

# Example for Exam 1

Country	GDP per capita (x)	Total Fertility Rate (y)	X <sup>2</sup>	Y <sup>2</sup>	XY
Argentina	18.6	2.25	345.96	5.06	41.85
Bolivia	5.5	2.80	30.25	7.84	15.40
Brazil	12.1	1.79	146.41	3.20	21.66
Chile	19.1	1.84	364.81	3.39	35.14
Columbia	11.1	2.07	123.21	4.28	22.98
Ecuador	10.6	2.29	112.36	5.24	24.27
Paraguay	6.8	1.96	46.24	3.84	13.33
Peru	11.1	2.22	123.21	4.93	24.64
Uruguay	16.6	1.84	275.56	3.39	30.54
Venezuela	13.6	2.35	184.96	5.52	31.96

$$\Sigma x = 125.1 \quad \Sigma y = 21.41 \quad \Sigma x^2 = 1752.97 \quad \Sigma y^2 = 46.70 \quad \Sigma xy = 261.78$$

$$SS_{xx} = \Sigma x^2 - \frac{(\Sigma x)^2}{n} = 1752.97 - \frac{(125.1)^2}{10} = 1752.97 - \frac{15650.01}{10}$$

$$= 1752.97 - 1565.001 = \boxed{187.9}$$

$$SS_{yy} = \Sigma y^2 - \frac{(\Sigma y)^2}{n} = 46.70 - \frac{(21.41)^2}{10} = 46.70 - \frac{458.39}{10}$$

$$= 46.70 - 45.84 = \boxed{0.86}$$

$$SS_{xy} = \Sigma xy - \frac{(\Sigma x)(\Sigma y)}{n} = 261.78 - \frac{(125.1)(21.41)}{10} = 261.78 - \frac{2678.39}{10}$$

$$= 261.78 - 267.84 = \boxed{-6.06}$$

$$r = \frac{SS_{xy}}{\sqrt{SS_{xx} \cdot SS_{yy}}} = \frac{-6.06}{\sqrt{(187.9)(0.86)}} = \frac{-6.06}{\sqrt{161.594}} = \frac{-6.06}{12.71} = \boxed{-0.47}$$

$$b_1 = \frac{SS_{xy}}{SS_{xx}} = \frac{-6.06}{187.9} = \boxed{-0.032}$$

$$\hat{y} = 2.541 - 0.032x$$

$$b_0 = \frac{\Sigma y}{n} - b_1 \cdot \frac{\Sigma x}{n} = \frac{21.41}{10} - (-0.032) \cdot \frac{125.1}{10} = 2.141 - (-0.032) \cdot 12.51$$

$$= 2.141 - (-0.4) = 2.141 + 0.4 = \boxed{2.541}$$