

NMA HW1

1)

x	y
7	3
8	1
9	1
10	9

$$\begin{aligned} f(9.5) &= \cancel{(9.5-7)}(9.5-8)(9.5-9)(9.5-10) \times 3 \\ &\quad (7-8)(7-9)(7-10) \\ &\quad + (9.5-7)(9.5-9)(9.5-10) \times 1 \\ &\quad (8-7)(8-9)(8-10) \\ &\quad + (9.5-7)(9.5-8)(9.5-10) \times 1 \\ &\quad (9-7)(9-8)(9-10) \\ &\quad + (9.5-7)(9.5-8)(9.5-9) \times 9 \\ &\quad (10-7)(10-8)(10-9) \end{aligned}$$

$$\begin{aligned} &= 0.1875 + (-0.3125) + 0.9375 + \overset{2.8125}{\cancel{0.3125}} \\ &= \underline{\underline{3.625}} \end{aligned}$$

$$\begin{aligned} 2) \quad f(6) &= \frac{(6-7)(6-9)(6-10)}{(3-7)(3-9)(3-10)} \times 168 \\ &\quad + \frac{(6-3)(6-9)(6-10)}{\cancel{(6-7)}(7-9)(7-10)} \times 120 \\ &\quad + \frac{(6-3)(6-7)(6-10)}{(9-3)(9-7)(9-10)} \times 72 \\ &\quad + \frac{(6-3)(6-7)(6-9)}{(10-3)(10-7)(10-9)} \times 63 \\ &= 12 + 180 + 72 + 27 \\ &= \underline{\underline{147}} \end{aligned}$$

$$\begin{aligned}
 3) f(6) &= \frac{(6-2)(6-7)(6-8)}{(1-2)(1-7)(1-8)} \times 4 + \frac{(6-1)(6-7)(6-8)}{(2-1)(2-7)(2-8)} \\
 &\quad + \frac{(6-1)(6-2)(6-8)}{(7-1)(7-2)(7-8)} \times 5 + \frac{(6-1)(6-2)(6-7)}{(8-1)(8-2)(8-7)} \\
 &= -0.7619 + 1.6667 + 6.6667 + (-1.9545) \\
 &= 5.667
 \end{aligned}$$

$$\begin{aligned}
 4) f(5) &= \frac{(5-2)(5-3)(5-4)(5-7)}{(1-2)(1-3)(1-4)(1-7)} \times 2 \\
 &\quad + \frac{(5-1)(5-3)(5-4)(5-7)}{(2-1)(2-3)(2-4)(2-7)} \times 4 \\
 &\quad + \frac{(5-1)(5-2)(5-4)(5-7)}{(3-1)(3-2)(3-4)(3-7)} \times 8 \\
 &\quad + \frac{(5-1)(5-2)(5-3)(5-7)}{(4-1)(4-2)(4-3)(4-7)} \times 16 \\
 &\quad + \frac{(5-1)(5-2)(5-3)(5-4)}{(7-1)(7-2)(7-3)(7-4)} \times 128 \\
 &= -0.6667 + 6.4 - 24 + 42.6667 + 8.5333
 \end{aligned}$$

$$= 32.933$$

$$S \quad f(15) = \frac{(15-20)(15-14)(15-16)}{(10-20)(10-14)(10-16)} \times 0.25$$

$$+ \frac{(15-10)(15-14)(15-16)}{(20-10)(20-14)(20-16)} \times 0.2$$

$$+ \frac{(15-10)(15-20)(15-16)}{(14-10)(14-20)(14-16)} \times 0.15$$

$$+ \frac{(15-10)(15-20)(15-14)}{(16-10)(16-20)(16-14)} \times 0.10$$

$$= 0 - 0.0052 + (-0.00416) + 0.078125 + 0.052$$

$$= 0.120833$$

HW-2

① $x^3 + x - 1 = 0$

x	y
0.5	-0.375
0.6	-0.184
0.7	0.043

$$x' = \frac{x_1 y_2 - x_2 y_1}{y_2 - y_1}$$

$$= \frac{(0.6)(0.043) - (0.7)(-0.184)}{0.043 - (-0.184)}$$

$$= 0.681057$$

$$y' = -0.0037727$$

$\therefore$ Root of $x^3 + x - 1 = 0.681057$

② $x^3 - 2x + 0.5 = 0$

x	y
0	0.5
0.1	0.301
0.2	0.108
0.3	-0.073

$$x' = \frac{(0.2)(-0.073) - (0.3)(0.108)}{-0.073 - 0.108}$$

$$= 0.2596685$$

$$y' = -0.0018848$$

$\therefore$ Root of $x^3 - 2x + 0.5 = 0.2596685$

$$\textcircled{3} \quad x^3 + 2x - 20 = 0$$

x	y
2	-8
2.1	-6.531
2.2	-4.952
2.3	-3.24
2.4	-1.376
2.5	0.625

$$x' = \frac{(2.4)(0.625) - (2.5)(-1.376)}{0.625 - (-1.376)}$$

$$= 2.46876$$

$$y' = -0.015827$$

$$x'' = \frac{(2.46876)(0.625) - (-0.015827)(2.5)}{0.625 - (-0.015827)}$$

$$= 2.4685$$

$$y'' = -0.00028$$

$$\text{Root of } x^3 + 2x - 20 = 2.4695$$

$$\textcircled{4} \quad 3x - \cos x - 1 = 0$$

x	y
0	-2
0.1	-1.699
0.2	-1.399
0.3	-1.099
0.4	-0.799
0.5	-0.499
0.6	-0.199
0.7	0.1

$$x' = \frac{(0.6)(0.1) - (-0.199)(0.7)}{0.1 - (-0.199)}$$

$$= 0.6645$$

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$$y' = -0.00623$$

Root of $3x - \cos x - 1 \approx 0.6645$

$$5) \quad x^3 - 3x - 5 = 0$$

x	y
2	-3
2.1	-2.039
2.2	-0.952
2.3	0.267

$$x' = \frac{(2.2)(0.267) - (2.3)(-0.952)}{0.267 - (-0.952)}$$

$$= 2.2781$$

$$y' = -0.01159$$

$$x'' = \frac{(2.2781)(0.267) - (2.3)(-0.01159)}{0.267 - (-0.01159)}$$

$$= 2.279$$

$$y'' = -0.0000968$$

Root of $x^3 - 3x - 5 \approx 2.279$

$$6) x \log_{10} x - 1.2 = 0$$

x	y
2	-0.5979
2.1	-0.5233
2.2	-0.4467
2.3	-0.3680
2.4	-0.2875
2.5	-0.2052
2.6	-0.1211
2.7	-0.0353
2.8	0.052

$$x' = \frac{(2.7)(0.052) - (-0.0353)(2.8)}{0.052 - (-0.0353)}$$

$$= 2.7404$$

$$y' = -0.0001839$$

$$\text{Root of } x \log_{10} x - 1.2 = 2.7404$$

$$7) x^3 - 4x + 1 = 0$$

x	y
0	1
1	-2
2	1

$$x' = \frac{(1)(1) - (-2)(2)}{1 - (-2)} = 1.667$$

$$y' = -1.037$$

$$x'' = \frac{(1.667)(1) - 2(-1.037)}{1 - (-1.037)} = 1.8365$$

$$y'' = -0.1519 \quad \therefore \text{Root} = 1.8365$$

8) $x^3 + 2x^2 - 8 = 0$

x	y
1	-5
1.5	-0.125
2	8

$$x' = \frac{(1.5)(8) - (-0.125)(2)}{8 - (-0.125)}$$

$$= 1.50769$$

$$y' = -0.02654$$

$$x'' = \frac{(1.50769)(8) - (-0.02654)(2)}{8 - (-0.02654)}$$

$$= 1.5093$$

$$y'' = -0.005862$$

Root of $x^3 + 2x^2 - 8 = 1.5093$

9) $x^3 - 9x + 1 = 0$

x	y
1	-7
2	-9
2.5	-5.875
2.9	-0.711
3	1

$$x' = \frac{(2.9)(1) - (3)(-0.711)}{1 - (-0.711)}$$

$$= 2.9415$$

$$y' = -0.02147$$

$$x'' = \frac{(2.9415)(1) - (3)(-0.02147)}{1 - (-0.02147)}$$

$$= 2.9427$$

$$y'' = -0.0015$$

$$\text{Root of } x^3 - 9x + 1 = 2.9427$$

$$10) x^3 - x - 4 = 0$$

x	y
1	-4
1.5	-2.125
1.6	-1.504
1.7	-0.787
1.8	0.032

$$x' = \frac{(1.7)(0.032) + (1.8)(-0.787)}{0.032 - (-0.787)}$$

$$= 1.7961$$

$$y' = -0.00199$$

$$\therefore \text{Root of } x^3 - x - 4 = 1.7961$$