Lagrange interpolation

This method like the polynomial fit uses n^{th} order polynomial but uses a smarter way of writing the polynomial that avoids the computation of the inverse

EXAMPLE

Given the following data

x	0	1	2
y	2	0	4

Generate a polynomial fit to the data using Lagrange interpolation.

Solution :

$$y = b_0 (\underline{x-1})(\underline{x-2}) + b_1 (x-0)(x-2) + b_2 (x-0)(x-1)$$

x	0	1	2
y	2	0	4

$$y = b_0 (x-1)(x-2) + b_1 (x-0)(x-2) + b_2 (x-0)(x-1)$$

Substituting

$x=0 ; y=2$

$$2 = b_0 (0-1)(0-2) + 0 + 0 \Rightarrow \boxed{b_0 = 1}$$

$x=1 ; y=0$

$$0 = b_1 (1-0)(1-2) \Rightarrow \boxed{b_1 = 0}$$

$x=2 ; y=4$

$$4 = b_2 (2-0)(2-1) \Rightarrow \boxed{b_2 = 2}$$

$$y = 1(x-1)(x-2) + 0 + 2(x-0)(x-1)$$

$$= x^2 - 3x + 2 + 2x^2 - 2x$$

$$\boxed{y = 3x^2 - 5x + 2}$$

y = 3x^2-5x+2