

Hermit Method

"by using divided difference"

z	$f(z)$	First divided differences	Second divided differences
$z_0 = x_0$	$f[z_0] = f(x_0)$	$f[z_0, z_1] = f'(x_0)$ <i>given</i>	
$z_1 = x_0$	$f[z_1] = f(x_0)$	$f[z_1, z_2] = \frac{f[z_2] - f[z_1]}{z_2 - z_1}$ <i>find from</i>	$f[z_0, z_1, z_2] = \frac{f[z_1, z_2] - f[z_0, z_1]}{z_2 - z_0}$
$z_2 = x_1$	$f[z_2] = f(x_1)$	$f[z_2, z_3] = f'(x_1)$ <i>given</i>	$f[z_1, z_2, z_3] = \frac{f[z_2, z_3] - f[z_1, z_2]}{z_3 - z_1}$
$z_3 = x_1$	$f[z_3] = f(x_1)$	$f[z_3, z_4] = \frac{f[z_4] - f[z_3]}{z_4 - z_3}$	$f[z_2, z_3, z_4] = \frac{f[z_3, z_4] - f[z_2, z_3]}{z_4 - z_2}$
$z_4 = x_2$	$f[z_4] = f(x_2)$	$f[z_4, z_5] = f'(x_2)$ <i>given</i>	$f[z_3, z_4, z_5] = \frac{f[z_4, z_5] - f[z_3, z_4]}{z_5 - z_3}$
$z_5 = x_2$	$f[z_5] = f(x_2)$		

$f(z_0, z_1, z_2, z_3)$
 $f(z_1, z_2, z_3, z_4)$
 $f(z_2, z_3, z_4, z_5)$

Simillene

like 3.3

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

★ Take the Top result ★

Q10 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

	z_n	$f(x)$	$f'(x)$	Deg 1	Deg 2	Deg 3
	$z_0 = 8.3$	17.56492				
	$z_1 = 8.3$	17.56492	3.116256			
	$z_2 = 8.6$	18.50515	3.151762			
	$z_3 = 8.6$	18.50515				

$f(z_1, z_2) = \frac{f(z_2) - f(z_1)}{z_2 - z_1} = \frac{18.50515 - 17.56492}{8.6 - 8.3} = 3.1341$
 $f(z_0, z_1, z_2) = \frac{f(z_1, z_2) - f(z_0, z_1)}{z_0 - z_2} = \frac{3.1341 - 3.116256}{8.3 - 8.6} = 0.05948$
 $f(z_1, z_2, z_3) = \frac{f(z_3) - f(z_1, z_2)}{z_3 - z_1} = \frac{3.151762 - 3.1341}{8.6 - 8.3} = 0.0587333$
 $f(z_0, z_1, z_2, z_3) = \frac{f(z_1, z_2, z_3) - f(z_0, z_1, z_2)}{z_3 - z_0} = \frac{0.0587333 - 0.05948}{8.6 - 8.3} = -0.00020222$ (Could be (-))

take the top result

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

$$M_3 = 17.56492 + 3.116256(x - 8.3) + 0.05948(x - 8.3)(x - 8.3) + (-0.00020222)(x - 8.3)(x - 8.3)(x - 8.6)$$

Q38