Polinomio Interpolación Lineal

$f(x) = \frac{1}{x}$

x	2	2.5	4
$f(x)$	0.5	0.4	0.25

$$P(x) = \frac{f(x_1) - f(x_0)}{x_1 - x_0}(x - x_0) + f_0$$

$$P(x) = \left(\frac{0.4 - 0.5}{2.5 - 2}\right)(x - 2) + 0.5$$

$$P(x) = -0.2(x-2) + 0.5$$
$$P(x) = -0.2x + 0.4 + 0.5$$
$$P(x) = -0.2x + 0.9$$

R/ $P(x) = -0.2x + 0.9$

Escaneado con CamScanner

Polinomio interpolación cuadratico.

$f(x) = \frac{1}{x}$

x	2	2.5	4
$f(x)$	0.5	0.4	0.25

$b_{(0)} = 0.5$

$b_1 = \frac{0.4 - 0.5}{2.5 - 2}$, $b_1 = -0.2$

$$b_2 = \frac{\begin{pmatrix} 0.25 - 0.4 \\ 4 - 2.5 \end{pmatrix} - \begin{pmatrix} 0.4 - 0.5 \\ 2.5 - 2 \end{pmatrix}}{4 - 2}$$

$b_2 = 0.05$

$P_{(x)} = 0.5 + (-0.2)(x-2) + (0.05)(x-2)(x-2.5)$
$P_{(x)} = 0.5 - 0.2x + 0.4 + (0.05)(x^2 - 4.5x + 5)$
$P_{(x)} = 0.5 - 0.2x + 0.4 + 0.05x^2 - 0.225x + 0.25$
$P_{(x)} = 0.05x^2 - 0.425x + 1.15$

R/ $P(x) = 0.05x^2 - 0.425x + 1.15$

Escaneado con CamScanner

Interpolación de Lagrange.

x	4	0	-6	1	-4
$f(x)$	808	4	1438	10	160

Polinomio de grado 1

$$P_1 = (808)\left(\frac{x-0}{4-0}\right) + (4)\left(\frac{x-4}{0-4}\right)$$

$$= (808)\left(\frac{x}{4}\right) + (4)\left(\frac{x-4}{0-4}\right)$$

$$= (808)\left(\frac{1}{4}x\right) + 4\left(\frac{1}{-4}x - \frac{4}{-4}\right)$$

$$= 202x + 4\left(\frac{x}{-4} + 1\right)$$

$$= 202x + 4 - x$$

$$= 202x + 4 - x$$

$$= 201x + 4$$

R/ $P_1 = 201x + 4$.

Escaneado con CamScanner

Polinomio de grado 2

x	4	0	-6	1	-4
$f(x)$	808	4	1438	10	160

$$P_2 = (808)\left(\frac{(x-0)(x+6)}{(4-0)(4+6)}\right) + (4)\left(\frac{(x-4)(x+6)}{(0-4)(0+6)}\right)$$

$$+ (1438)\left(\frac{(x-4)(x+0)}{(-6-4)(-6-0)}\right)$$

$$P_2 = (808)\left(\frac{(x)(x+6)}{(4)(10)}\right) + (4)\left(\frac{(x-4)(x+6)}{(-4)(6)}\right) + (1438)\left(\frac{(x-4)(x)}{(-10)(-6)}\right)$$

$$P_2 = (808)\left(\frac{x^2+6x}{40}\right) + (4)\left(\frac{(x^2+6x-4x-24)}{-24}\right) + (1438)\left(\frac{x^2-4x}{60}\right)$$

$$P_2 = (808)\left(\frac{x^2}{40} + \frac{6x}{40}\right) + (4)\left(\frac{x^2+2x-24}{-24}\right) + (1438)\left(\frac{x^2}{60} - \frac{4x}{60}\right)$$

$$P_2 = 20.2x^2 + 121.2x - 0.166666666667x^2 - x + 4$$
$$+ 23.96666667x^2 - 95.86666667x \ (+44x^2 +$$
$$24.33333333x + 4)$$

R/ $P_2 = 44x^2 + 24.33333333x + 4.$

Escaneado con CamScanner

Polinomio grado 3.

x	4	0	-6	1	-4
$f(x)$	808	4	1438	10	160

$$P_3 = (808)\left(\frac{(x-0)(x+6)(x-1)}{(4-0)(4+6)(4-1)}\right) + (4)\left(\frac{(x-4)(x+6)(x-1)}{(0-4)(0+6)(0-1)}\right)$$
$$+(1438)\left(\frac{(x-4)(x-0)(x-1)}{(-6-4)(-6-0)(-6-1)}\right) + (10)\left(\frac{(x-4)(x-0)(x+6)}{(1-4)(1-0)(1+6)}\right)$$

$$P_3 = (808)\left(\frac{(x)(x+6)(x-1)}{(4)(10)(3)}\right) + (4)\left(\frac{(x-4)(x+6)(x-1)}{(-4)(6)(-1)}\right)$$
$$+(1438)\left(\frac{(x-4)(x-0)(x-1)}{(-10)(-6)(-7)}\right) + (10)\left(\frac{(x-4)(x)(x+6)}{(-3)(1)(7)}\right)$$

$$P_3 = (808)\left(\frac{(x)(x+6)(x-1)}{120}\right) + (4)\left(\frac{(x-4)(x+6)(x-1)}{24}\right)$$
$$+(1438)\left(\frac{(x-4)(x)(x-1)}{-420}\right) + (10)\left(\frac{(x-4)(x)(x+6)}{-21}\right)$$

$$P_3 = (808)\left(\frac{(x)(x^2-x+6x-6)}{120}\right) + (4)\left(\frac{(x-4)(x^2+6x-x-6)}{24}\right)$$
$$+(1438)\left(\frac{(x)(x^2-x-4x+4)}{-420}\right) + (10)\left(\frac{(x)(x^2+6x-4x-24)}{-21}\right)$$

$$P_3 = (808)\left(\frac{(x)(x^2+5x-6)}{120}\right) + (4)\left(\frac{(x-4)(x^2+5x-6)}{24}\right)$$

$$+(1438)\left(\frac{(x)(x^2-5x+4)}{-420}\right) + (10)\left(\frac{(x)(x^2+2x-24)}{-21}\right)$$

Escaneado con CamScanner

$$P_3 = (808)\left(\frac{x^3 + 5x^2 - 6x}{120}\right) + (4)\left(\frac{x^3 + 5x^2 - 6x - 4x^2 - 20x + 24}{24}\right)$$

$$+ (1438)\left(\frac{x^3 - 5x^2 + 4x}{-480}\right) + (10)\left(\frac{x^3 + 2x^2 - 24x}{-21}\right)$$

$$P_3 = (808)\left(\frac{x^3}{120} + \frac{5x^2}{120} - \frac{6x}{120}\right) + (4)\left(\frac{x^3}{24} + \frac{x^2}{24} - \frac{26x}{24} + \frac{24}{24}\right)$$

$$+ (1438)\left(\frac{x^3}{-420} - \frac{5x^2}{-420} + \frac{4x}{-420}\right) + (10)\left(\frac{x^3}{-21} + \frac{2x^2}{-21} - \frac{24x}{-21}\right)$$

$$P_3 = 6.733333333x^3 + 33.66666667x^2 - 40.4x +$$
$$0.1666666667x^3 + 0.1666666667x^2 - 4.333333333x + 4$$
$$- 3.423809524x^3 + 17.11904762x^2 - 13.69523810x$$
$$- 0.4761904762x^3 - 0.9523809524x^2 + 11.42857143x$$

~~R/ $P_3 =$~~

R/ $P_3 = 3x^3 + 50.00000033x^2 - 47x + 4$

Escaneado con CamScanner

Polinomio de grado 4.

x	4	0	-6	1	-4
$f(x)$	808	4	1438	10	160

$$P_4 = (808)\left(\frac{(x-0)(x+6)(x-1)(x+4)}{(4-0)(4+6)(4-1)(4+4)}\right) +$$
$$(4)\left(\frac{(x-4)(x+6)(x-1)(x+4)}{(0-4)(0+6)(0-1)(0+4)}\right) +$$
$$(1438)\left(\frac{(x-4)(x-0)(x-1)(x+4)}{(-6-4)(-6-0)(-6-1)(-6+4)}\right) +$$
$$(10)\left(\frac{(x-4)(x-0)(x+6)(x+4)}{(-1-4)(-1-0)(-1+6)(-1-4)}\right) +$$
$$(160)\left(\frac{(x-4)(x-0)(x+6)(x-1)}{(-4-4)(-4-0)(-4+6)(-4-1)}\right)$$

$$P_4 = (808)\left(\frac{(x)(x+6)(x-1)(x+4)}{(4)(10)(3)(8)}\right) +$$
$$(4)\left(\frac{(x-4)(x+6)(x-1)(x+4)}{(-4)(6)(-1)(4)}\right) +$$
$$(1438)\left(\frac{(x-4)(x)(x-1)(x+4)}{(-10)(-6)(-7)(-2)}\right) +$$
$$(10)\left(\frac{(x-4)(x)(x+6)(x+4)}{(-3)(1)(7)(5)}\right) +$$
$$(160)\left(\frac{(x-4)(x)(x+6)(x-1)}{(-8)(-4)(2)(-5)}\right)$$

Escaneado con CamScanner

$$P_4 = (808)\left(\frac{(x)(x+6)(x-1)(x+4)}{960}\right) +$$
$$(4)\left(\frac{(x-4)(x+6)(x-1)(x+4)}{96}\right) +$$
$$(1438)\left(\frac{(x-4)(x)(x-1)(x+4)}{840}\right) +$$
$$(10)\left(\frac{(x-4)(x)(x+6)(x+4)}{-105}\right) +$$
$$(160)\left(\frac{(x-4)(x)(x+6)(x-1)}{-320}\right)$$

$$P_4 = (808)\left(\frac{(x)(x+6)(x^2+4x-x-4)}{960}\right) +$$
$$(4)\left(\frac{(x-4)(x+6)(x^2+4x-x-4}{96}\right) +$$
$$(1438)\left(\frac{(x-4)(x)(x^2+4x-x-4}{840}\right) +$$
$$(10)\left(\frac{(x-4)(x)(x^2+4x+6x+24)}{-105}\right) +$$
$$(160)\left(\frac{(x-4)(x)(x^2-x+6x-6)}{-320}\right)$$

Escaneado con CamScanner

$$P_4 = (808)\left(\frac{(x)(x+6)(x^2+3x-4)}{960}\right) +$$
$$(4)\left(\frac{(x-4)(x+6)(x^2+3x-4)}{96}\right) +$$
$$(1438)\left(\frac{(x-4)(x)(x^2+3x-4)}{840}\right) +$$
$$(10)\left(\frac{(x-4)(x)(x^2+10x+24}{-105}\right) +$$
$$(160)\left(\frac{(x-4)(x)(x^2+5x-6)}{-320}\right)$$

1

$$P_4 = (808)\left(\frac{(x)(x^3+3x^2-4x+6x^2+18x-24)}{960}\right) +$$
$$(4)\left(\frac{(x-1)(x^3+3x^2-4x+6x^2+18x-24}{96}\right) +$$
$$(1438)\left(\frac{(x)(x^3+3x^2-4x-4x^2-12x+16}{840}\right) +$$
$$(10)\left(\frac{(x)(x^3+10x^2+24x-4x^2-40x-96}{-105}\right)$$
$$(160)\left(\frac{(x)(x^3+5x^2-6x-4x^2-20x+24}{-320}\right)$$

$$P_4 = (808)\left(\frac{(x)(x^3+9x^2+14x-24}{960}\right) + (4)\left(\frac{(x-4)(x^3+9x^2+14x-24}{96}\right) +$$
$$(1438)\left(\frac{(x)(x^3-x^2-16x+16)}{840}\right) + (10)\left(\frac{(x)(x^3+6x^2-16x-96)}{-105}\right)$$
$$(160)\left(\frac{(x)(x^3+x^2-26x+24)}{-320}\right)$$

Escaneado con CamScanner

$$P_4 = (808)\left(\frac{x^4 + 9x^3 + 14x^2 - 24x}{960}\right) +$$

$$(4)\left(\frac{x^4 + 9x^3 + 14x^2 - 24x - 4x^3 - 36x^2 - 56x + 96}{96}\right) +$$

$$(1438)\left(\frac{(x^4 - x^3 - 16x^2 + 16x)}{840}\right) + (10)\left(\frac{x^4 + 6x^3 - 16x^2 - 96x}{-105}\right) +$$

$$(160)\left(\frac{x^4 + x^3 - 26x^2 + 24x}{-320}\right)$$

$$P_4 = (808)\left(\frac{x^4}{960} + \frac{9x^3}{960} + \frac{14x}{960} - \frac{24x}{960}\right) + (4)\left(\frac{x^4}{96} + \frac{5x^3}{96} - \frac{22x^2}{96} - \frac{80x}{96} + \frac{96}{96}\right)$$

$$+ (1438)\left(\frac{x^4}{840} - \frac{x^3}{840} - \frac{16x^2}{840} + \frac{16x}{840}\right) +$$

$$(10)\left(\frac{x^4}{-105} + \frac{6x^3}{-105} - \frac{16x^2}{-105} - \frac{96x}{-105}\right) +$$

$$(160)\left(\frac{x^4}{-320} - \frac{x^3}{-320} - \frac{26x^2}{-320} + \frac{24x}{-320}\right)$$

$$P_4 = 0.841666667x^4 + 7.575x^3 + 11.78333333x^2 - 20.20x +$$
$$0.041666666667x^4 + 0.2083,333333x^3 - 0.916666666667x^2 - 3.333333333x$$
$$+ 4 + 1.719047762x^4 - 1.719047762x^3 - 27.39047619x^2$$
$$+ 27.39047619x - 0.5x^4 + 0.5x^3 + 13x^2 - 12x$$

$$P_4 = 2.000014714x^4 + 6x^3 - 2.000000003x^2 + x + 4.$$ R/

Escaneado con CamScanner