

Ex. For the function $f(x) = x^4$ compute the divided difference table for the points $0, 1, 1, 1, 2$.

Write down the osculating polynomial interpolating $f(x)$ at those points

X	f(x)	I DD	II DD	III DD	IV DD.
0	0				
1	1	1			
1	1	4	3		
1	1	4	6	3	
2	16	15	11	5	1

$$f'(x) = 4x^3 \quad f'(1) = 4$$

$$f''(x) = 12x^2 \quad f''(1) = 12 \quad \frac{f''(1)}{2} = 6$$

The osculating polynomial is

$$H_4(x) = 0 + 1 \cdot x + 3x(x-1) + 3x(x-1)^2 + 1 \cdot x(x-1)^3$$