

4) Given the values

$x:$	5	7	11	13	17
$f(x):$	150	392	1452	2366	5202

Evaluate $f(9)$, using Newton's divided difference formula

Formula

Newton's Divided Difference Interpolation formula

$$y(x) = y_0 + (x - x_0)f[x_0, x_1] + (x - x_0)(x - x_1)f[x_0, x_1, x_2] + \dots$$

x	$f(x)$	$f[x_0, x_1]$	$f[x_0, x_1, x_2]$	$f[x_0, x_1, x_2, x_3]$	$f[x_0, x_1, x_2, x_3, x_4]$
		1 ST ORDER	2 ^{ORDER}	3 ^{ORDER}	4 ^{ORDER}
5	150				
7	392	$\frac{392-150}{7-5} = 121$	$\frac{265-121}{11-5} = 24$	$\frac{32-24}{13-5} = 1$	$\frac{1-1}{17-5} = 0$
11	1452	$\frac{1452-392}{11-7} = 265$	$\frac{457-265}{13-7} = 32$	$\frac{42-32}{17-7} = 1$	
13	2366	$\frac{2366-1452}{13-11} = 457$	$\frac{709-457}{17-11} = 42$		
17	5202	$\frac{5202-2366}{17-13} = 709$			

$$Y(x) = 150 + (x-5) \cdot 121 + (x-5)(x-7) \cdot 24 + (x-5)(x-7)(x-11) \cdot 1$$

$$y = x^3 + x^2$$

$$Y(9) = 9^3 + 9^2 = 810$$

SE MATLAB PLOT: