

Chi square

- Chi-square formula: $\chi^2 = \sum \frac{(O - E)^2}{E}$

- Chi-square formula:

- Goodness of fit: $df = \text{categories} - 1$
- Homogeneity: $df = (r - 1)(c - 1)$
- Independence: $df = (r - 1)(c - 1)$

- Chi-square expected counts for homogeneity/ independence:

$$E = \frac{(\text{row total})(\text{column total})}{\text{table total}}$$

- Interpretation:

A larger χ^2 value provides more evidence against H_0 .

- Chi-square conditions:

- Random sample
- Large counts: all expected counts are at least 5

Linear regression

- Linear regression t-test for slope:

$$t = \frac{b - \beta_0}{SE_b} \quad df = n - 2$$

- Confidence interval for slope:

$$b \pm t^* \cdot SE_b$$

- Standard error of the slope:

$$SE_b = \frac{s}{\sqrt{\sum (x_i - \bar{x})^2}}$$

- Conditions for inference on slope:

- Linear pattern in scatterplot
- Roughly normal
- Residuals independent
- Constant variance