STAT 705 Test 1 Formula Sheet

$$Y_{i\cdot} = \sum_{j=1}^{n_i} Y_{ij}, \quad \bar{Y}_{i\cdot} = \frac{Y_{i\cdot}}{n_i}, \quad Y_{\cdot\cdot} = \sum_{i=1}^{r}\sum_{j=1}^{n_i} Y_{ij}, \quad \bar{Y}_{\cdot\cdot} = \frac{Y_{\cdot\cdot}}{n_T}$$

$$SSTO = \sum_i \sum_j (Y_{ij} - \bar{Y}_{\cdot\cdot})^2$$

$$SSTR = \sum_i n_i (\bar{Y}_{i\cdot} - \bar{Y}_{\cdot\cdot})^2 \qquad MSTR = \frac{SSTR}{r-1}$$

$$SSE = \sum_i \sum_j (Y_{ij} - \bar{Y}_{i\cdot})^2 \qquad MSE = \frac{SSE}{n_T - r}$$

$$\Delta = \max(\mu_i) - \min(\mu_i)$$

$$\bar{Y}_{i\cdot} \pm t_{(1-\alpha/2,\, n_T - r)} \sqrt{\frac{MSE}{n_i}}$$

$$(\bar{Y}_{i\cdot} - \bar{Y}_{i'\cdot}) \pm t_{(1-\alpha/2,\, n_T - r)} \sqrt{MSE\left(\frac{1}{n_i} + \frac{1}{n_{i'}}\right)}$$

$$\hat{L} \pm t_{(1-\alpha/2,\, n_T - r)} \sqrt{MSE \sum_i \frac{c_i^2}{n_i}}$$

where $L = c_1\mu_1 + c_2\mu_2 + \cdots + c_r\mu_r$

$$(\bar{Y}_{i\cdot} - \bar{Y}_{i'\cdot}) \pm T \sqrt{MSE\left(\frac{1}{n_i} + \frac{1}{n_{i'}}\right)}, \qquad T = \frac{1}{\sqrt{2}} q_{(1-\alpha,\, r,\, n_T - r)}$$

$$q^* = \frac{\sqrt{2}\,|\bar{Y}_{i\cdot} - \bar{Y}_{i'\cdot}|}{\sqrt{MSE\left(\frac{1}{n_i} + \frac{1}{n_{i'}}\right)}}$$

$$\hat{L}_1 \pm t_{(1-\frac{\alpha}{2g};\, n_T - r)}\left[s(\hat{L}_1)\right]$$

$$\vdots$$

$$\hat{L}_g \pm t_{(1-\alpha/2g;\, n_T - r)}\left[s(\hat{L}_g)\right]$$

$$r_{ij} = \frac{e_{ij}}{\sqrt{\frac{MSE(n_i - 1)}{n_i}}}$$

STAT 705 – Test 1 Formula Sheet

Two-Factor ANOVA formulas (balanced data)

$$SSTO = \sum_i \sum_j \sum_k (Y_{ijk} - \bar{Y}_{...})^2$$

$$SSTR = n \sum_i \sum_j (\bar{Y}_{ij.} - \bar{Y}_{...})^2$$

$$SSE = \sum_i \sum_j \sum_k (Y_{ijk} - \bar{Y}_{ij.})^2$$

$$SSA = nb \sum_i (\bar{Y}_{i..} - \bar{Y}_{...})^2 \quad , \quad SSAB = SSTR - SSA - SSB$$

$$SSB = na \sum_j (\bar{Y}_{.j.} - \bar{Y}_{...})^2$$