

Practice Problems

Multiple Choice

1. Find the expected value of the cell marked with the "****" in the following 3×2 table (the bold face values are the marginal totals):

observation	observation	19
observation	****	31
observation	observation	27
45	32	77

- a. 74.60
b. 18.12
c. 12.88
d. 19.65
e. 18.70
2. A χ^2 goodness-of-fit test is performed on a random sample of 360 individuals to see if the number of birthdays each month is proportional to the number of days in the month. X^2 is determined to be 23.5. The P -value for this test is
- a. $0.001 < P < 0.005$
b. $0.02 < P < 0.025$
c. $0.025 < P < 0.05$
d. $0.01 < P < 0.02$
e. $0.05 < P < 0.10$
3. Two random samples, one of high school teachers and one of college teachers, are selected and each sample is asked about their job satisfaction. Which of the following are appropriate null and alternative hypotheses for this situation?
- a. H_0 : The proportion of each level of job satisfaction is the same for high school teachers and college teachers.
 H_A : The proportions of teachers highly satisfied with their jobs is higher for college teachers.
- b. H_0 : Teaching level and job satisfaction are independent.
 H_A : Teaching level and job satisfaction are not independent.
- c. H_0 : Teaching level and job satisfaction are related.
 H_A : Teaching level and job satisfaction are not related.
- d. H_0 : The proportion of each level of job satisfaction is the same for high school teachers and college teachers.
 H_A : Not all of the proportions of each level of job satisfaction are the same for high school teachers and college teachers.
- e. H_0 : Teaching level and job satisfaction are independent.
 H_A : Teaching level and job satisfaction are not related.

Free Response

- i) 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.

Hint \rightarrow This is a χ^2 GOF Test. Make an expected table so that all days have same count, first.

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4. The Behavioral Risk Factor Surveillance System is an ongoing health survey system that tracks health conditions and risk behaviors in the United States. In one of their studies, a random sample of 8,866 adults answered the question “Do you consume five or more servings of fruits and vegetables per day?” The data are summarized by response and by age-group in the frequency table below.

Age-Group (years)	Yes	No	Total
18–34	231	741	972
35–54	669	2,242	2,911
55 or older	1,291	3,692	4,983
Total	2,191	6,675	8,866

Do the data provide convincing statistical evidence that there is an association between age-group and whether or not a person consumes five or more servings of fruits and vegetables per day for adults in the United States?