## Correlation and Regression Formulas (rev 4_15)

Equation of a line $\qquad y = \hat{\beta}_0 + \hat{\beta}_1 x$

where $\hat{\beta}_1 = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sum_{i=1}^{n}(x_i - \bar{x})^2}$ or $\hat{\beta}_1 = \frac{\sum_{i=1}^{n} x_i y_i - n\bar{x}\bar{y}}{\sum_{i=1}^{n} x_i^2 - n\bar{x}^2}$ $\qquad \hat{\beta}_0 = \bar{y} - \hat{\beta}_1 \bar{x}$

$$r = \frac{\sum_{i=1}^{n}(x_i - \bar{x})\,(y_i - \bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i - \bar{x})^2}\sqrt{\sum_{i=1}^{n} y_i - \bar{y})^2}} \qquad r = \frac{\sum x_i y_i - \frac{\left(\sum x_i\right)\left(\sum y_i\right)}{n}}{\sqrt{\left(\sum x_i^2 - \frac{\left(\sum x_i\right)^2}{n}\right)\left(\sum y_i^2 - \frac{\left(\sum y_i\right)^2}{n}\right)}}$$

<u>ANOVA</u>

$SSE = \sum_{i=1}^{n}(y_i - \hat{y})^2$ with $v$=n-2

$SST = \sum_{i=1}^{n}(y_i - \bar{y})^2$ with $v$=n-1

$SSR = SST - SSE$ with $v$=1

MS = SS/v $\qquad F_0 = \frac{MS_{regression}}{MS_{error}}$ $\qquad$ reject if $F_0 > F_{\alpha,1,n-2}$

$$r^2 = \frac{SSR}{SST}$$