11.10: Formula Review

11.2 Facts About the Chi-Square Distribution

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

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

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

11.3 Test of a Single Variance

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

- n : sample sizes: 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 $\dfrac{(n-1)s^2}{\sigma_0^2}$, where $n =$ sample size, $s^2 =$ sample variance, and $\sigma^2 =$ population variance.
- The test may be left-, right-, or two-tailed.

11.4 Goodness-of-Fit Test

$\sum_k \dfrac{(O-E)^2}{E}$ 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 $\sum_{i \cdot j} \dfrac{(O-E)^2}{E}$ 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 $E = \dfrac{(\text{row total})(\text{column total})}{\text{total surveyed}}$.

11.6 Test for Homogeneity.

$\sum_{i \cdot j} \dfrac{(O-E)^2}{E}$ 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