$$f(x_i, x_i, x_n) = \frac{f[x_i, x_j] - f[x_j, x_n]}{x_i - x_0}$$

Ejercicio

x	f(x)
1	0
4	1.386294
5	1.609438
6	1.791752

Calcula f(2) interpolación en lineal, cuadrática y cúbica

Lineal $f_1(x) = \frac{f(x_1) - f(x_0)}{x_1 - x_0}(x - x_0) + f(x_0)$

$$f_1(2) = \frac{1.386294 - 0}{4 - 1}(2 - 1) + 0$$

$$f_1(2) = 0.1162098$$

Cuadrática

$$f_2(x) = b_0 + b_1(x - x_0) + b_2(x - x_0)(x - x_1)$$

$$b_0 = f(x_0) = 0$$

$$b_1 = \frac{f(x_1) - f(x_0)}{x_1 - x_0} = \frac{1.386294 - 0}{4 - 1} = 0.462098$$

$$b_2 = \frac{\frac{f(x_2) - f(x_1)}{x_2 - x_1} - \frac{f(x_1) - f(x_0)}{x_1 - x_0}}{} = \frac{\frac{1.6094 - 1.3862}{5 - 4} - \frac{1.386294}{4 - 1}}{}$$

$$b_2 = \frac{0.223144 - 0.462098}{4} = -0.059738$$

$f_2(x) = 0 + 0.462098(2-1) + (-0.0597385)(2-1)(2-4)$

$f_2(2) = 0 + 0.462098 + 0.119477 = 0.581575$

Cubica

$f_3(x) = b_0 + b_1(x-x_0) + b_2(x-x_0)(x-x_1) + b_3(x-x_0)(x-x_1)(x-x_2)$

$$f_3(x_3) = f(x_0) + \frac{f(x_1)-f(x_0)}{x_1-x_0}(x_2-x_0) + \left(\frac{\frac{f(x_2)-f(x_1)}{x_2-x_1} - \frac{f(x_1)-f(x_0)}{x_1-x_0}}{x_2-x_0}\right)(x_2-x_0)(x_2-x_1)$$

$+ b_3(x-x_0)(x-x_1)(x-x_2)$

Polinomio de Interpolación de Newton

$$f[x_n, x_{n-1}, x_1, x_0] = \frac{f[x_n, x_{n-1}, x_1] - f[x_{n-1}, x_{n-2}, x_1, x_0]}{x_n - x_0}$$

$$f[x_3, x_2, x_1, x_0] = \frac{f[x_3, x_2, x_1] - f[x_2, x_1, x_0]}{x_3 - x_0}$$

$$= \frac{\frac{f(x_3, x_2) - f(x_2, x_1)}{x_3 - x_1} - \frac{f(x_2, x_1) - f(x_1, x_0)}{x_2 - x_0}}{x_3 - x_0}$$

$$= \frac{\frac{\frac{1.791752-1.609438}{6-4} - \frac{1.609438-1.386294}{6-4}}{6-1} - \frac{1.791752-1.609438}{6-1} - \frac{1.609438-0}{6-1}}{6-1}$$

$$= \frac{0.091157 - 0.111572 - 0.0864628 - 0.3218876}{5} = -0.07575308$$

$$f_3(2) = 0 + 0.462098(1) + (-0.0557885)(2-1)(2-4)$$

$$+ (-0.0757)(1)(2-4)(2-5)$$

$$f_3(2) = 0.12705652$$