1)

x	y
7	3
8	1
9	1
10	9

$x = 9.5$

$$f(9.5) = \frac{(9.5-8)(9.5-9)(9.5-10)}{(7-8)(7-9)(7-10)} \times 3$$

$$+ \frac{(9.5-7)(9.5-9)(9.5-10)}{(8-7)(8-9)(8-10)} \times 1$$

$$+ \frac{(9.5-7)(9.5-8)(9.5-10)}{(9-7)(9-8)(9-10)} \times 1$$

$$+ \frac{(9.5-7)(9.5-8)(9.5-9)}{(10-7)(10-8)(10-9)} \times 9$$

$$= \frac{-0.375}{-6} \times 3 + \frac{-0.625}{2} \times 1 + \frac{-1.875}{-2} \times 1$$

$$+ \frac{1.875}{6} \times 9$$

$$= 0.1875 - 0.3125 + 0.9375 + 2.8125$$

$$= 3.625 //$$

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2)

x	y
3	168
7	120
9	72
10	63

$x = 6$

$$= f(6) = \frac{(6-7)(6-9)(6-10)}{(3-7)(3-9)(3-10)} \times 168 +$$

$$\frac{(6-3)(6-9)(6-10)}{(7-3)(7-9)(7-10)} \times 120 +$$

$$\frac{(6-3)(6-7)(6-10)}{(9-3)(9-7)(9-10)} \times 72 + \frac{(6-3)(6-7)(6-9)}{(10-3)(10-7)(10-9)} \times 63$$

$$= \frac{-12}{-168} \times 168 + \frac{36}{24} \times 120 + \frac{12}{-12} \times 72 + \frac{9}{+21} \times 63$$

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

$$= 147 //$$

3)

x	y
1	4
2	5
7	5
8	4

$x = 6$

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

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

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

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

$$= \frac{8}{-42} \times 4 + \frac{10}{30} \times 5 + \frac{-40}{-30} \times 5 + \frac{-20}{42} \times 4$$

$$= -0.761904761 + 1.66667 + 6.66667 + 1.9047619$$

$$= 5.666670334$$

X	Y
1	2
2	4
3	8
4	16
7	128

$\times 25$

Sol $$F(5) = \frac{(5-2)(5-3)(5-4)(5-7)}{(1-2)(1-3)(1-4)(1-7)} \times 2$$

$$+\frac{(5-1)(5-3)(5-4)(5-7)}{(2-1)(2-3)(2-4)(2-7)}\times 4+\frac{(5-1)(5-2)(5-4)(5-7)}{(3-1)(3-2)(3-4)(3-7)}\times 8$$

$$+\frac{(5-1)(5-2)(5-3)(5-7)}{(4-1)(4-2)(4-3)(4-7)}\times 16+\frac{(5-1)(5-2)(5-3)(5-4)}{(7-1)(7-2)(7-3)(7-4)}\times 128$$

$$=\frac{-12}{36}\times 2+\frac{-16}{-10}\times 4+\frac{-24}{8}\times 8+\frac{-48}{-18}\times 16$$

$$+\frac{24}{360}\times 128$$

$$=-0.66667+6.4-24+42.666667+8.53334$$

$$=32.933331$$

5)

X	Y
10	0.25
20	0.2
14	0.15
16	0.10

$x = 15$

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

$$+\frac{(15-10)(15-14)(15-16)}{(20-10)(20-14)(20-16)}\times 0.2+\frac{(15-10)(15-20)(15-16)}{(14-10)(14-20)(14-16)}\times 0.15$$

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

$$= \frac{5}{-240} \times 0.25 + \frac{-5}{240} \times 0.2 + \frac{25}{48} \times 0.15$$

$$+ \frac{-25}{-48} \times 0.10$$

$$= -0.005208334 + 0.004166667 + 0.078125$$

$$+ 0.052083333$$

$$= 0.120833324$$

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Homework 2

① $x^3+x-1=0$ b/w 0.5 & 1

x	y	
0.5	~~0.125~~ -0.375	
x_1 0.6	-0.184	y_1
x_2 0.7	0.043	y_2
0.8	0.312	
0.9	0.629	
1	1	

$$\bar{X}_2 \quad \frac{x_1y_2 - x_2y_1}{y_2 - y_1}$$

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

$$= \frac{0.0258 + 0.1288}{0.227} = \frac{0.1546}{0.227} = 0.6810573$$

$$\bar{y} = (0.68105)^3 + 0.68105 - 1$$
$$= -0.00304177$$

② $x^3 - 2x + 0.5 = 0$ b/w 0 & 1

x	y	
x_1 0	~~+0.5~~ 0.5	y_1
x_2 0.5	-0.375	y_2
1	-0.5	

$$\bar{x} = \frac{0(-0.375) - 0.5(0.5)}{-0.375 - 0.5} = 0.285714285$$

$$\bar{y} = (0.285714285)^3 - 2(0.285714285) + 0.5$$
$$= 0.523323615 - 0.57142857$$
$$= -0.048104955$$

③ $x^3 + 2x - 2020$ b/w 2 and 2.5

x	y	
2	-8	
2.1	-5.739	
2.2	-4.952	
2.3	-3.233	
x_1 2.4	-1.376	y_1
x_2 2.5	0.625	y_2

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

$$= \frac{1.5 + 3.44}{2.001} = 2.468765617$$

$$\bar{y} = (2.468765617)^3 + 2(2.468765617) - 20$$
$$= 15.04664175 + 4.937531234 - 20$$
$$= -0.015827$$

4) $3x - \cos x - 1 = 0$ b/w 0 & 1

x	y	
0	-2	
x_1 0.5	-0.37758	y_1
x_2 1	1.459897694	y_2

$$\bar{x} = \frac{0.5(1.459697694) - 1(-0.37758)}{1.459697694 + 0.37758}$$

$$= \frac{1.107428847}{1.837277694} = 0.602755288$$

$$\bar{y} = 3(0.602755288) - \cos(0.602755288) - 1$$
$$= 1.808265864 - 0.823776731 - 1$$
$$= -0.01551$$

5) $x^3 - 3x = 5$ b/w 2 & 2.5

x	y	
2	-3	
2.1	-2.039	
x_1 2.2	-0.952	y_1
x_2 2.3	0.267	y_2
2.4	1.624	
2.5	3.125	

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

$$= \frac{0.5874 + 2.1896}{1.219} = 2.278096801$$

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$\overline{Y} = (2.2780968801)^3 - 3(2.2780968801) - 5$

$= 11.822696 - 6.834290463 - 5$

$= -0.011594$

7) $x^3 - 4x + 120$

x	y	
x_1 0	1	y_1
x_2 1	-2	y_2
2	1	
3	16	

$\overline{X} = \frac{0 \times (-2) - 1(1)}{-2 - 1} = 0.3334$

$\overline{Y} = (0.33334)^3 - 4(0.33334) + 1$

$= 0.037039 - 1.33336 + 1$

$= -0.296321$

x	y
0.33334	-0.296321
0	+1

$\overline{X} = \frac{0.33334(1) - 1(-0.296321)}{-2 - 0.296321}$

$= \frac{-0.66668 + 0.296321}{-1.703679} = 0.217387782$

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$$\bar{Y} = (0.217387782)^3 - 4(0.217387782) + 1$$
$$= 0.010273191 - 0.869551128 + 1$$
$$= 0.140722063$$

x	Y
0.217387782	0.140722063
0	1

$$= \frac{0.217387782\,(1) - 0}{1 - 0.140722063}$$

$$= \frac{0.33334\,(1) - 0}{1 + 0.296321}$$
$$= 0.257143298$$

$$\bar{Y} = (0.257143298)^3 - 4(0.257143298) + 1$$
$$= 0.146482609 - 1.028573192 + 1$$
$$= 0.117909417$$

x	y
0.257143298	0.117909417
0	1

$$\bar{X} = \frac{0.257143298\,(1) - 0}{1 - 0.117909417} = \frac{0.257143298}{0.882090583}$$

$$= 0.29131575$$

$\overline{Y}_2 \quad (0.29151575)^3 - 4(0.29151573) + 1$

$= 0.02477342\overline{6} - 1.166063 + 1$

$= -0.14128957\overline{4}$

X	Y
0.29151575	-0.14128957$\overline{4}$
0.25714329$\overline{8}$	0.11790941$\overline{7}$

$X_2 = 0.29151575(0.11790941\overline{7}) - 0.25714329\overline{8}(-0.14128957\overline{4})$

$0.11790941\overline{7} + 0.14128957\overline{4}$

$= \frac{0.034372452 + 0.036331667}{0.25919899\overline{1}}$

$= \frac{0.07070411\overline{9}}{0.25919899\overline{1}} = 0.27277928$

$\overline{Y} = (0.27277928)^3 - 4(0.27277928) + 1$

$= 0.02029710\overline{6} - 1.09111712 + 1$

$= -0.07082$

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

x	y
0	-8
1	-5
2	8

x	y
1.0	-5
1.5	-0.125
2	8

x	y
1.5	-0.125
1.6	1.216

$$\bar{X}_2 = \frac{1.5 \times 1.216 - 1.6(-0.125)}{1.216 + 0.125}$$

$$= \frac{1.824 + 0.2}{1.341} = 1.509321402$$

$$\bar{Y} = (1.509322)^3 + 2(1.509322)^2 - 8$$

$$= 3.438312 + 4.5561022 - 8$$

$$= -0.00558$$

=

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

x	y	
0	1	
x_1 0.1	0.101	y_1
x_2 0.2	-0.792	y_2

$$\bar{x} = \frac{0.1(-0.792) - 0.2(0.101)}{-0.792 - 0.101}$$

$$= \frac{-0.0792 - 0.0202}{-0.893} = 0.111310 19$$

$$\bar{y} = (0.111310)^3 - 9(0.111310) + 1$$

$$= 0.001379128623 - 1.001 79171 + 1$$

$$= -0.000412$$

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

x	y	
0	-4	
1.-	-4	
x_1 1.5	-1.125	$= y_1$
x_2 2	2	$= y_2$

$$\bar{x} = \frac{1.5(2) - 2(-1.125)}{2 + 1.125} = \frac{3 + 2.25}{3.125}$$

$$= 1.68$$

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$\bar{Y} = 1.168(1.68)^3 - 1.68 - 4$

$= -0.938368$

x	y
1.68	-0.938368
2	2

$\bar{X} = \frac{1.68(2) - 2(-0.938368)}{2 + 0.938368}$

$= \frac{3.36 + 1.876736}{2.938368} = \frac{5.236736}{2.93836}$

$= 1.782196872$

$\bar{Y} = (1.782196872)^3 - 1.782196872 - 4$

$= 5.660659488 - 11 - 11$

$= -0.121537384$

x	y
1.7822	-0.12153
2	2

$\bar{X} = \frac{1.7822(2) - 2(-0.12153)}{2 + 0.12153} = \frac{3.5644 + 0.24306}{2.12153}$

$= 1.794676483$

$\bar{Y} = (1.794676)^3 - 1.794676 - 4$

$= -0.0142$