StatisticsSolutions
Advancement Through Clarity

Chi-Square Goodness of Fit Test

The Chi-Square Goodness of Fit Test is a non-parametric test that is used to determine whether the observed frequency of a given phenomenon differs from the expected frequency. In the chi-square goodness of fit test, the expected frequency can also be considered a probability distribution.

Therefore, chi-square goodness of fit test examines how well theoretical (or **EXPECTED**) distributions fit the empirical (or **OBSERVED**) distribution.

Procedure for Chi-Square Goodness of Fit Test:
(1) Set up the Null and Alternative Hypothesis for a chi-square goodness of fit test:

Null hypothesis: In a Chi-Square goodness of fit test, the null hypothesis predicts that the observed frequency will not differ from the expected frequency.

Alternative hypothesis: In a Chi-Square goodness of fit test, the alternative hypothesis predicts that the observed frequency will differ from the expected frequency.

(2) Calculate the value of Chi-Square goodness of fit test using the following formula:

$$\chi^2 = \left[\frac{(O-E)^2}{E}\right]$$ Where, χ^2 = Chi-Square goodness of fit test O = observed value E = expected value

(3) Assess the value of the test statistic. Chi-Square goodness of fit tests work the same as other statistical tests, such as a *t*-test, ANOVA, and the like. The calculated chi-square goodness of fit value is compared with a critical value available in a chi-square probability table.

If the value of the chi-square goodness of fit test that we calculated is **GREATER than the critical value in the chi-square probability table**, we reject the null hypothesis and conclude that there is a significant difference between the observed and the expected frequency.

If the value of the chi-square goodness of fit test that we calculated is **LESS than the critical value in the chi-square probability table**, we accept the null hypothesis and conclude that there is no significant difference between the observed and expected frequency.