

Multiple Choice (Questions #1-10) - Circle the answer of your choice.

1. A geneticist claims that four species of fruit flies should appear in the ratio 1:3:3:9. Suppose that a sample of 4000 flies contained 226, 764, 733, and 2277 flies of each species, respectively. At the 10% significance level, is there sufficient evidence to reject the geneticist's claim?

- (a) The test proves the geneticist's claim.
- (b) The test proves the geneticist's claim is false.
- (c) The test does not give sufficient evidence to reject the geneticist's claim.
- (d) The test gives sufficient evidence to reject the geneticist's claim.
- (e) The test is inconclusive.

2. A study was done to determine the effectiveness of varying amounts of vitamin C in reducing the number of common colds. A survey of 450 people provided the following information:

	Daily amount of vitamin C taken		
	None	500 mg	1000 mg
No colds	57	26	17
At least one cold	223	84	43

Is there evidence of a relationship between catching a cold and taking vitamin C?

- (a) The data prove that vitamin C reduces the number of common colds.
- (b) The data prove that vitamin C has no effect on the number of common colds.
- (c) There is significant evidence at the 1% significance level of a relationship between taking vitamin C and catching fewer colds.
- (d) There is significant evidence at the 10% level, but not at the 1% significance level, of a relationship between taking vitamin C and catching fewer colds.
- (e) There is not sufficient evidence at the 10% level of a relationship between taking vitamin C and catching fewer colds.

4. The following data was collected concerning food purchases at several sporting events:

		Food Purchases		
		Hot Dogs	Popcorn	No Purchase
Sport	Football	240	80	30
	Basketball	50	90	10

What would be the appropriate procedure to attempt to determine if a relationship exists between sports and food purchases?

- (a) goodness-of-fit test with 2 df
- (b) multiple 2-sample proportion tests
- (c) chi-square independence test with 2 df
- (d) chi-square independence test with 6 df
- (e) goodness-of-fit test with 6 df

5. Using the data from question #4, what is the expected number of hot dog purchases at basketball games?

- (a) 203
- (b) 50
- (c) 83.3
- (d) 87
- (e) cannot be determined

6. In the following table, what value of n results in a table showing perfect independence between gender and type of pet?

		Dog	Cat
	Girls	n	52
	Boys	35	10

- (a) 10
- (b) 17
- (c) 27
- (d) 77
- (e) 182

7. It is generally agreed that the use of the chi-squared distribution is appropriate when the:

- (a) sample size is at least 30
- (b) sample size is large enough so that all of the observed cell counts is at least 5
- (c) sample size is large enough so that all of the expected cell counts is at least 5
- (d) sample size is large enough so that at least one of the expected cell counts is at least 5
- (e) sample size is large enough so that the average of the expected cell counts is at least 5

8. A two-way table of counts is analyzed to examine the hypothesis that the row and column classifications are independent. There are 3 rows and 4 columns. The degrees of freedom for the chi-square statistic are

- (a) 12
- (b) 11
- (c) 6
- (d) The minimum of $n_1 - 1$ and $n_2 - 1$
- (e) None of the above

9. In a chi-squared goodness of fit test, suppose that 100 observations of data are organized according to 10 class intervals, the test statistic has:

- (a) 99 degrees of freedom
- (b) 97 degrees of freedom
- (c) 9 degrees of freedom
- (d) 7 degrees of freedom
- (e) the number of degrees of freedom cannot be determined without the data

10. Which of the following statements are true?

- I. The chi-squared inference procedures deal with categorical variables.
- II. The chi-squared distribution is symmetric.
- III. A chi-squared independence test on a 2X2 table has 2 degrees of freedom.

- (a) I only
- (b) I and II only
- (c) I and III only
- (d) I, II, and III
- (e) none of the above

Free Response (#11-12) - Show your work.

11. Five partners in a law firm brought in the following numbers of new clients during the past year.

Partner	Jones	Smith	Brown	Allen	Cross
Number of new clients	35	42	22	41	30

Is there sufficient evidence at the 5% or 10% level of significance that the partners do not bring in equal numbers of new clients? Show your work.

12. The following grades were earned by students in three teachers' classes.

		Grade		
		A	B	C
Teacher	Ms. C	12	24	12
	Mr. M	6	12	18
	Mr. W	15	6	3
	Total			

(a) Determine if these teachers, as a group, meet the established standard of 30% A's, 40% B's, and 30% C's?

(b) Is there evidence that the grading patterns are associated with the teacher who awards the grades?