

# STAT 705 - Test 2 Formula Sheet

Two-Factor ANOVA Formulas: (balanced data)

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

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

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

$$SSA = nb \sum_i (\bar{Y}_{i..} - \bar{Y}_{...})^2$$

$$SSAB = SSTR - SSA - SSB$$

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

"Least squares" means:

$$\hat{\mu}_{i.} = \frac{\sum_j \bar{Y}_{ij.}}{b}, \quad \hat{\mu}_{.j} = \frac{\sum_i \bar{Y}_{ij.}}{a}$$

$$ICC = \frac{\sigma_{\mu}^2}{\sigma_y^2} = \frac{\sigma_{\mu}^2}{\sigma_{\mu}^2 + \sigma^2} \quad \text{in the random-effects ANOVA model.}$$

CI's in the random-effects model:

$$100(1-\alpha)\% \text{ CI for } \mu_{.} \text{ is: } \bar{Y}_{..} \pm t_{(1-\alpha/2; r-1)} \sqrt{\frac{MSTR}{rn}}$$

$$100(1-\alpha)\% \text{ CI for } \sigma^2 \text{ is: } \left( \frac{r(n-1)MSE}{\chi^2_{[1-\alpha/2; r(n-1)]}}, \frac{r(n-1)MSE}{\chi^2_{[\alpha/2; r(n-1)]}} \right)$$

ANOVA formulas for RCBD:

$$SSBL = r \sum_i (\bar{Y}_{i.} - \bar{Y}_{..})^2$$

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

$$SSBL, TR = \sum e_{ij}^2 \quad \text{where } e_{ij} = Y_{ij} - \hat{Y}_{ij} \\ = Y_{ij} - [\bar{Y}_{i.} + \bar{Y}_{.j} - \bar{Y}_{..}]$$

Repeated Measures:

$$\omega = \sigma_p^2 / \sigma_y^2 = \sigma_p^2 / [\sigma_p^2 + \sigma^2]$$