

FREE RESPONSE.

1. An AP Statistics student noted that the probability distribution for a binomial random variable with $n = 4$ and $p = 0.3$ is approximately given by:

n	P
0	0.240
1	0.412
2	0.265
3	0.076
4	0.008

(Note: $\sum p = 1.001$ rather than 1 due to rounding.)

The student decides to test the randBin function on her TI-83/84 by putting 500 values into a list using this function ($\text{randBin}(4, 0.3, 500) \rightarrow L1$) and counting the number of each outcome. (Can you think of an efficient way to count each outcome?) She obtained

n	Observed
0	110
1	190
2	160
3	36
4	4

Do these data provide evidence that the randBin function on the calculator is correctly generating values from this distribution?

2. A chi-square test for the homogeneity of proportions is conducted on three populations and one categorical variable that has four values. Computation of the chi-square statistic yields $X^2=17.2$. Is this finding significant at the 0.01 level of significance?
3. Which of the following best describes the difference between a test for independence and a test for homogeneity of proportions? Discuss the correctness of each answer.
- A. There is no difference because they both produce the same value of the chi-square test statistic.
 - B. A test for independence has one population and two categorical variables, whereas a test for homogeneity of proportions has more than one population and only one categorical variable.
 - C. A test for homogeneity of proportions has one population and two categorical variables, whereas a test for independence has more than one population and only one categorical variable.
 - D. A test for independence uses count data when calculating chi-square and test for homogeneity uses percentages or proportions when calculating chi-square.

4. Compute the expected value for the cell that contains the frog. You are given the marginal distribution.

	D	E	F	G	Total
A					94
B					96
C					119
Total	74	69	128	38	309

5. Restaurants in two parts of a major city were compared on customer satisfaction to see if location influences customer satisfaction. A random sample of 38 patrons from the Big Steak Restaurant in the eastern part of town and another random sample of 36 patrons from the Big Steak Restaurant on the western side of town were interviewed for the study. The restaurants are under the same management, and the researcher established that they are virtually identical in terms of décor, service, menu, and food quality. The results are presented in the following table.

Patron's Ratings of Restaurants

	Excellent	Good	Fair	Poor
Eastern	10	12	11	5
Western	6	15	7	8

Do these data provide good evidence that location influences customer satisfaction?

6. A chi-square test for goodness of fit is done on a variable with 15 categories. What is the minimum value of χ^2 necessary to reject the null hypothesis at the 0.02 level of significance?
7. The number of defects from a manufacturing process by day of the week are as follows:

	Monday	Tuesday	Wednesday	Thursday	Friday
Number	36	23	26	25	40

The manufacturer is concerned that the number of defects is greater on Monday and Friday. Test at the 0.05 level of significance, the claim that the proportion of defects is the same each day of the week.

8. A study was done on opinions concerning the legalization of marijuana at Mile High College. One hundred fifty-seven respondents were randomly selected from a large pool of faculty, students, and parents at the college. Respondents were given a choice of favoring the legalization of marijuana, opposing the legalization of marijuana, or favoring making marijuana a legal but controlled substance. The results of the survey were as follows.

	Favor Legalization	Oppose Legalization	Favor Legalization with Control
Students	17	9	6
Faculty	33	40	27
Parents	5	8	12

Do these data support, at the 0.05 level, the contention that the type of respondent (student, faculty, or parent) is related to the opinion toward legalization? Is this a test of independence or a test of homogeneity of proportions?