

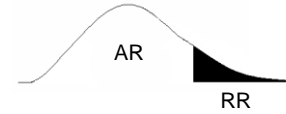
# CHI-SQUARE $\chi^2$ (Chapter 11)

**CHI-SQUARE TEST FOR GOODNESS OF FIT** (section 11.1, pages 591 – 596 only)  
 (Use when checking if data follows a given pattern or distribution)

1. **H<sub>0</sub>**: Data follows claimed distribution  
**H<sub>1</sub>**: Data does not follow claimed distribution (always right tailed)

2. **Alpha Level**: Use given alpha, use  $\alpha = .05$  as default.

3. **Critical Value**: from Table G (p. 785),  $df = \# \text{ categories} - 1$



4. **Test Value**:  $tv = \sum \frac{(O - E)^2}{E}$  where  $\begin{cases} O = \text{observed value} \\ E = \text{expected value} \end{cases}$

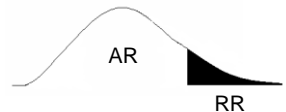
5. **Decision**: Reject  $H_0$  if  $tv > \text{critical value}$ ; do not reject  $H_0$  if  $tv \leq \text{critical value}$ .

**CHI-SQUARE TEST FOR INDEPENDENCE** (section 11.2)  
 (Use when checking a table to see if the row variable is independent of the column variable)

1. **H<sub>0</sub>**: Row variable and column variable are independent  
**H<sub>1</sub>**: Row variable and column variable are dependent (always right tailed)

2. **Alpha Level**: Use given alpha, use  $\alpha = .05$  as default

3. **Critical Value**: from Table G,  $df = (\# \text{ rows} - 1) \times (\# \text{ cols} - 1)$



4. **Test Value**:

A. Find row totals, column totals and grand total

B. **Expected value** for a given cell =  $\frac{\text{row total} \times \text{column total}}{\text{grand total}}$

C. **Test Value**:  $tv = \sum \frac{(O - E)^2}{E}$  where  $\begin{cases} O = \text{observed value} \\ E = \text{expected value} \end{cases}$

5. **Decision**: Reject  $H_0$  if  $tv > \text{critical value}$ ; Do not reject  $H_0$  if  $tv \leq \text{critical value}$ .

**CHI-SQUARE TEST FOR HOMOGENEITY OF PROPORTIONS** (section 11.2)  
 (Use when data in table is based on yes/no choice or claim is related to a series of proportions)

1. **H<sub>0</sub>**:  $p_1 = p_2 = \dots = p_n$   
**H<sub>1</sub>**: At least one population proportion is different from the others (always right tailed)

2. – 5. Same as Test for Independence above