1 samples

Asymmetric data?

Sign-test

- Calculate sign of differences from reference median
- Calculate probability P from Binomial distribution with $p = 0.5$
- Reject H_0 if $P < \alpha$

Wilcoxon Sign-rank test

- Calculate sign of differences from reference median
- Calculate ranks, r_i
- Multiply ranks by their sign
- Calculate rank sums and select minimum
- Get W_{crit} from table
- Reject H_0 if $W < W_{crit}$

2 samples

Mann-Whitney U-test

- Calculate the sum ranks for each group (W)
- Calculate U-statistic for each group

n<8

- Get U_{crit} from table
- Reject H_0 if $\min(U_1, U_2) < U_{crit}$

$$\mu_U = \frac{n_1 n_2}{2}$$

$$\sigma_U^2 = \frac{n_1 n_2 (n_1 + n_2 + 1)}{12}$$

$$Z_i = \frac{U_i - \mu_U + c_i}{\sigma_U}$$

- Calculate p using Φ
- Reject H_0 if $p < \alpha$

>2 samples

Kruskall-Wallis

- Calculate the sum ranks for each group

$$H = -3(N+1) + \frac{12}{N(N+1)} \sum_{i=1}^{k} \frac{W_i^2}{J_i}$$

- Calculate p value from χ^2 distribution with $\nu = I - 1$
- Reject H_0 if $p < \alpha$