Hermit Method

"by using devided difference"

z	$f(z)$	First divided differences	Second divided differences
$z_0 = x_0$	$f[z_0] = f(x_0)$	$f[z_0, z_1] = f'(x_0)$ ← given	
$z_1 = x_0$	$f[z_1] = f(x_0)$	$f[z_1, z_2] = \dfrac{f[z_2] - f[z_1]}{z_2 - z_1}$ ← find from	$f[z_0, z_1, z_2] = \dfrac{f[z_1, z_2] - f[z_0, z_1]}{z_2 - z_0}$ → $f(z_0, z_1, z_2, z_3)$
$z_2 = x_1$	$f[z_2] = f(x_1)$	$f[z_2, z_3] = f'(x_1)$ ← given	$f[z_1, z_2, z_3] = \dfrac{f[z_2, z_3] - f[z_1, z_2]}{z_3 - z_1}$ → $f(z_1, z_2, z_3, z_4)$
$z_3 = x_1$	$f[z_3] = f(x_1)$	$f[z_3, z_4] = \dfrac{f[z_4] - f[z_3]}{z_4 - z_3}$	$f[z_2, z_3, z_4] = \dfrac{f[z_3, z_4] - f[z_2, z_3]}{z_4 - z_2}$ → $f(z_2, z_3, z_4, z_5)$
$z_4 = x_2$	$f[z_4] = f(x_2)$	$f[z_4, z_5] = f'(x_2)$ ← given	$f[z_3, z_4, z_5] = \dfrac{f[z_4, z_5] - f[z_3, z_4]}{z_5 - z_3}$
$z_5 = x_2$	$f[z_5] = f(x_2)$		

Similleme like 3.3

$$H_{2n+1}(x) = f[z_0] + \sum_{k=1}^{2n+1} f[z_0, \ldots, z_k](x - z_0)(x - z_1) \cdots (x - z_{k-1}).$$

★ Take the Top result ★

Q1 & 1. Use Theorem 3.9 or Algorithm 3.3 to construct an approximating polynomial for the following data.

a.

x	$f(x)$	$f'(x)$
8.3	17.56492	3.116256
8.6	18.50515	3.151762

Deg1 Deg2 Deg3

z_n	$f(x)$	$f(x)$	$f(z_0,z_1,z_2)$, $f(z_1,z_2,z_3)$
$z_0 = 8.3$	17.56492		$f(z_0,z_1,z_2) = \frac{f(z_1,z_2)-f(z_0,z_1)}{z_0-z_2}$
		3.116256	
$z_1 = 8.3$	17.56492		$= 0.05948$
		$= \frac{18.50515-17.56492}{8.6-8.3}$	$f(z_0,z_1,z_2,z_3) = \frac{f(z_1,z_2,z_3)-f(z_0,z_1,z_2)}{z_3-z_0}$
		$f(z_1,z_2) = 3.1341$	
$z_2 = 8.6$	18.50515		$f(z_1,z_2,z_3) = \frac{f(z_2,z_3)-f(z_1,z_2)}{z_3-z_1}$
		3.151762	$= -0.00020222$
$z_3 = 8.6$	18.50515		$= 0.05887333$

Could be (−)

take the Top result

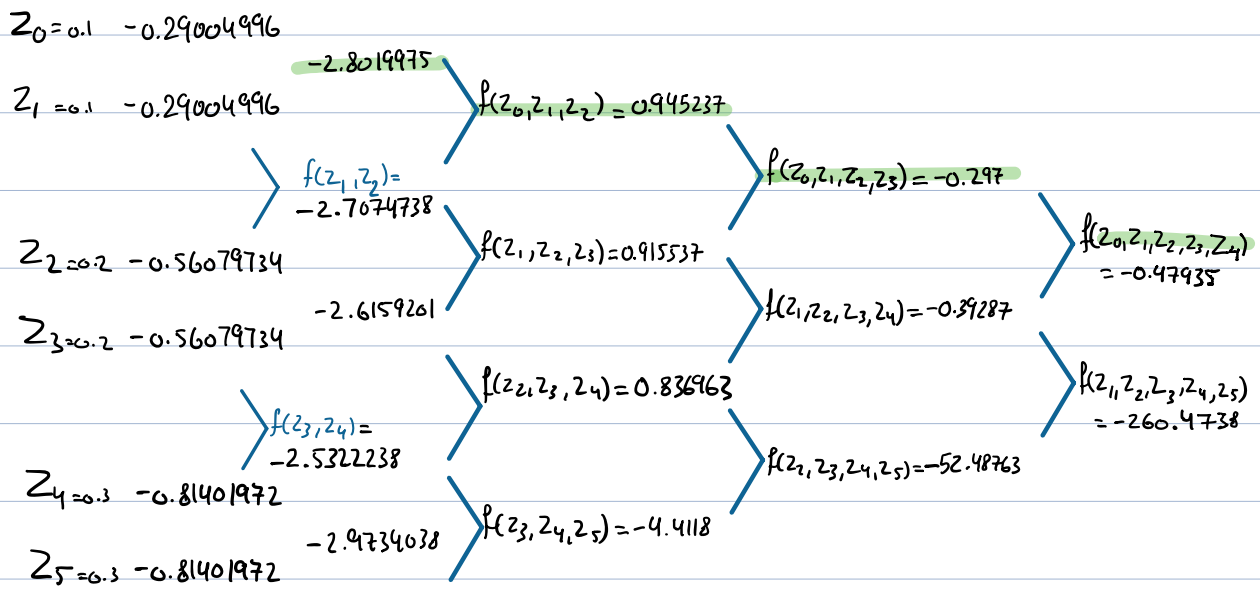
$$H_{2n+1} = f(z_0) + f(z_0,z_1)(x-z_0) + f(z_0,z_1,z_2)(x-z_0)(x-z_1) + f(z_0,z_1,z_2,z_3)(x-z_0)(x-z_1)(x-z_2)$$

$$H_3 = 17.56492 + 3.116256(x-8.3) + 0.05948(x-8.3)(x-8.3) + (-0.00020222)(x-8.3)(x-8.3)(x-8.6)$$

Q28 **2.** Use Theorem 3.9 or Algorithm 3.3 to construct an approximating polynomial for the following data.

c.

x	$f(x)$	$f'(x)$
0.1	−0.29004996	−2.8019975
0.2	−0.56079734	−2.6159201
0.3	−0.81401972	−2.9734038



$$P_5 = f(z_0) + f(z_0,z_1)(x-z_0) + f(z_0,z_1,z_2)(x-z_0)(x-z_1) + f(z_0,z_1,z_2,z_3)(x-z_0)(x-z_1)(x-z_2) +$$

$$f(z_0,z_1,z_2,z_3,z_4)(x-z_0)(x-z_1)(x-z_2)(x-z_3)$$

0.1, 0.1, −0.279, 0.1, 0.1, 0.2

−0.29004996, −2.8019975, 0.945237, −0.47935

0.1, 0.1, 0.2, 0.2

Q38