Lagrange's Interpolation Method/Formula

Applicable even if the values of x are not at equal distance (unlike to Newton's Forward/Backward interpolation formula)

$$y = \frac{(x-x1)(x-x2)(x-x3)\dots(x-xn)}{(x0-x1)(x0-x2)(x0-x3)\dots(x0-xn)} \times y_0 + \frac{(x-x0)(x-x2)(x-x3)\dots(x-xn)}{(x1-x0)(x1-x2)(x1-x3)\dots(x1-xn)} \times y_1 + \frac{(x-x0)(x-x1)(x-x3)\dots(x-xn)}{(x2-x0)(x2-x1)(x1-x3)\dots(x1-xn)} \times y_3 + \dots + \frac{(x-x0)(x-x1)(x-x2)\dots(x-xn-1)}{(xn-x0)(xn-x1)(xn-x3)\dots(xn-x)} \times y_n$$

Example 1:

Age in months		Weight in LBS (pound)	
x_0	0	y_0	5
x_1	2	y_1	7
x_2	3	y_2	8
x_3	5	y_3	10
x_4	6	y_4	12

The above table gives normal weight of a baby during six month of life. Estimate the weight of baby at the age of 4 months.

	A	B	C	D	E	F	G	H	I
1	x= 4								
2	**Age in months**		**Weight in LBS (pound)**		$Term_1$	$Term_2$	$Term_3$	$Term_4$	$Term_5$
3	x_0	0	y_0	5	0.11111	-2.33333	7.11111	5.33333	-1.33333
4	x_1	2	y_1	7					
5	x_2	3	y_2	8					
6	x_3	5	y_3	10					
7	x_4	6	y_4	12					
8									
9	y=	8.88889							