

12.4: Chapter 12 Formulas

$SS_{xx} = (n - 1)s_{rx}^2$ $SS_{yy} = (n - 1)s_{ry}^2$ $SS_{xy} = \sum(xy) - n \cdot \bar{x} \cdot \bar{y}$	Correlation Coefficient $r = \frac{SS_{xy}}{\sqrt{(SS_{xx} \cdot SS_{yy})}}$
Correlation t-test $H_0 : \rho = 0$ $H_1 : \rho \neq 0$ $t = r \sqrt{\left(\frac{n-2}{1-r^2}\right)}$ $df = n - 2$	Regression Equation (Line of Best Fit) $\hat{y} = b_0 + b_1x$
Slope $b_1 = \frac{SS_{xy}}{SS_{xx}}$	y-Intercept $b_0 = \bar{y} - b_1\bar{x}$
Slope t-test $H_0 : \beta_1 = 0$ $H_1 : \beta_1 \neq 0$ $t = \frac{b_1}{\sqrt{\left(\frac{MSE}{SS_{xx}}\right)}}$ $df = n - p - 1 = n - 2$	Slope/Model F-test $H_0 : \beta_1 = 0$ $H_1 : \beta_1 \neq 0$
Standard Error of Estimate $s_{est} = \sqrt{\frac{\sum(y_i - \hat{y}_i)^2}{n-2}} = \sqrt{MSE}$	Residual $e_i = y_i - \hat{y}_i$
Prediction Interval $\hat{y} \pm t_{\alpha/2} \cdot s_{est} \sqrt{\left(1 + \frac{1}{n} + \frac{(x - \bar{x})^2}{SS_{xx}}\right)}$	Coefficient of Determination $R^2 = (r)^2 = \frac{SSR}{SST}$
Multiple Linear Regression Equation $\hat{y} = b_0 + b_1x_1 + b_2x_2 + \dots + b_px_p$	Model F-Test for Multiple Regression $H_0 : \beta_1 = \beta_2 = \dots = \beta_p = 0$ $H_1 : \text{At least one slope is not zero.}$
Adjusted Coefficient of Determination $R_{adj}^2 = 1 - \left(\frac{(1-R^2)(n-1)}{(n-p-1)}\right)$	

Source	SS = Sum of Squares	df	MS = Mean Square	F
Regression	$SSR = \frac{(SS_{xy})^2}{SS_{xx}}$	p	$MSR = \frac{SSR}{p}$	$F = \frac{MSR}{MSE}$
Error	$SSE = SS_{yy} - SSR$	$n - p - 1$	$MSE = \frac{SSE}{n - p - 1}$	
Total	$SST = SS_{yy}$	$n - 1$		

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