BIOLOGY 300 Formulas for Midterm and Final— RETURN WITH EXAM

$$\chi^2 = \sum_i \frac{(|f_i - \hat{f}_i| - 0.5)^2}{\hat{f}_i} \qquad \chi^2 = \sum_i \sum_j \frac{(|f_{ij} - \hat{f}_{ij}| - 0.5)^2}{\hat{f}_{ij}} \qquad G = 2\sum_i f_i \ln \frac{f_i}{\hat{f}_i} \qquad P(X) = \frac{e^{-\mu}\mu^X}{X!}$$

$$P(X) = \frac{n!}{X!(n-X)!}\, p^X q^{n-X} \qquad \hat{p} \pm (t_{\alpha(2),\infty} s_{\hat{p}} + \frac{1}{2n}) \qquad s_{\hat{p}} = \sqrt{\frac{\hat{p}\hat{q}}{n-1}}$$

$$\chi^2 = \frac{\nu s^2}{\sigma_o^2} \qquad \frac{\nu s^2}{\chi^2_{\alpha/2,\nu}} \leq \sigma^2 \leq \frac{\nu s^2}{\chi^2_{1-\alpha/2,\nu}} \qquad \frac{1}{F_{\alpha(2),\nu_1\nu_2}} \frac{s_1^2}{s_2^2} \leq \frac{\sigma_1^2}{\sigma_2^2} \leq \frac{s_1^2}{s_2^2} F_{\alpha(2),\nu_2\nu_1}$$

$$\bar{X} \pm t_{\alpha(2),\nu} s_{\bar{X}} \qquad \bar{X}_1 - \bar{X}_2 \pm t_{\alpha(2),\nu} s_{\bar{X}_1 - \bar{X}_2} \qquad s_{\bar{X}_1 - \bar{X}_2} = \sqrt{\frac{s_{\mathrm{p}}^2}{n_1} + \frac{s_{\mathrm{p}}^2}{n_2}} \qquad s_{\bar{X}_1 - \bar{X}_2} = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

$$U = n_1 n_2 + \frac{n_1(n_1+1)}{2} - R_1 \qquad U' = n_1 n_2 - U \qquad \mu_U = \frac{n_1 n_2}{2} \qquad \sigma_U = \sqrt{\frac{n_1 n_2 (n_1 + n_2 + 1)}{12}} \qquad Z = \frac{|U - \mu_U| - 0.5}{\sigma_U}$$

$$SS_{\text{error}} = \sum_i \sum_j (X_{ij} - \bar{X}_i)^2 = \sum_i \nu_i s_i^2 \qquad df_{\text{error}} = N - k \qquad SS_{\text{group}} = \sum_i n_i (\bar{X}_i - \bar{X})^2 \qquad df_{\text{group}} = k - 1$$

$$SS_{\text{total}} = \sum_i \sum_j (X_{ij} - \bar{X})^2 = SS_{\text{error}} + SS_{\text{group}} \qquad H = \frac{12}{N(N+1)} \sum_i \frac{R_i^2}{n_i} - 3(N+1)$$

$$q = \frac{\bar{X}_B - \bar{X}_A}{\mathrm{SE}} \qquad \mathrm{SE} = \sqrt{\frac{\mathrm{MS}_{\text{error}}}{2}\left(\frac{1}{n_A} + \frac{1}{n_B}\right)} \qquad b = \frac{\sum xy}{\sum x^2} \qquad SS_{\text{total}} = \sum_i (Y_i - \bar{Y})^2 = \sum y^2 \qquad r^2 = \frac{SS_{\text{regression}}}{SS_{\text{total}}}$$

$$SS_{\text{regression}} = \sum (\hat{Y}_i - \bar{Y})^2 = \frac{\left(\sum xy\right)^2}{\sum x^2} = b \sum xy \qquad SS_{\text{residual}} = \sum (Y_i - \hat{Y}_i)^2 \qquad df_{\text{regression}} = 1 \qquad df_{\text{residual}} = n - 2$$

$$s_b = \sqrt{\frac{\mathrm{MS}_{\text{residual}}}{\sum x^2}} \qquad s_{\hat{Y}_i} = \sqrt{\mathrm{MS}_{\text{residual}}\left[\frac{1}{n} + \frac{(X_i - \bar{X})^2}{\sum x^2}\right]} \qquad (s_{\hat{Y}_i})_1 = \sqrt{\mathrm{MS}_{\text{residual}}\left[1 + \frac{1}{n} + \frac{(X_i - \bar{X})^2}{\sum x^2}\right]}$$

$$\sum xy = \sum XY - \frac{\sum X \sum Y}{n} \qquad r = \frac{\sum xy}{\sqrt{\sum x^2 \sum y^2}} = b\,\frac{s_X}{s_Y} \qquad s_r = \sqrt{\frac{1 - r^2}{n-2}} \qquad t = \frac{r}{s_r}$$

$$z = 0.5 \ln\left(\frac{1+r}{1-r}\right) = \tanh^{-1}(r) \qquad r = \frac{e^{2z} - 1}{e^{2z} + 1} = \tanh(z) \qquad \sigma_z = \sqrt{\frac{1}{n-3}} \qquad Z = \frac{z - \zeta_o}{\sigma_z} \qquad r_s = 1 - \frac{6 \sum d_i^2}{n^3 - n}$$