Multiple Means

Parameters: $\mu_1, \mu_2, \dots, \mu_k$
Point estimates: $\bar{x}_1, \bar{x}_2, \dots, \bar{x}_k$

Confidence Interval does not apply

Conditions for Distributional Approximation (Assuming H_0)

1. observations are independent within and across groups
2. Data within each group is normal or samples sizes large
3. Variability across the groups is about equal

Hypotheses

$H_0: \mu_1 = \mu_2 = \dots = \mu_k$

H_a: At least one μ_i is different $[i \in \{1, 2, \dots, k\}]$

Test Statistic Random Variable (Assuming H_0)

$$F = \frac{MSG}{MSE} = \frac{\frac{1}{k-1}\sum_j n_j (\bar{X}_j - \bar{X})^2}{\frac{1}{n_{total} - k}\sum_{ij} (X_{ij} - \bar{X}_j)^2} \sim F(df_1 = k-1, df_2 = n_{total} - k)$$

($\bar{X}$: overall mean; (Fisher's))

Observed Test Statistic

f_{obs} = the same as F but with random variables replaced with observed values

P-value

$P(F \geq f_{obs})$