Straight-Line Fit (Least Squares) and Prediction

Least-squares straight line y = a + b x through up to eight points, with the coefficient of determination R^2 and the predicted y at a chosen x.

Method: Ordinary least squares y = a + bx

Input parameters

Unit system: SI

Parameter	Value	Unit
Number of points used	5.0000	
Point 1: x	20.000	
Point 1: y	41.500	
Point 2: x	40.000	
Point 2: y	61.000	
Point 3: x	60.000	
Point 3: y	82.300	
Point 4: x	80.000	
Point 4: y	99.800	
Point 5: x	100.00	
Point 5: y	121.00	
Point 6: x	0	
Point 6: y	0	
Point 7: x	0	
Point 7: y	0	
Point 8: x	0	
Point 8: y	0	
x for prediction	70.000	

Calculated results

Parameter	Value	Unit
Slope	0.98900	
Intercept	21.780	
Coefficient of determination	99.928	%
Predicted y at x_0	91.010	

Formula and method

$$b = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2}, \quad a = \bar{y} - b\bar{x}, \quad R^2 = \frac{S_{xy}^2}{S_{xx} S_{yy}}$$

Variables

n	Number of points used	-
x_1	Point 1: x	-
y_1	Point 1: y	-
x_2	Point 2: x	-

y_2	Point 2: y	-
x_3	Point 3: x	-
y_3	Point 3: y	-
x_4	Point 4: x	-
y_4	Point 4: y	-
x_5	Point 5: x	-
y_5	Point 5: y	-
x_6	Point 6: x	-
y_6	Point 6: y	-
x_7	Point 7: x	-
y_7	Point 7: y	-
x_8	Point 8: x	-
y_8	Point 8: y	-
x_0	x for prediction	-
b	Slope	-
a	Intercept	-
R^2	Coefficient of determination	-
$\widehat{y}$	Predicted y at x_0	-

Method and standards

Least squares.

Assumptions and limits

- Errors in y only. Extrapolation beyond the data and the trivial two-point fit are flagged.

References

- Ordinary least squares y = a + bx

Report details

Report reference	FCC-G7Y9-T0VG (the same inputs always give the same reference)
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Calculator	Straight-Line Fit (Least Squares) and Prediction
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Release checks	2 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/general/geometry/linear-regression

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Reopens the calculator with the inputs of this report.