

11.9: Formula Review

11.2 Facts About the Chi-Square Distribution

$X^2 = (Z_1)^2 + (Z_2)^2 + \dots (Z_{df})^2$ chi-square distribution random variable

$\mu_{X^2} = df$ chi-square distribution population mean

$\sigma_{X^2} = \sqrt{2(df)}$ Chi-Square distribution population standard deviation

11.3 Test of a Single Variance

$\chi^2 = \frac{(n-1)s^2}{\sigma_0^2}$ Test of a single variance statistic where:

n : sample size

s : sample standard deviation

σ_0 : hypothesized value of the population standard deviation

$df = n - 1$ Degrees of freedom

Test of a Single Variance

- Use the test to determine variation.
- The degrees of freedom is the number of samples -1 .
- The test statistic is $\frac{(n-1)s^2}{\sigma_0^2}$, where n = sample size, s^2 = sample variance, and σ^2 = population variance.
- The test may be left-, right-, or two-tailed.

11.4 Goodness-of-Fit Test

$\sum_k \frac{(O - E)^2}{E}$ goodness-of-fit test statistic where:

O : observed values

E : expected values

k : number of different data cells or categories

$df = k - 1$ degrees of freedom

11.5 Test of Independence

Test of Independence

- The number of degrees of freedom is equal to (number of columns - 1)(number of rows - 1).
- The test statistic is $\sum_{i,j} \frac{(O - E)^2}{E}$ where O = observed values, E = expected values, i = the number of rows in the table, and j = the number of columns in the table.
- If the null hypothesis is true, the expected number $E = \frac{(\text{row total})(\text{column total})}{\text{total surveyed}}$.

11.6 Test for Homogeneity.

$\sum_{i,j} \frac{(O - E)^2}{E}$ Homogeneity test statistic where: O = observed values

E = expected values

i = number of rows in data contingency table

j = number of columns in data contingency table

$df = (i - 1)(j - 1)$ Degrees of freedom

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