

Q1. $\sqrt{7 + \sqrt{7 + \sqrt{7 + \dots}}}$
 $\sqrt{7 + 7} = x$

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

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

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

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

Q2. $7x^2 - 6y^2 = -11x^2 - 4y^2$

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

$$\left(\frac{x}{y}\right)^2 = \frac{2}{18}$$

$$\frac{x}{y} = +1/3$$

Q3. $x + 3y = 4$
 $x^2 + y^2 - 4y = 12$ (1)

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

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

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

$$5y^2 - 14y + 4 = 0$$

$$y = \frac{2.6489}{0.1510} \text{ by quad eq.}$$

$$a) d = (3.5)^2 - 16(3.5) + 34$$

$$d = 25 \text{ (mill of particles / foot}^2\text{)}$$

$$b) \frac{d}{dx}(d) = 4x - 16 \rightarrow x = 4$$

$$\frac{d^2}{dx^2} = 4$$

$$\text{min}$$

$$x = 4$$

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

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

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

$$x = 11 \text{ or } x = -3$$

$\therefore x = 11$ as speed cannot be negative.

$$\text{Q5. a) company 1: } 1500 + 25x > 0$$

$$b) \text{ company 2: } 2100 + 22y > 0$$

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

$$3x < 600$$

$$x < 200$$

$$\text{or } d = (3.5)^2 - 16(3.5) + 34$$

$$d = 2.5 \text{ (mill of particles / foot}^3\text{)}$$

$$b) \frac{d}{dx}(d) = 4x - 16 \Rightarrow x = 4$$

$$\frac{d^2}{dx^2} = 4$$

$$\text{min } x = 4$$

$$(C) 100 = 2x^2 - 16x + 34$$

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

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

$$x = 11 \text{ or } x = -3$$

$\therefore x = 11$ as speed cannot be negative

$$\text{Q5. a) company 1 :- } 1500 + 25x > 0$$

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

$$3x < 600$$

$$x < 200$$

Ques. $x^3 - 7x^2 + 14x - 6 = 0$

a) $[0, 1]$

a	b	t	f(t)
0	1	1.5	2.625
0	1.5	0.75	0.984375
0	0.75	0.375	-1.68164
0.375	0.75	0.5625	0.16186
0.5625	0.75	0.65625	0.45547

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	-0.016
3.4	3.6	3.5	0.125
3.4	3.5	3.45	
3.4	3.425	3.425	-1.99×10^{-3}
3.4125	3.4125	3.4125	5.35×10^{-3}
3.4125	3.41875		
3.4125			

$$27. \quad f(x) = 230x^4 + 18x^3 + 9x^2 - 221x - 9$$

$$f'(x) = 920x^3 + 54x^2 + 18x - 221$$

$$i) \quad [-1, 0]$$

$$x_1 = 0$$

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$$

$$x_2 = 1.0 - \frac{(-9)}{-221} \Rightarrow -0.040723$$

$$x_3 = -0.040 \Rightarrow -0.0409288$$

$$x_4 = -0.04065 \Rightarrow -0.04065988$$

ii) Same $\uparrow$

$$\text{Ques. a) } \frac{70 + 86 + 81 + 83 + x}{5} = \frac{320 + x}{5} = \mu$$

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

$$c) \quad 450 > 320 + x > 400$$

$$130 > x > 80$$

$$\text{Ques. } x_1 = 4\% \quad , \quad y_1 = 8.54 \quad @ \text{ IRR, } y = 0$$

$$x_2 = 20\% \quad , \quad y_2 = -11.81$$

$$\frac{x - 4}{16} = \frac{-8.54}{-11.81 - 8.54}$$

$$x = 10.71\%$$

Q 10. $R(x) = 32x - 0.21x^2$
 $C(x) = 195 + 12x$

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

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

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

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

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

$$x = 84.2114 \quad / \quad 11.0266$$

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

$$0.42x > 20$$

$$x > 47.61$$

an order should be more than

47.61

$$x = 84.2114$$