

APPENDIX IV: Test for the difference of two population means.

On the basis of the independent samples from two normal populations having a common but unspecified variance, to the hypothesis (H_0) that the difference between the means $\delta = \mu_1 - \mu_2$ has a specified value δ_0 ,

$$H_0 : \delta = \delta_0$$

the procedure is to reject H_0 against alternatives $H : \delta > \delta_0$,
at the level of significance α if

$$T = \frac{|\bar{X}_1 - \bar{X}_2|}{\sqrt{\frac{S_1^2 + S_2^2}{n_1 + n_2 - 2} \times \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}} > t_{2\nu}(\alpha)$$

where $\nu = n_1 + n_2 - 2$ (degrees of freedom)

$$S_1^2 = \sum (X_{i1} - \bar{X}_1)^2 \text{ where } \bar{X}_1 = \sum_{i_1=1}^{n_1} X_{i_1} / n_1$$

$$\text{and } S_2^2 = \sum (X_{i_2} - \bar{X}_2)^2 \text{ where } \bar{X}_2 = \sum_{i_2=1}^{n_2} X_{i_2} / n_2$$