Product-Moment Correlation Coefficient

$$r = \frac{\sum(xy)}{\sqrt{(\sum x^2)(\sum y^2)}}$$

$r = \ product - moment\ correlation\ coefficient$
$x = first\ set\ of\ data$
$y = second\ set\ of\ data$

Population Correlation Coefficient

$$\rho = \frac{1}{N} * \sum\{\left[\frac{(X_i - \mu_X)}{\sigma_X}\right] * \left[\frac{(Y_i - \mu_Y)}{\sigma_Y}\right]\}$$

$\rho = \ population\ correlation\ coefficient$
$N = population\ size$
$X_i = the\ ith\ element\ of\ the\ first\ population$
$Y_i = the\ ith\ element\ of\ the\ second\ population$
$\mu_X = mean\ of\ the\ first\ population$
$\mu_Y = mean\ of\ the\ second\ population$
$\sigma_X = the\ standard\ deviation\ of\ the\ first\ population$
$\sigma_Y = the\ standard\ deviation\ of\ the\ second\ population$

Sample Correlation Coefficient

$$r = \left[\frac{1}{(n-1)}\right] * \sum\{\left(\frac{x_i - \bar{x}}{s_x}\right) * \left(\frac{y_i - \bar{y}}{s_y}\right)\}$$

$r = \ sample\ correlation\ coefficient$
$n = sample\ size$
$x_i = the\ ith\ element\ of\ the\ first\ sample$
$y_i = the\ ith\ element\ of\ the\ second\ sample$
$\bar{x} = mean\ of\ the\ first\ sample$
$\bar{y} = mean\ of\ the\ second\ sample$
$s_x = first\ sample's\ standard\ deviation$
$s_y = second\ sample'sstandard\ deviation$

Population Regression Line

$$Y = B_0 + B_1 X$$

$Y = \ value\ of\ the\ dependent\ variable$
$B_0 = a\ constant$

$B_1 = regression\ coefficient$
$X = value\ of\ the\ independent\ variable$

Estimate of Population Regression Line

$$\hat{y} = b_0 + b_1 x$$

$\hat{y} = predicted\ value\ of\ the\ dependent\ variable$
$b_0 = a\ constant$
$b_1 = regression\ coefficient$
$x = value\ of\ the\ independent\ variable$

Regression Coefficient

$$b_1 = \frac{\sum[(x_i - \bar{x})(y_i - \bar{y})]}{\sum[(x_i - \bar{x})^2]}$$

$b_1 = regression\ coefficient$
$\Sigma = summation$
$x_i = the\ ith\ element\ of\ the\ first\ sample$
$y_i = the\ ith\ element\ of\ the\ second\ sample$
$\bar{x} = mean\ of\ the\ first\ sample$
$\bar{y} = mean\ of\ the\ second\ sample$

Constant in the Regression Equation

$$b_0 = \bar{y} - b_1 * \bar{x}$$

$b_0 = constant$
$\bar{y} = mean\ of\ sample\ y$
$b_1 = regression\ coefficient$
$\bar{x} = mean\ of\ sample\ x$

Coefficient of Determination

$$R^2 = \left\{\left(\frac{1}{N}\right) * \frac{\sum[(x_i - \bar{x}) * (y_i - \bar{y})]}{\sigma_x * \sigma_y}\right\}^2$$

$R^2 = the\ coefficient\ of\ determination$
$N = population\ size$
$\bar{x} = mean\ of\ the\ first\ sample$
$\bar{y} = mean\ of\ the\ second\ sample$
$x_i = the\ ith\ element\ of\ the\ first\ sample$

$$y_i = the\ ith\ element\ of\ the\ second\ sample$$

Standard Deviation of Population X

$$\sigma_x = \sqrt{\frac{\sum(x_i - \bar{x})^2}{N}}$$

$\sigma_x = the\ standard\ deviation\ of\ the\ first\ sample$
$\bar{x} = mean\ of\ sample\ x$
$N = population\ size$
$x_i = the\ ith\ element\ of\ the\ first\ sample$

Residual

$e = y - \hat{y}$
$e = residual$
$y = observed\ value$
$\hat{y} = predicted\ value$

Exponential Model

$\log(y) = b_0 + b_1 x$
$\log = \log \text{base } 10$
$y = \text{dependent variable}$
$b_0 = \text{constant}$
$b_1 = regression\ coefficient$
$x = independent\ variable$

Quadratic Model

$$\sqrt{y} = b_0 + b_1 x$$

$y = \text{dependent variable}$
$b_0 = \text{constant}$
$b_1 = regression\ coefficient$
$x = independent\ variable$

Reciprocal Model

$$\frac{1}{y} = b_0 + b_1 x$$

$y = \text{dependent variable}$

$b_0 = $ constant
$b_1 = regression\ coefficient$
$x = independent\ variable$

Logarithmic Model

$$y = b_0 + b_1 \log(x)$$

$\log$ = log base 10
y = dependent variable
$b_0 = $ constant
$b_1 = regression\ coefficient$
$x = independent\ variable$

Power Model

$$\log(y) = b_0 + b_1 \log(x)$$

$\log$ = log base 10
y = dependent variable
$b_0 = $ constant
$b_1 = regression\ coefficient$
$x = independent\ variable$

$$SE = s_{b1} = \frac{\sqrt{\frac{\sum(y_i - \hat{y}_i)^2}{n-2}}}{\sqrt{\sum(x_i - \bar{x})^2}}$$

$SE = standard\ error$
$s_{b1} = standard\ deviation\ of\ b1$
$\bar{x} = mean\ of\ sample\ x$
$\hat{y} = predicted\ value$
$x_i = the\ ith\ element\ of\ the\ first\ sample$
$y_i = the\ ith\ element\ of\ the\ second\ sample$

Standard Error

$$t = \frac{b_1}{SE}$$

$b_1 = regression\ coefficient$
$SE = standard\ error$

$$t = test\ statistic\ for\ t\ norms$$

Degrees of Freedom (Linear Regression)

$$DF = n - 2$$

$$DF = degrees\ of\ freedom,$$
$$n = sample\ size$$