

1 Basic Calculations

1.1 Data:

$X_i :$

$\bar{X} :$

$Y_i :$

$\bar{Y} :$

1.2 Squares and Cross-products, $\Sigma x^2, \Sigma y^2, \Sigma xy$

$\Sigma x^2 = \Sigma (X_i - \bar{X})^2 =$

machine formula: $\Sigma x^2 = \Sigma X_i^2 - (\Sigma \bar{X}^2) / n$

$\Sigma y^2 = \Sigma (Y_i - \bar{Y})^2 =$

$\Sigma xy = \Sigma (X_i - \bar{X})(Y_i - \bar{Y}) =$

2 Regression Parameter Estimates

2.1 Regression coefficient (b)

$b = \frac{\Sigma xy}{\Sigma x^2} = \frac{\Sigma (X_i - \bar{X})(Y_i - \bar{Y})}{\Sigma (X_i - \bar{X})^2} =$

2.2 Y intercept (a):

$a = \bar{Y} - b\bar{X} =$

2.3 Coefficient of determination (r^2):

$r^2 = \frac{\text{regression SS}}{\text{total SS}} = \frac{(\Sigma xy)^2 / \Sigma x^2}{\Sigma y^2} =$

3 Testing significance of Regression Coefficient

3.1 Hypotheses: $H_0: \beta = 0$ $H_A: \beta \neq 0$

3.2 Testing H_0 using ANOVA

Source of Var.	SS	DF	MS
Total $[Y_i - \bar{Y}]$	Σy^2	n-1	
Reg. $[\hat{Y}_i - \bar{Y}]$	$(\Sigma xy)^2 / \Sigma x^2$	1	reg.SS / reg.DF
Resid. $[Y_i - \hat{Y}_i]$	total SS - reg.SS	n-2	resid.SS / resid.DF

$F_{calc} = \frac{\text{regression MS}}{\text{residual MS}} =$

critical value: $F_{\alpha(1),v_1,v_2} = F_{\alpha(1),1,n-2} =$

Statistical Conclusion:

3.3 Testing H_0 using t -test

$$b = \quad \quad \quad \beta_0 =$$

$$s_{Y.X}^2 = \text{residual MS} =$$

$$s_b = \sqrt{\frac{s_{Y.X}^2}{\sum x^2}}$$

$$t = \frac{b - \beta_0}{s_b}$$

$$\text{critical value: } t_{\alpha(2), n-2} =$$

Statistical Conclusion:

Word Conclusion:

3.4 Confidence interval for Regression Coefficient:

$$b \pm t_{\alpha(2), (n-2)} s_b =$$