

# **Chi-Square Tests and Non-Parametric Tests**

1. A contingency table allows us to cross-tabulate how observations are grouped between two or more different variables.

(True / False)

2. Which of the following statements is true?

- The expected frequency in chi-square test is the frequency that you would expect to observe if the population proportions of the groups were different from each other.
- Chi-squared tests can be used for testing both two-sided and one-sided hypotheses.
- Like the t-test, the chi-square test can only be used to test differences between two groups.
- The decision rule for the chi-square test is: if the chi-square test statistic is larger than the chi-square critical value, then reject the null hypothesis.

3. Identify the correct statement.

- Like the chi-square test of proportions, the chi-square test of independence can be used to assess whether two or more categorical variables are independent from each other.
- The procedure for the chi-square test of independence and the chi-square test for differences in population proportions are slightly different from each other.
- The following statement could be the alternative hypothesis in a chi-square test: the GPA of a student varies according to the faculty she is studying in.

- The expected frequency for a particular cell can be computed as the corresponding row total times the corresponding column.
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4. Which of the following statements is false?

- When the sample is highly skewed, the mean is a better measure of the center of the distribution so we prefer non-parametric tests.
  - Non-parametric tests are usually simple to carry out.
  - Non-parametric tests are less accurate than parametric tests when the assumptions of the parametric test are met.
  - Non-parametric tests involve hypotheses of the median whereas parametric tests usually involve hypotheses of the mean.
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5. Which of the following is true?

- When the alternative hypothesis states that the median is greater than a particular value, we check whether the p-value is greater than the chosen significance level and reject the null if it is.
  - We use the standard normal distribution to compute the p-value for the sign test.
  - The sign test makes use of both the location and magnitude of each datapoint in the sample.
  - For the sign test, under the null hypothesis we expect half the observations to be above the hypothesized mean and half to be below it.
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6. Match the research question with the correct type of test.

- Is there a relationship between type of car (sedan, hatchback, coupe, and SUV) and fuel efficiency (low, moderate, high) – (Sign test, Chi-square test for differences in proportions, Chi-square test for independence, Wilcoxon rank sum test)
- Is the median blood sugar level the same before and after taking a particular drug? – (Sign test, Chi-square test for differences in proportions, Chi-square test for independence, Wilcoxon rank sum test)
- Is the median test score the same for girls and boys? – (Sign test, Chi-square test for differences in proportions, Chi-square test for independence, Wilcoxon rank sum test)
- Is the proportion of cellphone owners the same across all age groups (young, middle aged, elderly) – (Sign test, Chi-square test for differences in proportions, Chi-square test for independence, Wilcoxon rank sum test)