NEWTON INTERPOLATION METHOD:

- **BACKWARD DIFFERENCE:**

Formula:

P=$\frac{x-x_n}{h}$

y(x)=$y_n + p\nabla y_n + \frac{p(p+1)}{2!}.\nabla^2 y_n + \frac{p(p+1)(p+2)}{3!}.\nabla^3 y_n + \frac{p(p+1)(p+2)(p+3)}{4!}.\nabla^4 y_n$ ..

EXAMPLE:

Find solution using Newton's Forward Difference Formula

x	F(x)
1891	46
1901	66
1911	81
1921	93
1931	101

X=1925

SOLUTION:

The value of table for x and y

x	1891	1901	1911	1921	1931
y	46	66	81	93	101

Newton's forward difference table is

x	y	∇y	$\nabla^2 y$	$\nabla^3 y$	$\nabla^4 y$
1891	46				
		20			
1901	66		-5		
		15		2	
1911	81		-3		-3
		12		-1	
1921	93		-4		
		8			

1931	101				

The value of x at you want to find the f(x):x=1895

h=$x_1 - x_0$

=1901-1891=10

P=$\frac{x-x_n}{h}$=$\frac{1925-1931}{10}$=0.4

Newton's forward difference interpolation formula is

y(x)=$y_n + p\nabla y_n + \frac{p(p+1)}{2!}.\nabla^2 y_n + \frac{p(p+1)(p+2)}{3!}.\nabla^3 y_n + \frac{p(p+1)(p+2)(p+3)}{4!}.\nabla^4 y_n$

y (1925) =$101 + (-0.6) \times 8 + \frac{-0.4(-0.6+1)}{2} \times -4 + \frac{-0.6(-0.6+1)(-0.6+2)}{6} \times -1 + \frac{-0.6(-0.6+1)(-0.6+2)(-0.6+3)\times -3}{24}$

y (1925) =102+4.8+0.48+0.056+0.1008

y (1925) =96.8368

Solution for newton's forward interpolation method y (1925) =96.8368