**Chap 11: Analysis of Variance (F test)**

* **One-way ANOVA/ ANOVA: A single Factor**

1. **Assumptions:**

Populations are normally distributed.  
Populations have equal variances.  
Samples are randomly and independently selected.

MS: Mean Square SS: Sum of Squares df: degrees of freedom

| **1** | **Hypotheses of One-Way ANOVA** |  |
| --- | --- | --- |
| **2** | **Compute test statistic** | Diagram  Description automatically generated |
| **3** | **Identify critical values** | : significance level  Numerator d.f = df1 =  Denominator d.f = df2 = |
| **4** | **Decision** | 🡪 Reject  🡪 Fail to reject |

1. **One-way ANOVA Summary Table**

Graphical user interface, text, application

Description automatically generated

* **Two-way ANOVA**

1. **Assumptions:**

Populations are normally distributed.  
Populations have equal variances.  
Samples are randomly and independently selected.

| **Hypotheses of Two-Way ANOVA** | **: There is no difference in means by factor A.**  **: There is a difference in mean by factor A.** | **: There is no difference in means by factor B.**  **: There is a difference in means by factor B.** | **: There is no interaction effect in means.**  **:**  **There is an interaction effect between factor A and factor B in means.** |
| --- | --- | --- | --- |
| **Compute**  **test statistic** |  |  |  |
| **Identify**  **critical values** | A picture containing diagram  Description automatically generated | A picture containing diagram  Description automatically generated | A picture containing diagram  Description automatically generated |
| **Decision** | 🡪 Reject  🡪 Fail to reject | 🡪 Reject  🡪 Fail to reject | 🡪 Reject  🡪 Fail to reject |

1. **Two-Way ANOVA Sources of Variation**Chart, diagram

   Description automatically generated with medium confidence

Two Factors of interest: A and B

r = number of levels of factor A.

c = number of levels of factor B.

n’ = number of replications for each cell.

n = total number of observations in all cells n = (r)(c)(n’).

Xijk = value of the kth observation of level i of factor A and level j of factor B.

1. **Two-way ANOVA Summary Table**

Graphical user interface, table

Description automatically generated