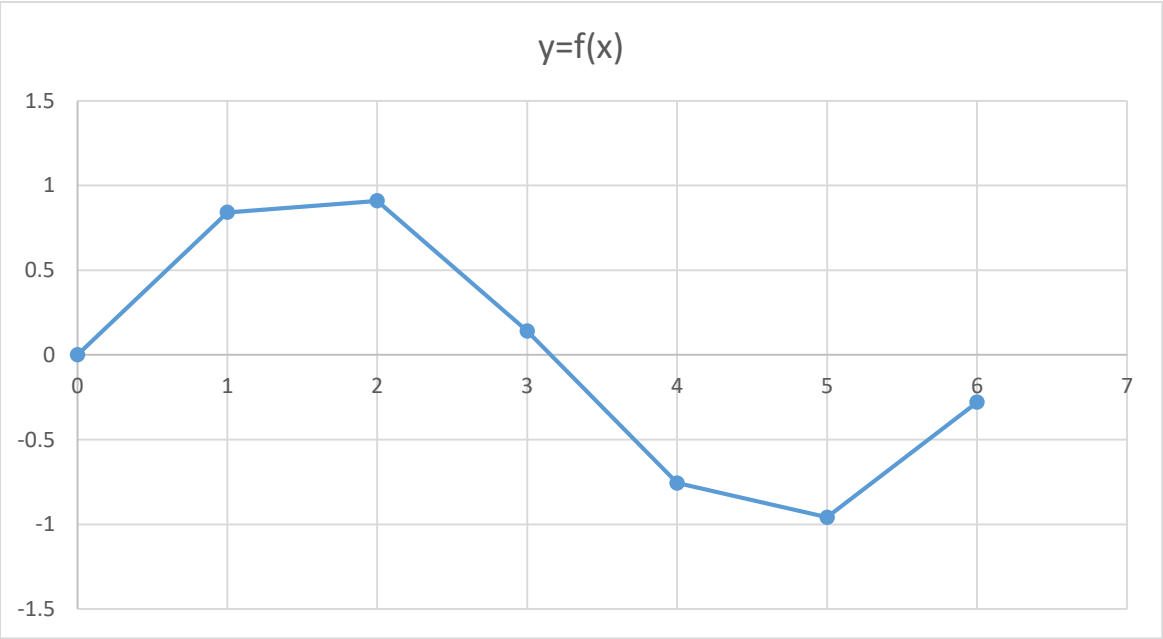
Central Difference Formula / Method

$$y = y_0 + \frac{u}{1!}\Delta y_0 + \frac{u(u-1)}{2!}\Delta^2 y_{-1} + \frac{u(u-1)(u+2)}{3!}\Delta^3 y_{-2} + \ldots\ldots + \frac{u(u-1)(u+2)\ldots(u-n+1)}{n!}\Delta^n y_{-n}$$

Example 1:

x		y=f(x)	
x_{-3}	0	y_0	0
x_{-2}	1	y_1	0.8415
x_{-1}	2	y_2	0.9093
Central x_0	3	y_3	0.1411
x_1	4	y_4	-0.7568
x_2	5	y_5	-0.9589
X_3	6	y_6	-0.2794

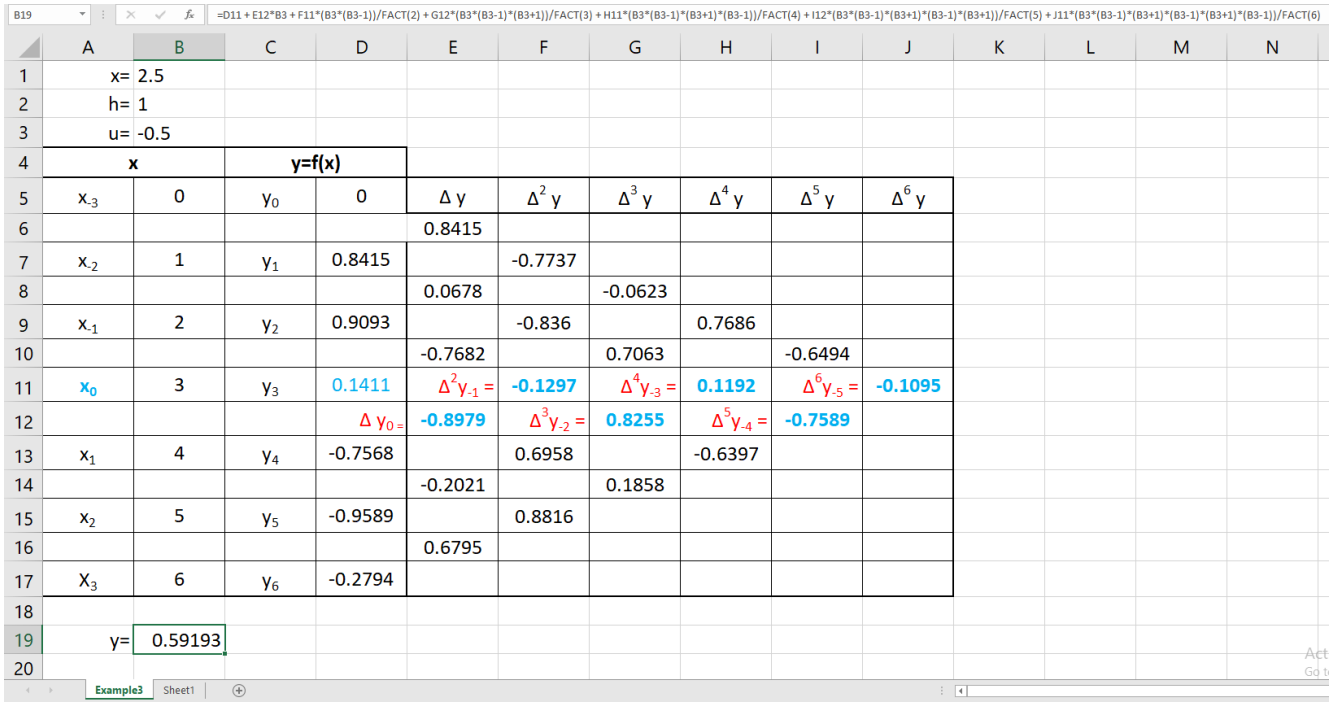
Find/estimate/interpolate the value of y=f(x) for x=2.5.



Can we apply Newton Forward Interpolation Method? Yes.
Why? Because $x_1-x_0 = x_2-x_1 = x_3-x_2 = x_n - x_{n-1} = h = 1$

Now, $u = \frac{x-x0}{h} = \frac{2.5-3}{1} = 0.5$

$$y = y_0 + \frac{u}{1!}\Delta y_0 + \frac{u(u-1)}{2!}\Delta^2 y_{-1} + \frac{u(u-1)(u+2)}{3!}\Delta^3 y_{-2} + \ldots\ldots + \frac{u(u-1)(u+2)\ldots(u-n+1)}{n!}\Delta^n y_{-n}$$


B19
=D11 + E12*B3 + F11*(B3*(B3-1))/FACT(2) + G12*(B3*(B3-1)*(B3+1))/FACT(3) + H11*(B3*(B3-1)*(B3+1)*(B3-1))/FACT(4) + I12*(B3*(B3-1)*(B3+1)*(B3-1)*(B3+1))/FACT(5) + J11*(B3*(B3-1)*(B3+1)*(B3-1)*(B3+1)*(B3-1))/FACT(6)
x= 2.5
h= 1
u= -0.5
x
y=f(x)
Δ y
Δ² y
Δ³ y
Δ⁴ y
Δ⁵ y
Δ⁶ y
0.8415
-0.7737
0.0678
-0.0623
0.9093
-0.836
0.7686
-0.7682
0.7063
-0.6494
0.1411
Δ²y-1 =
-0.1297
Δ⁴y-3 =
0.1192
Δ⁶y-5 =
-0.1095
Δ y0 =
-0.8979
Δ³y-2 =
0.8255
Δ⁵y-4 =
-0.7589
-0.7568
0.6958
-0.6397
-0.2021
0.1858
-0.9589
0.8816
0.6795
-0.2794
y= 0.59193
Example3
Sheet1

y = 0.59193