$$H_0 : T_j = 0, \forall j$$

Normal Equations

$$\sum_{i=1}^{n}\sum_{j=1}^{k} X_{ij} = \sum_{i=1}^{n}\sum_{j=1}^{k} m + \sum_{i=1}^{n}\sum_{j=1}^{k} t_j = nkm + n\sum_{j=1}^{n} t_j \text{, but} \sum_{j=1}^{k} t_j = 0$$

$$\text{so} \sum_{i=1}^{n}\sum_{j=1}^{k} X_{ij} = nkm$$

$$\sum_{i=1}^{n} X_{ij} = \sum_{i=1}^{n} m + \sum_{i=1}^{n} t_j = nm + nt_j$$

m is the least squares estimate of

t_j is the least squares estimate of T_j

$$SS_r(m, t_j) = m\sum_{i=1}^{n}\sum_{j=1}^{k} X_{ij} + \sum_{j=1}^{n} t_j \sum_{i=1}^{n} X_{ij}$$

Assuming H_0 is True, the model is :

$$X_{ij} = \mu + \varepsilon_{ij}$$

$$SS_r(m') = m'\sum_{i=1}^{n}\sum_{j=1}^{k} X_{ij}$$

Between Treatments : $SS_r(m, t_j) - SS_r(m')$

$$SS_e = \sum_{i=1}^{n}\sum_{j=1}^{k} X_{ij}^2 - SS_r(m, t_j)$$

Test Statistic is : $F_{k-1,(n-1)k} = \dfrac{SS_t / (k-1)}{SS_e / ((n-1)k)}$