

Economics 310 Spring 2004
Equations and formulas for Final Exam

$$\bar{x} = \frac{\sum_{i=1}^n x_i}{n} \quad s^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1} = \frac{\sum_{i=1}^n x_i^2 - \frac{(\sum_{i=1}^n x_i)^2}{n}}{n-1}$$

$$\binom{N}{n} = \frac{N!}{n!(N-n)!} \text{ where } N! = (N)(N-1)(N-2)\dots(2)(1)$$

$P(L_1 \cap L_2) = P(L_1)P(L_2)$ if L_1 and L_2 are independent

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$

$$\sigma_{\bar{x}} = \sigma / \sqrt{n}$$

$$\sigma_{\hat{p}} = \sqrt{\frac{pq}{n}}$$

$$z\text{-score} = \frac{\bar{x} - \mu}{\sigma_{\bar{x}}}$$

$$\bar{x} \pm z_{\alpha/2} \sigma_{\bar{x}}$$

$$\hat{p} \pm z_{\alpha/2} \sigma_{\hat{p}} \text{ where } \sigma_{\hat{p}} = \sqrt{\frac{pq}{n}}$$

$$\bar{x} \pm t_{\alpha/2, s_{\bar{x}}} \text{ where } s_{\bar{x}} = s / \sqrt{n}$$

$$\tilde{p} = \frac{x+2}{n+4}$$

$$n = \frac{(z_{\alpha/2})^2 \sigma^2}{B^2}$$

$$n = \frac{(z_{\alpha/2})^2 pq}{B^2}$$

$$z = \frac{\hat{\theta} - \theta_0}{\sigma_{\hat{\theta}}} \text{ where for parameter } \theta = \mu, \sigma_{\bar{x}} = \sigma / \sqrt{n}, \text{ and for parameter } \theta = p, \sigma_{\hat{p}} = \sqrt{\frac{p_0 q_0}{n}}$$

$$t = \frac{\bar{x} - \mu_0}{s / \sqrt{n}}$$

Power = 1-β

$$\chi^2 = \frac{(n-1)s^2}{\sigma^2}$$

$$\sigma_{(\bar{x}_1 - \bar{x}_2)} = \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}} \approx \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

$$\text{or } \sigma_{(\bar{x}_1 - \bar{x}_2)} \approx \sqrt{s_p^2 \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}$$

$$\text{where } s_p^2 = \frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}$$

$$\sigma_{\bar{x}_D} = \frac{\sigma_D}{\sqrt{n_D}} \approx \frac{s_D}{\sqrt{n_D}}$$

$$\sigma_{(\hat{\beta}_1 - \hat{\beta}_2)} = \sqrt{\frac{p_1 q_1}{n_1} + \frac{p_2 q_2}{n_2}} \approx \sqrt{\frac{\hat{p}_1 \hat{q}_1}{n_1} + \frac{\hat{p}_2 \hat{q}_2}{n_2}} \quad \text{or} \approx \sqrt{\hat{p} \hat{q} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}; \hat{p} = \frac{x_1 + x_2}{n_1 + n_2}$$

$$n_1 = n_2 = \frac{(z_{\alpha/2})^2 (\sigma_1^2 + \sigma_2^2)}{B^2} \quad n_1 = n_2 = \frac{(z_{\alpha/2})^2 (p_1 q_1 + p_2 q_2)}{B^2}$$

$$F = \frac{\text{larger } s^2}{\text{smaller } s^2} \quad \text{or} \quad F = \frac{s_1^2}{s_2^2}$$

$$\hat{y} = \hat{\beta}_0 + \hat{\beta}_1 x \quad \hat{\beta}_1 = \frac{SS_{xy}}{SS_{xx}}, \hat{\beta}_0 = \bar{y} - \hat{\beta}_1 \bar{x}$$

$$SS_{xy} = \sum (x_i - \bar{x})(y_i - \bar{y}) = \sum x_i y_i - \frac{\sum x_i \sum y_i}{n}$$

$$SS_{xx} = \sum (x_i - \bar{x})^2 = \sum x_i^2 - \frac{(\sum x_i)^2}{n} \quad SS_{yy} = \sum (y_i - \bar{y})^2 = \sum y_i^2 - \frac{(\sum y_i)^2}{n}$$

$$s^2 = \frac{SSE}{n - (k + 1)} \quad SSE = \sum (y_i - \hat{y}_i)^2 = SS_{yy} - \hat{\beta}_1 SS_{xy} \quad s_{\hat{\beta}_1} = \frac{s}{\sqrt{SS_{xx}}}$$

$$\hat{\beta}_i \pm t_{\alpha/2} s_{\hat{\beta}_i} \quad r = \frac{SS_{xy}}{\sqrt{SS_{xx} SS_{yy}}} \quad R^2 = \frac{SS_{yy} - SSE}{SS_{yy}}$$

$$\hat{y} \pm t_{\alpha/2} s \sqrt{\frac{1}{n} + \frac{(x_p - \bar{x})^2}{SS_{xx}}} \quad \hat{y} \pm t_{\alpha/2} s \sqrt{1 + \frac{1}{n} + \frac{(x_p - \bar{x})^2}{SS_{xx}}} \quad t = \frac{\hat{\beta}_i - 0}{s_{\hat{\beta}_i}}$$

$$R_a^2 = 1 - \left[\frac{(n-1)}{n - (k+1)} \right] (1 - R^2)$$

$$F = \frac{(SS_{yy} - SSE) / k}{SSE / [n - (k + 1)]} = \frac{\text{MeanSquare}(\text{Model})}{\text{MeanSquare}(\text{Error})}$$

$$E(y) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 \quad E(y) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_1 x_2 \quad E(y) = \beta_0 + \beta_1 x + \beta_2 x^2$$