Direct (Vandermonde) Method of Interpolation
Linear Interpolation

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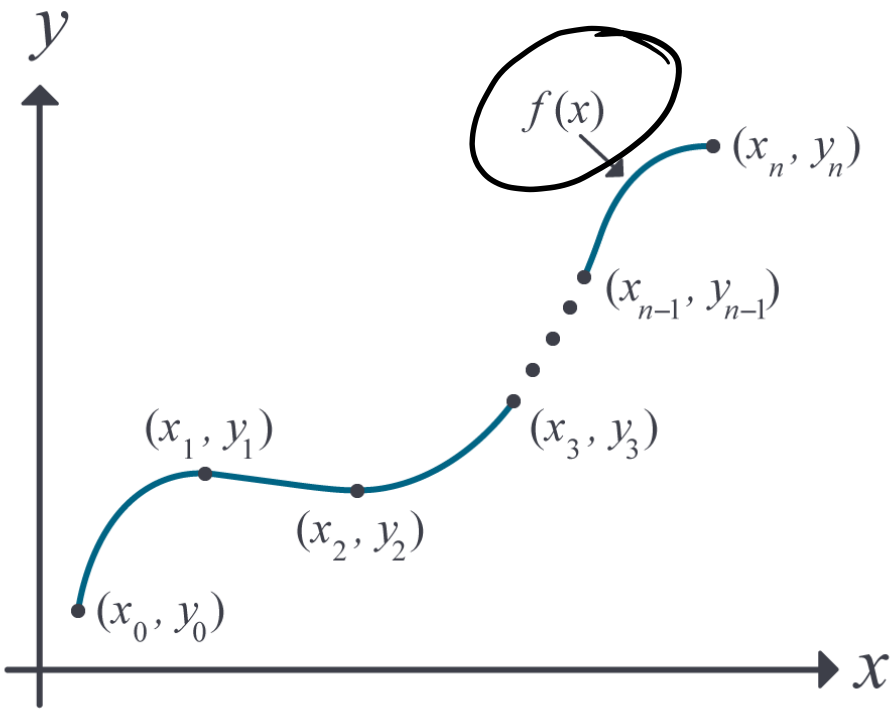
- Click on Direct Method of Interpolation

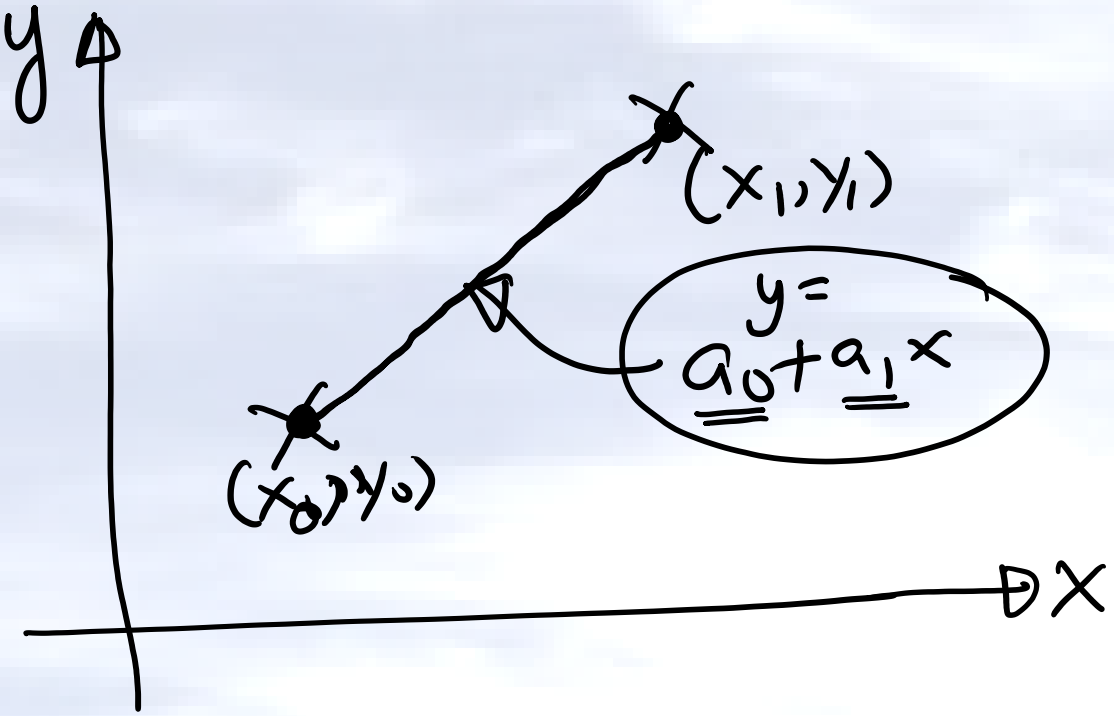
General order direct (Vandermonde) method of interpolation



n+1 data points

p_n

Linear Interpolation



Example of direct (Vandermonde) method of interpolation

The upward velocity of a rocket is given as a function of time.

t (s)	$v(t)$ (m/s)
0	0
10	227.04
15	362.78
20	517.35
22.5	602.97
30	901.67

Estimate the velocity at t=16 seconds using the direct method of interpolation with a first-order polynomial.

$$v(t) = a_0 + a_1 t, \quad 15 \le t \le 20$$

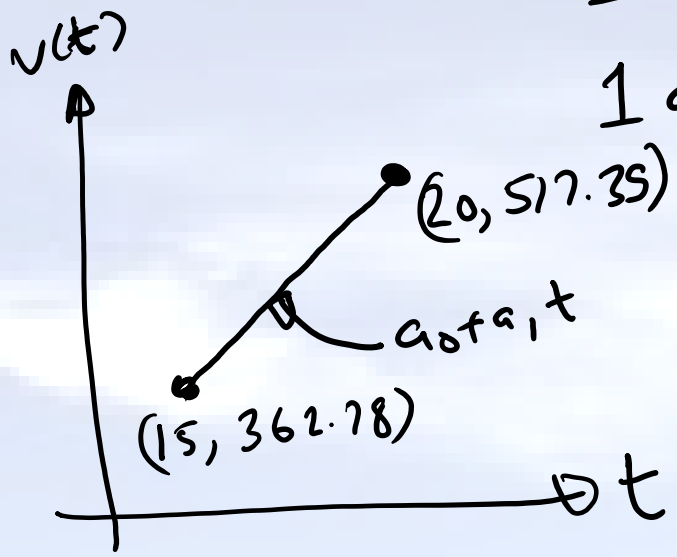
$$v(15) = 362.78, \quad v(20) = 517.35$$

$$v(15) = a_0 + a_1(15) = 362.78 \quad \text{—— ①}$$

$$v(20) = a_0 + a_1(20) = 517.35 \quad \text{—— ②}$$

$$1a_0 + 15a_1 = 362.78$$

$$1a_0 + 20a_1 = 517.35$$



$$\begin{bmatrix} 1 & 15 \\ 1 & 20 \end{bmatrix} \begin{bmatrix} a_0 \\ a_1 \end{bmatrix} = \begin{bmatrix} 362.78 \\ 517.35 \end{bmatrix}$$

$$a_0 = -100.93$$

$$a_1 = 30.941$$

$$v(t) = a_0 + a_1 t, \quad 15 \le t \le 20$$

$$= -100.93 + 30.941t, \quad 15 \le t \le 20$$

$$v(16) = -100.93 + 30.941(16)$$

$$= 393.7 \text{ m/s}.$$

END

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