Forecasting Problem 2 Solution

Example Problem Solution
Building Products Store

Quarter	Building Permits, x	Lumber Sales (1,000s of bd ft), y
1	8	12.6
2	12	16.3
3	7	9.3
4	9	11.5
5	15	18.1
6	6	7.6
7	5	6.2
8	8	14.2
9	10	15.0
10	12	17.8

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SUMMARY OUTPUT

Regression Statistics

Multiple R	0.925475
R Square	0.856503
Adjusted R Square	0.838566
Standard Error	1.67644
Observations	10

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	134.2004	134.2004	47.75045	0.000123
Residual	8	22.48362	2.810453		
Total	9	156.684			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	1.340654	1.74928	0.766404	0.465447	-2.69319	5.3745	-2.69319	5.3745
Permits	1.252103	0.181197	6.91017	0.000123	0.834262	1.669944	0.834262	1.669944

Example Problem Solution
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Step 1: Compute Components of Linear Regression Equation

$$\bar{x} = \frac{92}{10} = 92$$

$$\bar{y} = \frac{128.6}{10} = 12.86$$

$$b = \frac{\sum xy - n\bar{x}\bar{y}}{\sum x^2 - n\bar{x}^2} = \frac{(1{,}290.3) - (10)(9.2)(12.86)}{(932) - (10)(9.2)^2} = 1.25$$

$$a = \bar{y} - b\bar{x} = 12.86 - (1.25)(9.2) = 1.36$$

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Step 2: Develop the Linear regression equation

$$y = a + bx, \quad y = 1.36 + 1.25x$$

Step 3: Compute the Correlation Coefficient

$$r = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{\sqrt{[\, n\Sigma x^2 - (\Sigma x)^2 \,][\, n\Sigma y^2 - (\Sigma y)^2 \,]}}$$

$$r = \frac{(10)(1{,}170.3) - (92)(128.6)}{\sqrt{[(10)(932) - (92^2)][(10)(1{,}810.48) - (128.6)^2]}} = 0.925$$

Step 4: Calculate the forecast for x = 10 permits

$$Y = a + bx = 1.36 + 1.25(10) = 13.86 \text{ or } 1{,}386 \text{ board ft}$$