



## Interpolation - Straight Line

The process of constructing a mathematical data point within a range of known data points

Experimental data

Raw data variables

(Independent variables)

(dependent variables)

<code>data :=</code>	<code>1 0.5</code>	<code>x<sub>i</sub> := col(data, 1) =</code>	<code>1</code>	<code>y<sub>d</sub> := col(data, 2) =</code>	<code>0.5</code>
	<code>2 1.7</code>		<code>2</code>		<code>1.7</code>
	<code>3 3.4</code>		<code>3</code>		<code>3.4</code>
	<code>4 5.7</code>		<code>4</code>		<code>5.7</code>
	<code>5 8.4</code>		<code>5</code>		<code>8.4</code>
	<code>6 9.8</code>		<code>6</code>		<code>9.8</code>
	<code>7 11.8</code>		<code>7</code>		<code>11.8</code>
	<code>8 13.8</code>		<code>8</code>		<code>13.8</code>
	<code>9 15.8</code>		<code>9</code>		<code>15.8</code>
	<code>10 17.8</code>		<code>10</code>		<code>17.8</code>

Total number of data points `n := length(xi) = 10`

Known data points for x: `x0 := 1` `x1 := 10`

Known data points for y: `y0 := 0.5` `y1 := 17.8`

Using known data points the value of y can be found for any value of x:

`x2 := 8.935`

$$y := y_0 \cdot \left(1 - \frac{x_2 - x_0}{x_1 - x_0}\right) + y_1 \cdot \left(\frac{x_2 - x_0}{x_1 - x_0}\right) = 15.752833$$

Interpolation can also be used to find the slope and intercept of the line:

Slope of the line: `m :=  $\frac{y_1 - y_0}{x_1 - x_0} = 1.9222$`

Intercept of slope at y: `c := x0 · m - y0 = 1.422222`

Check with straight line equation: `y := m · x2 - c = 15.752833`

`f(x) := m · x - c`

