

# 1 Measures of Center

Mean

$$\bar{x} = \frac{\sum_{i=1}^N x_i}{N}$$

# 2 Measures of Spread

Deviation

$$Dev_{\bar{x}} = (x_i - \bar{x})$$

$$Dev_{\bar{x}}^2 = (x_i - \bar{x})^2$$

Variance

$$Var(X) = \frac{\sum_{i=1}^N Dev_{\bar{x}}^2}{N} = \frac{\sum_{i=1}^N (x_i - \bar{x})^2}{N}$$

Standard Deviation

$$StdDev(X) = \sqrt{Var(X)}$$

# 3 Measures of Association

Covariance

$$Cov(X, Y) = \frac{\sum_{i=1}^N Dev_{\bar{x}} Dev_{\bar{y}}}{N}$$

Correlation

$$Corr(X, Y) = \frac{Cov(Y, X)}{(StdDev(X) StdDev(Y))}$$

Regression Equation

$$Y = \alpha + \beta X + \epsilon$$

$$\beta = \frac{Cov(X, Y)}{Var(X)} = Corr(X, Y) \frac{StdDev(Y)}{StdDev(X)}$$

$$\alpha = \bar{y} - \beta \bar{x}$$