STA402S98 Formula Sheet for Test 2

$E[g(Y) \mid X=x] = \sum_y g(y) f_{Y|X}(y|x) = \sum_y g(y) \frac{P(Y = y \cap X = x)}{P(X = x)}$ (Treat these as definitions)

$E[g(Y)] = E[E[g(Y) \mid X=x]] = \sum_x E[g(Y) \mid X=x] f_X(x)$

$E[Y \mid A=i] = \sum_{j=1}^{b} E[Y \mid A=i \cap B=j] P(B=j \mid A=i) = \sum_{j=1}^{b} \mu_{i,j} P(B=j \mid A=i)$

For the multiple linear regression model $\mathbf{Y} = \mathbf{X}\boldsymbol{\beta} + \boldsymbol{\varepsilon}$, $\mathbf{X}$ (nxp) known constant, $\boldsymbol{\beta}$ (px1) unknown constant, $\boldsymbol{\varepsilon}$ (nx1) error random vector, we are often interested in testing H_0: $\mathbf{C}\boldsymbol{\beta} = \mathbf{0}$, where $\mathbf{C}$ is an sxp matrix of rank $s \leq p$.

For a single-factor design, $L = \sum_{i=1}^{r} c_i \mu_i$; $\hat{L} = \sum_{i=1}^{r} c_i \bar{Y}_{i\bullet}$; $s\{\hat{L}\} = \sqrt{MSE \sum_{i=1}^{r} \frac{c_i^2}{n_i}}$

Bonferroni: $\hat{L} \pm B\, s\{\hat{L}\}$, $\quad B = t(1 - \frac{\alpha}{2g}; n_T - r)$

Scheffé: $\hat{L} \pm S\, s\{\hat{L}\}$, $\quad S = \sqrt{(r-1) F(1-\alpha; r-1, n_T - r)}$

For two–factor ANOVA model with factors A (a levels) and B (b levels),

$Y_{ijk} = \mu_{..} + \alpha_i + \beta_j + (\alpha\beta)_{ij} + \varepsilon_{ijk} = \mu_{ij} + \varepsilon_{ijk}$, where ε_{ijk} are independent $N(0,\sigma^2)$

$\mu_{.j} = \frac{\sum_{i=1}^{a} \mu_{ij}}{a}$, $\mu_{i.} = \frac{\sum_{j=1}^{b} \mu_{ij}}{b}$, $\mu_{..} = \frac{\sum_{i=1}^{a} \mu_{i\bullet}}{a} = \frac{\sum_{j=1}^{b} \mu_{\bullet j}}{b}$

$\alpha_i = \mu_{i.} - \mu_{..}$, $\beta_j = \mu_{.j} - \mu_{..}$, $(\alpha\beta)_{ij} = \mu_{ij} - (\mu_{..} + \alpha_i + \beta_j)$

When all cell sample sizes = n,

$Y_{ij.} = \sum_{k=1}^{n} Y_{ijk}$; $Y_{i..} = \sum_{j=1}^{b} \sum_{k=1}^{n} Y_{ijk}$; $Y_{...} = \sum_{i=1}^{a} \sum_{j=1}^{b} \sum_{k=1}^{n} Y_{ijk}$

$\bar{Y}_{ij.} = Y_{ij.}/n$; $\bar{Y}_{i..} = Y_{i..}/(bn)$; $\bar{Y}_{.j.} = Y_{.j.}/(an)$; $\bar{Y}_{...} = Y_{...}/(abn)$