to an article in Marketing News, fewer checks are being written at grocery store checkout stands than in the past.

To determine whether there is a difference in the proportion of shoppers who paid by check over three consecutive years at a 0.05 level of significance, the results of a survey of 500 shoppers during three consecutive years are obtained and presented below.

	Year 1	Year 2	Year 3	Total
Yes	225	175	125	525
No	275	325	375	975
Total	500	500	500	1500

118.

Referring to Table 12-15, what is the expected number of shoppers who paid by check in year 1 if there was no difference in the proportion of shoppers who paid by check over the three years? ANSWER: 175 TYPE: PR DIFFICULTY: Easy KEYWORDS: chi-square test for difference in proportions, properties 119. Referring to Table 12-15, what is the expected number of shoppers who did not pay by check in year 3 if there was no difference in the proportion of shoppers who paid by check over the three years? ANSWER: 325 TYPE: PR DIFFICULTY: Easy KEYWORDS: chi-square test for difference in proportions, properties 20. Referring to Table 12-15, what is the form of the null hypothesis? a) [pic] b) [pic] c) [pic] d) [pic] ANSWER: a TYPE: MC DIFFICULTY: Easy KEYWORDS: chi-square test for difference in proportions, forms of hypothesis 121. Referring to Table 12-15, what is the form of the alternative

hypothesis? a) [pic] b) [pic] c) [pic] d) [pic] not all [pic] are the same

ANSWER: d TYPE: MC DIFFICULTY: Easy KEYWORDS: chi-square test for difference in proportions, forms of hypothesis 122. True or False: Referring to Table 12-15, the assumptions needed to perform the test are satisfied.

ANSWER:

True TYPE: TF DIFFICULTY: Moderate KEYWORDS: chi-square test for difference in proportions, assumption 123. Referring to Table 12-15, what are

the degrees of freedom of the test statistic? ANSWER: 2 TYPE: PR

DIFFICULTY: Easy KEYWORDS: chi-square test for difference in proportions, degrees of freedom 124. Referring to Table 12-15, what is the value of the

test statistic? ANSWER: 43.96 TYPE: PR DIFFICULTY: Moderate KEYWORDS:

chi-square test for difference in proportions, test statistic 125. Referring to Table 12-15, what is the critical value? ANSWER: 5.99 TYPE: PR DIFFICULTY:

Easy

KEYWORDS: chi-square test for difference in proportions, critical value 126.

Referring to Table 12-15, what is the p-value of the test statistic? ANSWER:

$2.9 \times 10^{-10}$  or smaller than 0.005 TYPE: PR DIFFICULTY: Moderate KEYWORDS:

chi-square test for difference in proportions, p-value 127. True or False:

Referring to Table 12-15, the null hypothesis cannot be rejected. ANSWER:

False TYPE: TF DIFFICULTY: Moderate KEYWORDS: chi-square test for

difference in proportions, decision 128. Referring to Table 12-15, what is the

correct conclusion? a) There is enough evidence that the proportions are all

different in the 3 years. ) There is not enough evidence that the proportions

are all different in the 3 years. c) There is enough evidence that at least two

of the proportions are not equal. d) There is not enough evidence that at least two of the proportions are not equal. ANSWER: c TYPE: MC DIFFICULTY: Moderate KEYWORDS: chi-square test for difference in proportions, conclusion 129. Referring to Table 12-15, what is the value of the critical range for the Marascuilo procedure to test for the difference in proportions between year 1 and year 2 using a 0.05 level of significance? ANSWER: 0.0754 TYPE: PR DIFFICULTY: Difficult

KEYWORDS: chi-square test for difference in proportions, Marascuilo procedure, critical value 130. Referring to Table 12-15, what is the value of the critical range for the Marascuilo procedure to test for the difference in proportions between year 1 and year 3 using a 0.05 level of significance? ANSWER: 0.0722 TYPE: PR DIFFICULTY: Difficult KEYWORDS: chi-square test for difference in proportions, Marascuilo procedure, critical range 131. Referring to Table 12-15, what is the value of the critical range for the Marascuilo procedure to test for the difference in proportions between year 2 and year 3 using a 0.05 level of significance? ANSWER: 0.0705 TYPE: PR DIFFICULTY: Difficult KEYWORDS: chi-square test for difference in proportions, Marascuilo procedure, critical value 132. True or False: Referring to Table 12-15, there is sufficient evidence to conclude that the proportions between year 1 and year 2 are different at a 0.05 level of significance. ANSWER: True TYPE: TF DIFFICULTY: Moderate KEYWORDS: chi-square test for difference in proportions, Marascuilo procedure, decision, conclusion 133.

True or False: Referring to Table 12-15, there is not sufficient evidence to conclude that the proportions between year 1 and year 3 are different at a 0.



05 level of significance. ANSWER: False TYPE: TF DIFFICULTY: Moderate  
KEYWORDS: chi-square test for difference in proportions, Marascuilo procedure, decision, conclusion 134. True or False: Referring to Table 12-15, there is sufficient evidence to conclude that the proportions between year 2 and year 3 are different at a 0.05 level of significance. ANSWER: True TYPE: TF DIFFICULTY: Moderate KEYWORDS: chi-square test for difference in proportions, Marascuilo procedure, decision conclusion