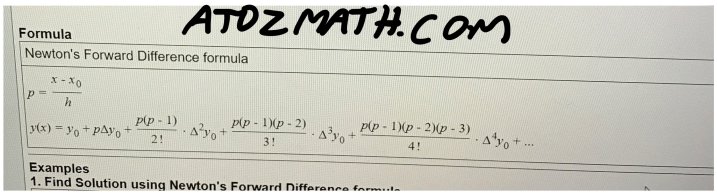
1) The following table gives four values of $f(x) = x^4 - 3x^3 + 6x^2 - 2x + 5$ at $x_i = 1, 2, 3$ and 4. Obtain a 3rd degree polynomial, $p(x)$ using Newton forward difference formula. Further, compare the plots of $f(x)$ *vs* x, and $p(x)$ *vs* x in the interval [0 5] in MATLAB.

x:	1	2	3	4
$f(x)$:	7	17	53	157

NEWTON FORWARD DIFFERENCE TABLE:

X	f(x)	Δf_i	$\Delta^2 f_i$	$\Delta^3 f_i$
1	7	10		
2	17		26	
		36		42
3	53		68	
		104		
4	157			



$h = X_1 - X_0 = 2 - 1 = 1$

$p = \frac{x-1}{1}$

$$P_3(x) = 7 + 10p + \frac{p(p-1)}{2!}.26 + \frac{p(p-1)(p-2)}{3!}.42$$

$$P_3(x) = 7 + \left(\frac{x-1}{1}\right).10 + \frac{\left(\frac{x-1}{1}\right)\left(\frac{x-1}{1}-1\right).26}{2!} + \frac{\left(\frac{x-1}{1}\right)\left(\frac{x-1}{1}-1\right)\left(\frac{x-1}{1}-2\right)}{3!}.42$$

SE MATLAB PLOT: