

EXAM 3 FORMULA SHEET

$$\bar{x} = (\sum x_i)/n \quad s^2 = \{1/(n-1)\}[\sum x_i^2 - (1/n)(\sum x_i)^2] \quad s^2_{\text{pool}} = [(n_1-1)s^2_1 + (n_2-1)s^2_2] / (n_1+n_2-2)$$

$$\bar{d} = (\sum d_i)/n \quad s^2_d = \{1/(n-1)\}[\sum d_i^2 - (1/n)(\sum d_i)^2]$$

$$\bar{p} = x/n \quad \bar{p}_{\text{pool}} = (x_1 + x_2) / (n_1 + n_2)$$

Inference on $\mu_1 - \mu_2$, Unknown σ s, Indep.Samples (You don't need to know this df formula for the exam!)

$$t_{\text{stat}} = [(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)_0] / \sqrt{[(s^2_1/n_1) + (s^2_2/n_2)]}$$

$$\text{C.I.: } (\bar{x}_1 - \bar{x}_2) \pm t_{\alpha/2, \text{df}} \sqrt{[(s^2_1/n_1) + (s^2_2/n_2)]}$$

Inference on $\mu_1 - \mu_2$, Unknown σ s, Indep. Samples, $\sigma^2_1 = \sigma^2_2$ Assumption

$$t_{\text{stat}} = [(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)_0] / \sqrt{[(s^2_{\text{pool}}/n_1) + (s^2_{\text{pool}}/n_2)]}$$

$$\text{C.I.: } (\bar{x}_1 - \bar{x}_2) \pm t_{\alpha/2, n_1+n_2-2} \sqrt{[(s^2_{\text{pool}}/n_1) + (s^2_{\text{pool}}/n_2)]}$$

Inference on $\mu_1 - \mu_2$, Unknown σ s, Dep.Samples ($\mu_1 - \mu_2 = \mu_d$)

$$t_{\text{stat}} = (\bar{d} - \mu_{d,0}) / (s_d/\sqrt{n})$$

$$\text{C.I.: } \bar{d} \pm t_{\alpha/2, n-1} (s_d/\sqrt{n})$$

Inference on $p_1 - p_2$, Large Indep.Samples, $(p_1 - p_2)_0 = 0$

$$Z_{\text{stat}} = [(\bar{p}_1 - \bar{p}_2) - 0] / \sqrt{[\bar{p}_{\text{pool}}(1 - \bar{p}_{\text{pool}})/n_1] + [\bar{p}_{\text{pool}}(1 - \bar{p}_{\text{pool}})/n_2]}$$

$$\text{C.I.: } (\bar{p}_1 - \bar{p}_2) \pm Z_{\alpha/2} \sqrt{[\bar{p}_1(1 - \bar{p}_1)/n_1] + [\bar{p}_2(1 - \bar{p}_2)/n_2]}$$

Inference on $p_1 - p_2$, Large Indep.Samples, $(p_1 - p_2)_0 \neq 0$

$$Z_{\text{stat}} = [(\bar{p}_1 - \bar{p}_2) - (p_1 - p_2)_0] / \sqrt{[\bar{p}_1(1 - \bar{p}_1)/n_1] + [\bar{p}_2(1 - \bar{p}_2)/n_2]}$$

$$\text{C.I.: } (\bar{p}_1 - \bar{p}_2) \pm Z_{\alpha/2} \sqrt{[\bar{p}_1(1 - \bar{p}_1)/n_1] + [\bar{p}_2(1 - \bar{p}_2)/n_2]}$$

$$\bar{x} = \sum x_i/n \quad \bar{y} = \sum y_i/n \quad SS_{xx} = \sum x_i^2 - (1/n)(\sum x_i)^2 = \sum (x_i - \bar{x})^2$$

$$SS_{yy} = \sum y_i^2 - (1/n)(\sum y_i)^2 = \sum (y_i - \bar{y})^2 \quad SS_{xy} = \sum x_i y_i - (1/n)(\sum x_i)(\sum y_i) = \sum [(x_i - \bar{x})(y_i - \bar{y})]$$

$$b_1 = SS_{xy}/SS_{xx} \quad b_0 = \bar{y} - b_1 \bar{x} \quad \hat{y} = b_0 + b_1 x$$

$$\text{df}_{\text{Reg}} = 1 \quad SSR = b_1 * SS_{xy} = \sum (\hat{y}_i - \bar{y})^2 \quad MSR = SSR/\text{df}_{\text{Reg}}$$

$$\text{df}_{\text{Err}} = n - 2 \quad SSE = SST - SSR = \sum (y_i - \hat{y}_i)^2 \quad MSE = SSE/\text{df}_{\text{Err}} = s^2_e$$

$$\text{df}_{\text{Tot}} = n - 1 \quad SST = SS_{yy} = \sum (y_i - \bar{y})^2$$

$$r^2 = SSR/SST \quad r = \star \sqrt{r^2} \quad \text{Global } F_{\text{stat}} = MSR/MSE$$

$$s_{b1} = \sqrt{[MSE/SS_{xx}]} \quad \text{C.I. for } \beta_1: b_1 \pm t_{\alpha/2, n-2} * s_{b1} \quad t_{\text{stat}} = [b_1 - 0] / s_{b1}$$

$$s_{\hat{y}} = \sqrt{[MSE\{1/n + (x_0 - \bar{x})^2/SS_{xx}\}]} \quad \text{C.I. for the mean of } y \text{ given } x=x_0: \hat{y} \pm t_{\alpha/2, n-2} * s_{\hat{y}}$$

$$s_{\text{ind}} = \sqrt{[MSE\{1 + 1/n + (x_0 - \bar{x})^2/SS_{xx}\}]} = \sqrt{[MSE + (s_{\hat{y}})^2]} \text{ for the same } x_0$$

$$\text{P.I. for an individual } y \text{ given } x=x_0: \hat{y} \pm t_{\alpha/2, n-2} * s_{\text{ind}}$$