

Q1) Let $\sqrt{7+\sqrt{7}} = x$

Squaring both sides

$$7 + \sqrt{7+x} = x^2$$

$$\sqrt{7+x} = x^2 - 7$$

$$7+x = (x^2-7)^2$$

$$7+x = x^4 - 7x^2 + 49$$

$$x^4 - 7x^2 - x + 42 = 0$$

2) $7x^2 + 11y^2 = -4y^2 + 6y^2$

$$18x^2 = 2y^2$$

$$\frac{x^2}{y^2} = \frac{2}{18}$$

$$\left(\frac{x}{y}\right)^2 = \frac{1}{9}$$

$$\frac{x}{y} = \pm \frac{1}{3}$$

Date

3) $x + 3y = 4$

$$x^2 + y^2 - 4y = 12.$$

$$x = 4 - 3y \quad (2)$$

x in (1)

$$(4 - 3y)^2 + y^2 - 4y = 12.$$

$$16 + 9y^2 - 24y + y^2 - 4y = 12.$$

$$5y^2 - 14y + 2 = 0$$

$$y = \frac{14 \pm \sqrt{196 - 4 \times 5 \times 2}}{10}$$

$$y = 2.6489 \quad \text{or} \quad y = 6.1510$$

4) $(3 \cdot 5)^2 - 16(3 \cdot 5) + 34$

$$d = 2.5$$

$$\frac{d(d)}{dr} = 4r - 16 \Rightarrow r = 4 \quad \text{when } \frac{d}{dr} = 0$$

$$\frac{d^2}{dr^2}(d) = 4$$

$\therefore$ Min $r = 4$ per min (in hundred)

Date

c) $100 = 2x^2 - 16x - 34$

$0 = 2x^2 - 16x - 66$

$x = \frac{16 \pm \sqrt{256 + 528}}{4}$

$x = 11$ or $x = -3$

$x = 11$ as speed cannot be -ve

5) a) Company 1 :- $1500 + 25x > 0$

b) Company 2 :- $2100 + 22y > 0$

c) $1500 + 25x < 2100 + 22x$

6) $x^3 - 7x^2 + 14x - 6 = 0$ $x < 200$

a) $[0, 1]$

a	b	t	f(t)
0	1	1.5	2.625
0	1.5	0.75	0.98437
0	0.75	0.375	-1.68164
0.375	0.75	0.5625	0.16186
0.5625	0.75	0.65625	0.4557

Date

b) $[1, 3.2]$

a	b	t	f(t)
3.2	1	2.1	1.791
3.2	2.1	2.65	0.55215
3.2	2.65	2.925	0.8582
3.2	2.925	3.0625	-0.0544

c) $[3, 2, 4]$

a	b	t	f(t)
3.2	4	3.6	0.336
3.2	3.6	3.4	-6.0016
3.4	3.6	3.5	0.125
3.4	3.5	3.45	0.666125
3.4	3.45	3.425	0.01302
3.4	3.425	3.4125	-1.99×10^{-3}
3.4125	3.4125	3.4125	5.35×10^{-3}
3.4125	3.41875		

$$f'(x) = 970x^3 + 54x^2 + 18x - 221$$

(i) $[-1, 0]$

$$x_1 = 0$$

$$x_{p+1} = x_p - \frac{f(x_p)}{f'(x_p)}$$

$$x_2 = 0 - \frac{(-9)}{-221} \Rightarrow 0.040723$$

$$x_3 = -0.040 \Rightarrow 0.0409288$$

$$x_4 = -0.04065 \Rightarrow 0.04065988$$

(ii) Same as above

Q8 a) $70 + \frac{86+81+83+x}{5} = \frac{320+x}{5} = 4$

b) $90 > \frac{320+x}{5} \geq 80$

c) $450 > 320 + x \geq 400$
 $130 > x \geq 80$

Q9 $x_1 = 4\%$ $y_1 = 8.54$ @ IRR $y=0$
 $x_2 = 20\%$ $y_2 = -11.81$

$$\frac{x-4}{20-4} = \frac{0-8.54}{-11.81-8.54}$$

$$x = 10.71\%$$

Date.

$$g_{10}) \quad R(x) = 32x - 0.21x^2$$

$$C(x) = 195 + 12x$$

As $R(x) - C(x) = \text{Profit}$ i.e. $f(x)$

$$F(x) = 32x - 0.21x^2 - 195 - 12x$$

$$= 0.21x^2 - 20x + 195 = 0$$

$$x = 20 \pm \frac{\sqrt{(-20)^2 - 4(0.21)(195)}}{2 \times 0.21}$$

$$x = 84.2114$$

$$\text{OR } x = 11.0265$$

$$f'(x) = 0.42x - 20 > 0$$

$$0.42x > 20$$

$$x > 47.61$$

as order should be more than

$$47.61 \quad x = 84.2114$$