INTERPOLACION DE LAGRANGE

Ejemplo: Encontrar la función a partir de los siguientes puntos utilizando el polinomio interpolador de Lagrange.

$$P_{(x)} = y_0 L_{0(x)} + y_1 L_{1(x)} + y_2 L_{2(x)} + y_3 L_{3(x)}$$

	x_0	x_1	x_2	x_3
x	1	2	3	4
y	-1	-2	-1	2
	y_0	y_1	y_2	y_3

$$L_0 = \frac{(x-x_1)*(x-x_2)(x-x_3)}{(x_0-x_1)*(x_0-x_2)*(x_0-x_3)} = \frac{(x-2)*(x-3)*(x-4)}{(1-2)*(1-3)*(1-4)} = \frac{x^3-9x^2+26x-24}{-6}$$

$$L_1 = \frac{(x-x_0)*(x-x_2)(x-x_3)}{(x_1-x_0)*(x_1-x_2)*(x_1-x_3)} = \frac{(x-1)*(x-3)*(x-4)}{(2-1)*(2-3)*(2-4)} = \frac{x^3-8x^2+19x-12}{2}$$

$$L_2 = \frac{(x-x_0)*(x-x_1)(x-x_3)}{(x_2-x_0)*(x_2-x_1)*(x_2-x_3)} = \frac{(x-1)*(x-2)*(x-4)}{(3-1)*(3-2)*(3-4)} = \frac{x^3-7x^2+14x-8}{-2}$$

$$L_3 = \frac{(x-x_0)*(x-x_1)(x-x_2)}{(x_3-x_0)*(x_3-x_1)*(x_3-x_2)} = \frac{(x-1)*(x-2)*(x-3)}{(4-1)*(4-2)*(4-3)} = \frac{x^3-6x^2+11x-6}{6}$$

$$P_{(x)} = y_0 L_{0(x)} + y_1 L_{1(x)} + y_2 L_{2(x)} + y_3 L_{3(x)}$$

$$P_{(x)} = -1\left[\frac{x^3-9x^2+26x-24}{-6}\right] - 2\left[\frac{x^3-8x^2+19x-12}{2}\right] - 1\left[\frac{x^3-7x^2+14x-8}{-2}\right] + 2\left[\frac{x^3-6x^2+11x-6}{6}\right]$$

$$P_{(x)} = \left[\frac{x^3-9x^2+26x-24}{6}\right] - [x^3-8x^2+19x-12] + \left[\frac{x^3-7x^2+14x-8}{2}\right] + \left[\frac{x^3-6x^2+11x-6}{3}\right]$$

$$P_{(x)} = \frac{(x^3-9x^2+26x-24) - (6x^3-48x^2+114x-72) + (3x^3-21x^2+42x-24) + (2x^3-12x^2+22x-12)}{6}$$

$$P_{(x)} = \frac{x^3-9x^2+26x-24-6x^3+48x^2-114x+72+3x^3-21x^2+42x-24+2x^3-12x^2+22x-12}{6}$$

$$P_{(x)} = \frac{6x^2-24x+12}{6} = x^2-4x+2$$

Gráfica de la función obtenida, en la cual podemos observar que los puntos dados coinciden