One-way independent sample ANOVA test

- is a F-test where the test statistic follows an F-dist with $k-1$ and $n-k$ degrees of freedom.
- is always a right-tailed test. So we reject H_0 if $F_{obs} > F_{\alpha,k-1,n-k}$.

Parametric one-way ANOVA has the following conditions:

(i) k independent random samples drawn from k (sub-) populations.

(ii) variable of interest is quantitative and continuous.

(iii) measurement scale is interval or ratio.

(iv) each (sub-) population is normally distributed.

(v) ... and has the same variance.

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- is always a right-tailed test. So we reject H_0 if $F_{obs} > F_{\alpha,k-1,n-k}$.
- the test statistic is calculated as:

$$F_{obs} = \frac{s_0^2}{s_p^2} = \frac{MST}{MSE} = \frac{SST/(k-1)}{SSE/(n-k)}$$

where

$$SST = \sum_{j=1}^{k} n_j(\bar{x}_j - \bar{x})^2; \quad SSE = \sum_{j=1}^{k}\sum_{i=1}^{n_j}(x_{ij} - \bar{x}_j)^2; \quad SS = \sum_{j=1}^{k}\sum_{i=1}^{n_j}(x_{ij} - \bar{x})^2; \quad SS = SST + SSE$$

where k is the number of groups, n is the total number of observations, n_j is the number of observations in group j, $\bar{x}_j$ is the mean of group j, and $\bar{x}$ is the overall mean.

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Kruskal-Wallis test

- is a generalisation of the Wilcoxon-rank sum test to two or more (sub-) populations.
- is a one-way ANOVA test for the equality of $k \geq 2$ (sub-) population medians.
- used generally when the normality of the data cannot be assumed.

Assumptions of Kruskal-Wallis test:

(i) k independent random samples drawn from k (sub-) populations.

(ii) the variable of interest is quantitative and continuous.

(iii) the measurement scale is at least ordinal.

(iv) the (sub-) populations have the same shape (distribution), and differ at most in central location (median).