Newton Divided Differences

القانون للحل 😊

$$b_0 = f(x_0)$$

$$b_1 = \frac{f(x_1) - f(x_0)}{x_1 - x_0}$$

$$b_2 = \frac{\frac{f(x_2) - f(x_1)}{x_2 - x_1} - \frac{f(x_1) - f(x_0)}{x_1 - x_0}}{x_2 - x_0}$$

$$b_3 = \frac{\frac{f(x_3) - f(x_2)}{x_3 - x_2} - \frac{f(x_2) - f(x_1)}{x_2 - x_1} - \frac{f(x_1) - f(x_0)}{x_1 - x_0}}{x_3 - x_0}$$

$$f(x) = b_0 + b_1(x_1 - x_0) + b_2(x - x_0)(x - x_1) + b_3(x - x_0)(x - x_1)(x - x_2)$$

	x_0	x_1	x_2	x_3
X	5	6	9	11
F(x)	12	13	14	16

Find f(7)

x	$f(x)$	$b1$	$b2$	$b3$
5	12	$\frac{13-12}{6-5} = 1$	$\frac{0.33-1}{9-5} = -0.1675$	
6	13			$\frac{0.134--0.1675}{11-5} = 0.05$
9	14	$\frac{14-13}{9-6} = 0.33$	$\frac{1-0.33}{11-6} = 0.134$	
11	16	$\frac{16-14}{11-9} = 1$		

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نشوف السبعة وين رح تكون موجودة حتى نقدر نحدد b1,b2 المستخدمين

$$b_0 = 12$$

$$b_1 = 0.33$$

$$b_2 = 0.134$$

$$b_2 = 0.05$$

$$f(7) = 12 + 0.33(7 - 5) + 0.134(7 - 5)(7 - 6) + 0.05(7 - 5)(7 - 6)(7 - 9)$$

$$f(7) = 12 + 0.66 + 0.268 + (-0.2)$$

$$f(7) = 10.928$$