

ASSIGNMENT - 1

$$1. \sqrt{7 + \sqrt{7 + \sqrt{7 + \sqrt{7}}}}$$

Let the above be x

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

Squaring both sides

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

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

again squaring

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

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

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

$$\begin{array}{l} x^4 - 7x^2 - x + 42 \\ \underline{x^4 - 6x^2 - 4x} \\ 10 \end{array}$$

$$\begin{array}{l} 9 = 3 \cdot 1926, \\ -2 \cdot 196 \end{array}$$

2.

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

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

$$10y^2 = -17x^2$$

$$\frac{-10}{17} = \frac{x^2}{y^2}$$

$$\sqrt{\frac{10}{17}} = \frac{x}{y}$$

$$\begin{array}{l} 7x^2 - 6y^2 \\ = -11x^2 - 4y^2 \end{array}$$

$$\begin{array}{l} 18x^2 - 2y^2 \\ \frac{x}{y} = \frac{1}{3} \end{array}$$

3

$$x + 3y = 4$$

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

$$x = 4 - 3y$$

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

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

$$10y^2 - 28y + 4 = 0$$

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

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

$$y = 2.6489 \quad y = 0.1510$$

4. $d = 2r^2 - 16r + 34$

a

$$r = 3.5$$

$$d = 2(3.5)^2 - 16(3.5) + 34 = 2.5$$

≈ 2.5 million particles per cubic foot

b

for minimum smoke

$$\frac{d}{dr} \geq 0$$

$$\frac{d}{dr} = 4r - 16 \geq 0$$

$$r \geq 4$$

c. $d \geq 100$

$$100 \geq 2x^2 - 16x + 54$$

$$x^2 - 8x - 33 \geq 0$$

$$x^2 - 11x + 5x - 33 \geq 0$$

$$(x-11)(x+3) \geq 0$$

$x \geq 11, -3$ (invalid).

speed of engine is 180 revolution/min

5

a company 1 - $1500 + 25x > 0$

b " 2 - $400 + 22x > 0$

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

$$3x < 600$$

$$x < 200$$

c

d

$$f(x) \rightarrow +ve - B$$

6.

$$x^3 - 7x^2 + 14x - 6 \quad [0, 1]$$

-	+		
a	b	$f(a)$	$f(b)$
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

1
2
3

$[3 \cdot 2, 1]$			
a	b	t	$t(t)$
3.2	2.1	2.1	1.791
3.2	2.1	2.65	0.552125
3.2	2.65	2.925	0.8582
3.2	2.925	3.0625	-0.0544

$[3 \cdot 2, 0]$			
a	b	t	$t(t)$
3.2	4	3.6	0.336
3.42	3.6	3.4	-0.016
3.4	3.6	3.5	0.125
3.4	3.5	3.45	0.046125

7.

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

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

i

$$[-1, 0]$$

$$x_1 = 0.$$

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

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

$$x_3 = -0.040723 - \frac{f(x_2)}{f'(x_2)} = -0.040659288$$

$$x_4 = -0.040659288 - \frac{f(x_3)}{f'(x_3)} = -0.04065988$$

ii same as above

$$\begin{array}{l} x = ? \\ x_1 = 4.1 \\ x_2 = 8.1 \end{array}$$

$$\begin{array}{l} y = 0 \\ y_1 = 8.54 \\ y_2 = -11.81 \end{array}$$

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

$$2.3829 = \frac{0.04}{x - 0.04}$$

$$59.57 = \frac{x - 1}{x - 0.04}$$

$$x - 0.04 = 0.0167$$

$$x = 5.67869$$

$$10. \begin{aligned} R(x) &= 32x - 0.21x^2 \\ C(x) &= 195 + 12x \end{aligned}$$

$$\therefore R - C = \text{profit}$$

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

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

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

$$a = 0.21 \quad b = -20 \quad c = 195$$

$$-b \pm \sqrt{b^2 - 4ac}$$

$$2a$$

$$x = 84.2114$$

$$x = 11.0666$$

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

$$0.42x > 20$$

$$x > 47.61$$

$\therefore$ Order should be more than 48

8) 70, 86, 81, 83

grade on final exam - u.

a)
$$\text{concrete average} = \frac{70 + 86 + 81 + 83 + u}{5} = \frac{320 + u}{5}$$

b)
$$80 \leq \frac{320 + u}{5} < 90$$

$$80 \leq x \leq 180$$

If we assume that all are out of 100

$$80 \leq x \leq 100$$