

①

x	7	8	9	10
y	3	1	1	9

Find the value of y at $x = 9.5$

$$\begin{aligned}
 f(9.5) &= \frac{(9.5-8)(9.5-9)(9.5-10)}{(7-8)(7-9)(7-10)} \times 3 \\
 &+ \frac{(9.5-7)(9.5-9)(9.5-10)}{(8-7)(8-9)(8-10)} \times 1 \\
 &+ \frac{(9.5-7)(9.5-8)(9.5-10)}{(9-7)(9-8)(9-10)} \times 1 \\
 &+ \frac{(9.5-7)(9.5-8)(9.5-9)}{(10-7)(10-8)(10-9)} \times 9 \\
 &= \frac{1.5 \times 0.5 \times -0.5}{-1 \times -2 \times -3} \times 3 + \frac{2.5 \times 0.5 \times -0.5}{1 \times -1 \times -2} \times 1 \\
 &+ \frac{2.5 \times 1.5 \times -0.5}{2 \times 1 \times -1} \times 1 + \frac{2.5 \times 1.5 \times 0.5}{3 \times 2 \times 1} \times 9 \\
 &= \frac{3}{16} + \left(-\frac{5}{16}\right) + \frac{15}{16} + \frac{45}{16}
 \end{aligned}$$

$$f(9.5) = 3.625$$

②

Dependent var	168	120	72	63
Independent var	3	7	9	10

③

Dependent var	3	7	72	10
Independent var	168	120	72	63

$$\begin{aligned}
 f(6) &= \frac{(6-7)(6-9)(6-10)}{(3-7)(3-9)(3-10)} \times 168 + \\
 &\frac{(6-3)(6-9)(6-10)}{(7-3)(7-9)(7-10)} \times 120 \\
 &+ \frac{(6-3)(6-7)(6-10)}{(9-3)(9-7)(9-10)} \times 72 + \\
 &\frac{(6-3)(6-7)(6-9)}{(10-3)(10-7)(10-9)} \times 63
 \end{aligned}$$

$$= \frac{-1x - 3x - 4}{-4x - 6x - 7} \times 168 + \frac{3x - 3x - 4}{4x - 2x - 3} \times 120$$

$$+ \frac{3x - 1x - 4}{6x - 2x - 1} \times 72 + \frac{3x - 1x - 3}{7x - 3x - 1} \times 63$$

$$= 12 + 180 + (-72) + 27$$

$$f(6) = 147$$

③	x	1	2	7	8
	f(x)	4	5	5	4

$$f(6) = \frac{(6-2)(6-7)(6-8)}{(1-2)(1-7)(1-8)} \times 4$$

$$+ \frac{(6-1)(6-7)(6-8)}{(2-1)(2-7)(2-8)} \times 5$$

$$+ \frac{(6-1)(6-2)(6-8)}{(7-1)(7-2)(7-8)} \times 5$$

$$+ \frac{(6-1)(6-2)(6-7)}{(8-1)(8-2)(8-7)} \times 4$$

$$= \frac{4x - 1x - 2}{-1x - 6x - 7} \times 4 + \frac{5x - 1x - 2}{1x - 5x - 6} \times 5$$

$$+ \frac{5x - 4x - 2}{6x - 5x - 1} \times 5 + \frac{5x - 4x - 1}{7x - 6x - 1} \times 4$$

$$= \frac{-16}{-21} + \frac{5}{3} + \frac{20}{3} + \left(\frac{-40}{21} \right)$$

$$f(6) = \frac{17}{3} / 5.6667$$

(24)	x	1	2	3	4	7
	$f(x)$	2	4	8	16	128

$$\begin{aligned}
 f(5) &= \frac{(5-2)(5-3)(5-4)(5-7)}{(1-2)(1-3)(1-4)(1-7)} \times 2 \\
 &+ \frac{(5-1)(5-3)(5-4)(5-7)}{(2-1)(2-3)(2-4)(2-7)} \times 4 \\
 &+ \frac{(5-1)(5-2)(5-4)(5-7)}{(3-1)(3-2)(3-4)(3-7)} \times 8 \\
 &+ \frac{(5-1)(5-2)(5-3)(5-7)}{(4-1)(4-2)(4-3)(4-7)} \times 16 \\
 &+ \frac{(5-1)(5-2)(5-3)(5-4)}{(7-1)(7-2)(7-3)(7-4)} \times 128 \\
 &= -\frac{2}{3} + \frac{32}{5} + (-24) + \frac{128}{3} + \frac{128}{15}
 \end{aligned}$$

$$f(5) = 32.933$$

(25)	x	10	20	14	16
	$f(x)$	0.25	0.2	0.15	0.10

$$\begin{aligned}
 f(15) &= \frac{(15-20)(15-14)(15-16)}{(10-20)(10-14)(10-16)} \times 0.25 \\
 &+ \frac{(15-10)(15-14)(15-16)}{(20-10)(20-14)(20-16)} \times 0.2 \\
 &+ \frac{(15-10)(15-20)(15-16)}{(14-10)(14-20)(14-16)} \times 0.15 \\
 &+ \frac{(15-10)(15-20)(15-14)}{(16-10)(16-20)(16-14)} \times 0.10 \\
 &= -\frac{1}{192} + \left(-\frac{1}{240}\right) + \frac{5}{64} + \frac{5}{96} \\
 &= 0.120833
 \end{aligned}$$

① $x^3 + x - 1 = 0$ find roots

x	y
0.5	-0.375
0.6	-0.184
0.7	0.043
0.8	0.312
0.9	0.629
1	1

$x_n = x_1 = 0.6 \quad x_2 = 0.7$

$y_1 = -0.184 \quad y_2 = 0.043$

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

$y_n = 0.68106$

$y = 0.68106^3 + 0.68106 - 1 = -0.00304$

$x_1 = 0.68106$

$y_2 x_2 = 0.7$

$y_1 = -0.00304$

$y_2 = 0.043$

$x_n = 0.68231$

$y_n = -0.00004$

$\therefore$ Root of $x^3 + x - 1 = 0$ is 0.68231

2. $x^3 - 2x + 0.5 = 0$ find roots

x	y
0.5	0.5
0.1	0.301
0.2	0.108
0.3	-0.073
0.4	-0.236
0.5	-0.375
0.6	-0.484
0.7	-0.557
0.8	-0.588
0.9	-0.571
1	-0.5

$$x_1 = 0.2 \quad x_2 = 0.3$$

$$y_1 = 0.108 \quad y_2 = -0.073$$

$$x_n = 0.25967$$

$$y_n = -0.00183$$

$$x_1 = 0.25967$$

$$x_2 = 0.3$$

$$y_1 = -0.00183$$

$$y_2 = -0.073$$

$$x_n = 0.25863$$

$$y_n = 0.00003$$

$\therefore$ Root of $x^3 - 2x + 0.5 = 0$ is 0.25863

3.] $x^3 + 2x - 20 = 0$ find roots

x

y

2

-8

2.1

-6.539

2.2

-4.952

2.3 2.4

-3.233

2.4 2.5

-1.376

2.5

0.625

$$x_1 = 2.4$$

$$x_2 = 2.5$$

$$y_1 = -1.376$$

$$y_2 = 0.625$$

$$x_n = 2.46877$$

$$y_n = -0.01574$$

$$x_1 = 2.46877$$

$$x_2 = 2.5$$

$$y_1 = -0.01574$$

$$y_2 = 0.625$$

$$x_n = 2.46954$$

$$y_n = -0.00012$$

$\therefore$ Root of $x^3 + 2x - 20 = 0$ is 2.46954

5.]

$$x^3 - 3x - 5 = 0$$

x

y

2

-3

2.1

-2.039

2.2

-0.952

2.3

0.267

2.4

1.624

2.5

3.125

$$x_1 = 2.2$$

$$y_1 = -0.952$$

$$x_2 = 2.3$$

$$y_2 = 0.267$$

$$x_n = 2.27809$$

$$y_n = -0.01168$$

$$x_1 = 2.27809$$

$$x_2 = 2.3$$

$$y_1 = -0.01168$$

$$y_2 = 0.267$$

$$x_n = 2.27901$$

$$y_n = -0.00011$$

$\therefore$ Root of $x^3 - 32.5$ is 2.27901

6) $2 \log_{10} x - 1.2 = 0$

x	y
2	-0.59794
2.1	-0.52333
2.2	-0.44667
2.3	-0.36802
2.4	-0.28749
2.5	-0.205149
2.6	-0.121069
2.7	-0.03517
2.8	0.05204
2.9	0.14095
3	0.231363

$$x_1 = 2.7$$

$$x_2 = 2.8$$

$$y_1 = -0.03517$$

$$y_2 = 0.05204$$

$$x_n = 2.74033$$

$$y_n = -0.000276$$

$\therefore$ Root of $2 \log_{10} x - 1.2 = 0$ is 2.74033

$\therefore$ Root of $2 \log_{10} x - 1.2 = 0$ is 2.74033

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

x	y
0	1
1	-2
2	1

$x_1 = 1$ $x_2 = 2$

$y_1 = -2$ $y_2 = 1$

$x_n = 1.6667$

$y_n = -1.03689$

$x_1 = 1.6667$ $x_2 = 2$

$y_1 = -1.03689$ $y_2 = 1$

$x_n = 1.83636$

$y_n = -0.152834$

$x_1 = 1.83636$ $x_2 = 2$

$y_1 = -0.152834$ $y_2 = 1$

$x_n = 1.85805$

$y_n = -0.01756$

$x_1 = 1.85805$ $x_2 = 2$

$y_1 = -0.01756$ $y_2 = 1$

$x_n = 1.86049$

$y_n = -0.002017$

$x_1 = 1.86049$ $x_2 = 2$

$y_1 = -0.002017$ $y_2 = 1$

$x_n = 1.86077$

$y_n = -0.00022$

$\therefore$ Root of $x^3 - 4x + 1 = 0$ is 1.86077

Q

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

x

0

1

2

y
-8

-5

8

$$x_1 = 1 \quad x_2 = 2$$

$$y_1 = -5 \quad y_2 = 8$$

$$x_n = 1.38462$$

$$y_n = -1.51109$$

$$x_1 = 1.38462 \quad x_2 = 2$$

$$y_1 = -1.51109 \quad y_2 = 8$$

$$x_n = 1.48239$$

$$y_n = -0.34752$$

$$x_1 = 1.48239 \quad x_2 = 2$$

$$y_1 = -0.34752 \quad y_2 = 8$$

$$x_n = 1.50394$$

$$y_n = -0.07466$$

$$x_1 = 1.50394 \quad x_2 = 2$$

$$y_1 = -0.07466 \quad y_2 = 8$$

$$x_n = 1.50853$$

$$y_n = -0.01577$$

$$x_1 = 1.50853 \quad x_2 = 2$$

$$y_1 = -0.01577 \quad y_2 = 8$$

$$x_n = 1.5094$$

$$y_n = -0.00467$$

$$x_1 = 1.5094 \quad x_2 = 2$$

$$y_1 = -0.00457 \quad y_2 = 8$$

$$x_n = 1.5097$$

$$y_n = -0.0007$$

∴ Root of $x^3 + 2x^2 - 8 = 0$ is 1.5097

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

$x \quad y$
 $0 \quad 1$
 $1 \quad -7$

$x_1 = 0 \quad x_2 = 1$

$y_1 = 1 \quad y_2 = -7$

$x_n = 0.125$

$y_n = -0.12305$

$x_1 = 0.125 \quad x_2 = 1$

$y_1 = -0.12305 \quad y_2 = -7$

$x_n = 0.10934$

$y_n = 0.01725$

$x_1, y_1 = 0.10934$

$y_1 = 0.01725$

$x_2 = 1$

$y_2 = -7$

$x_n = 0.111529$

$y_n = -0.00237$

$x_1 = 0.01725$

$x_2 = 1$

$y_1 = -0.00237$

$y_2 = -7$

$x_n = 0.01692$

$y_n = 0.84772$

$x_1 = 0.01692$

$x_2 = 1$

$y_1 = 0.01692$

$y_2 = -7$

$x_n = 0.01929$

$y_n = 0.82634$

$x_1 = 0.01929$

$x_2 = 1$

$y_1 = 0.8264$

$y_2 = -7$

$x_n = 0.12228$

$y_n = -0.09869$

$x_1 = 0.12228$

$x_2 = 1$

$y_1 = -0.09869$

$y_2 = -7$

$x_n = 0.10973$

$y_n = 0.01375$

$$x_1 = 0.10973$$

$$y_1 = 0.01375$$

$$x_n = 0.11148$$

$$y_n = -0.00193$$

$$x_2 = 1$$

$$y_2 = -7$$

$$x_1 = 0.11148 \quad x_2 = 1$$

$$y_2 = -0.00193 \quad y_2 = -7$$

$$x_n = 0.11123$$

$$y_n = 0.000306$$

$\therefore$ Root of $x^3 - 9x + 1 = 0$ is 0.11123

⑩ $x^3 - x - 4 = 0$

$$x$$

$$y$$

$$0$$

$$-4$$

$$1$$

$$-4$$

$$2$$

$$2$$

$$x_1 = 1 \quad x_2 = 2$$

$$y_1 = -4 \quad y_2 = 2$$

$$x_n = 1.6667$$

$$y_n = -1.0368$$

$$x_1 = 1.6667 \quad x_2 = 2$$

$$y_1 = -1.0368 \quad y_2 = 2$$

$$x_n = 1.7805$$

$$y_n = -0.13599$$

$$x_1 = 1.7805 \quad x_2 = 2$$

$$y_1 = -0.13599 \quad y_2 = 2$$

$$x_n = 1.79447$$

$$y_n = -0.01606$$

$$x_1 = 1.79447 \quad x_2 = 2$$

$$y_1 = -0.01606 \quad y_2 = 2$$

$$x_n = 1.79611$$

$$y_n = -0.001839$$

$$\alpha_1 = 1.79611 \quad \alpha_2 = 2$$

$$y_1 = -0.001839 \quad y_2 = 2$$

$$\alpha_n = 1.79629$$

$$y_n = -0.00028$$

$\therefore$ Root of $x^3 - x - 4 = 0$ is 1.79629

(10)