**1.**

When testing for independence in a contingency table with 3 rows and 4 columns, there are \_\_\_\_\_\_\_\_ degrees of freedom.

A) 6  
B) 7  
C) 12  
D) 5

**2.**

If we use the *χ*2 method of analysis to test for the differences among 4 proportions, the degrees of freedom are equal to:

A) 3  
B) 1  
C) 5  
D) 4

**3.**

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 *χ*2 test.  
C) both of the above  
D) none of the above

**4.**

True or False: When using the χ2 tests for independence, one should be aware that expected frequencies that are too small will lead to a too big type I error.

A) True  
B) False

**5.**

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.

A) True  
B) False

**6.**

**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.  
  
https://angel.grantham.edu/AngelUploads/QuestionData/ffa765a8-3456-4b4f-92ba-2d41a06ffcdb/JB1344J3B15434433165.jpg  
  
  
Referring to Table 12-1, which test would be used to properly analyze the data in this experiment?

A) *χ*2 test for differences between two proportions (related samples)  
B) *χ*2 test for differences between two proportions (independent samples)  
C) *χ*2 test for independence  
D) *χ*2 test for differences among more than two proportions

**7.**

**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.  
  
https://angel.grantham.edu/AngelUploads/QuestionData/aef02da6-f26c-4a63-8a10-70bdabfe43c7/JB1344J3B15434433165.jpg  
  
  
Referring to Table 12-1, the calculated test statistic is:

A) 48.1849  
B) 72.8063  
C) -0.1368  
D) -0.9991

**8.**

**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.  
  
https://angel.grantham.edu/AngelUploads/QuestionData/809c59f3-2d82-497d-b616-07e6642d5409/JB1344J3B15434433165.jpg  
  
  
Referring to Table 12-1, at 5% level of significance, the critical value of the test statistic is:

A) 5.9914  
B) 9.4877  
C) 13.2767  
D) 3.8415

**9.**

**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.  
  
https://angel.grantham.edu/AngelUploads/QuestionData/7603e551-6923-40ac-835d-451b13e7e95d/JB1344J3B15434433165.jpg  
  
  
Referring to Table 12-1, at 5% level of significance, there is sufficient evidence to conclude that

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 is associated with ethnic status in San Diego County.  
C) use of seat belts in motor vehicles depends on ethnic status in San Diego County.  
D) all of the above

**10.**

**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 for each of the 5 memory locations, along with the number of reported errors.  
  
https://angel.grantham.edu/AngelUploads/QuestionData/6645899e-b1fc-4e07-9dec-eaec3229f781/3LU56546213665134315.jpg  
  
The bank manager wanted to test whether the proportion of errors in transactions assigned to each of the 5 memory locations differ.  
  
  
Referring to Table 12-3, which test would be used to properly analyze the data in this experiment?

A) *χ*2 test of independence  
B) *χ*2 test for differences between two proportions (independent samples)  
C) *χ*2 test for the differences among more than two proportions  
D) *χ*2 test for differences between two proportions (related samples)

**11.**

**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 for each of the 5 memory locations, along with the number of reported errors.  
  
https://angel.grantham.edu/AngelUploads/QuestionData/10839540-7118-4822-a6f8-24fa2fb4aa9b/3LU56546213665134315.jpg  
  
The bank manager wanted to test whether the proportion of errors in transactions assigned to each of the 5 memory locations differ.  
  
  
Referring to Table 12-3, the degrees of freedom of the test statistic is:

A) 448  
B) 8  
C) 10  
D) 4

**12.**

**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 for each of the 5 memory locations, along with the number of reported errors.  
  
https://angel.grantham.edu/AngelUploads/QuestionData/9afe2aa0-af22-49df-9007-d580a675671c/3LU56546213665134315.jpg  
  
The bank manager wanted to test whether the proportion of errors in transactions assigned to each of the 5 memory locations differ.  
  
  
Referring to Table 12-3, the critical value of the test statistic at 1% level of significance is:

A) 20.0902  
B) 13.2767  
C) 7.7794  
D) 23.2093

**13.**

**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 for each of the 5 memory locations, along with the number of reported errors.  
  
https://angel.grantham.edu/AngelUploads/QuestionData/10c84f6b-22a0-48c9-9e1d-513c5ae8c5f8/3LU56546213665134315.jpg  
  
The bank manager wanted to test whether the proportion of errors in transactions assigned to each of the 5 memory locations differ.  
  
  
Referring to Table 12-3, the calculated value of the test statistic is:

A) 1.5190  
B) 1.4999  
C) -0.1777  
D) -0.0185

**14.**

**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 for each of the 5 memory locations, along with the number of reported errors.  
  
https://angel.grantham.edu/AngelUploads/QuestionData/76289c6d-8375-45d6-b1b9-d63b827f9b57/3LU56546213665134315.jpg  
  
The bank manager wanted to test whether the proportion of errors in transactions assigned to each of the 5 memory locations differ.  
  
  
Referring to Table 12-3, at 1% level of significance

A) 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.  
B) there is sufficient evidence to conclude that the proportions of errors in transactions assigned to each of the 5 memory locations are all different.  
C) 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.  
D) there is insufficient evidence to conclude that the proportions of errors in transactions assigned to each of the 5 memory locations are all different.

**15.**

**TABLE 12-4**  
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.  
  
  
  
  
  
Referring to Table 12-4, 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) *χ*2 test for differences between two proportions (independent samples)  
B) *χ*2 test for differences between two proportions (related samples)  
C) *χ*2 test for independence  
D) *χ*2 test for differences among more than two proportions

**16.**

**TABLE 12-4**  
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.  
  
  
  
  
  
Referring to Table 12-4, find the rejection region necessary for testing at the 0.05 level of significance whether there is a relationship between defect rate and years of experience.

A) Reject *H*0 if *χ*2 > 16.919  
B) Reject *H*0 if *χ*2 > 9.488  
C) Reject *H*0 if *χ*2 > 11.143  
D) Reject *H*0 if *χ*2 > 15.507

**17.**

**TABLE 12-4**  
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.  
  
  
  
  
  
Referring to Table 12-4, what is the expected number of employees with less than 1 year of training time and a high defect rate?

A) 4.17  
B) 9.17  
C) 5.28  
D) 4.60

**18.**

**TABLE 12-4**  
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.  
  
  
  
  
  
Referring to Table 12-4, what is the expected number of employees with 1 to 4 years of training time and a high defect rate?

A) 8.64  
B) 6.00  
C) 12.00  
D) 6.67

**19.**

**TABLE 12-4**  
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.  
  
  
  
  
  
Referring to Table 12-4, of the cell for 1 to 4 years of training time and a high defect rate, what is the contribution to the overall χ2 statistic for the independence test?

A) 0.015  
B) 0.1296  
C) 0.0144  
D) 0.36

**20.**

**TABLE 12-4**  
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.  
  
  
  
  
  
Referring to Table 12-4, 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 α = 0.05.

A) 0.074  
B) 0.055  
C) 0.045  
D) 0.080