Solution

section : A

1) $2(-4)^2 + 5(-4) - 12 = 2(16) - 20 - 12$

$$= 32 - 32$$

$$= 0$$

$\therefore x = -4$ is a solution of $2x^2 + 5x - 12$.

2) $D = b^2 - 4ac$

$$= (10)^2 - 4(1)(25)$$

$$= 100 - 100$$

$D = 0$

$\therefore$ The roots of $x^2 + 10x + 25 = 0$ are equal & real.

3) $\left(\dfrac{1 - \tan\theta}{1 - \cot\theta}\right)^2 = \left(\dfrac{1 - \tan\theta}{1 - \dfrac{1}{\tan\theta}}\right)^2$

$$= \left(\dfrac{1 - \tan\theta}{(\tan\theta - 1)/\tan\theta}\right)^2$$

$$= \left(\dfrac{\tan\theta(1 - \tan\theta)}{(\tan\theta - 1)}\right)^2$$

$$= \dfrac{\tan^2\theta\,(1 - \tan\theta)^2}{(\tan\theta - 1)^2}$$

$$= \dfrac{\tan^2\theta\,(\tan\theta - 1)^2}{(\tan\theta - 1)^2} \qquad \because a^2 = (-a)^2$$

$$= \tan^2\theta$$

4) $\left(\dfrac{1}{\cos^2\theta} - 1\right)\left(1 - \dfrac{1}{\sin^2\theta}\right)$

$= \dfrac{1 - \cos^2\theta}{\cos^2\theta} \times \dfrac{\sin^2\theta - 1}{\sin^2\theta}$

$= \dfrac{\sin^2\theta}{\cos^2\theta} \times \dfrac{-\cos^2\theta}{\sin^2\theta}$

$\therefore \Big] \; 1 - \cos^2\theta = \sin^2\theta$
$\quad \& \; \sin^2\theta - 1 = -(1 - \sin^2\theta)$
$\qquad\qquad = -\cos^2\theta$

$= -1.$

8) $N =$

75 84 85

C.I.	freq.	Cf
74.5 – 84.5	8	8
84.5 – 94.5	11	19
94.5 – 104.5	26	45
104.5 – 114.5	81	76
114.5 – 124.5	18	94
124.5 – 134.5	4	98
134.5 – 144.5	2	100
	N = 100	

5)

$\dfrac{N}{2} = 50$

$\therefore$ median class = 104.5 – 114.5
$\therefore$ lower limit of median class = 104.5

6)

No.		freq
1	I	1
2	II	2
3	II	2
4	III	3
5	IIII I	6
6	II	2
7	II	2

$\therefore$ mode = 5

7)

x	f	$f_i x_i$
5	3	15
15	K	15K
25	3	75
35	6	210
45	2	90
	$\Sigma f_i = 14 + K$	$\Sigma f_i x_i = 390 + 15K$

$$\bar{X} = \frac{\Sigma f_i x_i}{\Sigma f_i}$$

$$25 = \frac{390 + 15K}{14 + K}$$

$$350 + 25K = 390 + 15K$$

$$10K = 40$$

$$\boxed{K = 4}$$

8)

$$\frac{x - 7 - (x + 4)}{(x + 4)(x - 7)} = \frac{11}{30}$$

$$\frac{x - 7 - x - 4}{x^2 - 3x - 28} = \frac{11}{30}$$

$$\frac{-11}{x^2 - 3x - 28} = \frac{11}{30}$$

$$\therefore \quad x^2 - 3x - 28 = -30$$

$$\therefore \quad x^2 - 3x - 28 + 30 = 0$$

$$\therefore \quad x^2 - 3x + 2 = 0$$

$$\therefore \quad x^2 - x - 2x + 2 = 0$$

$$\therefore \quad x(x - 1) - 2(x - 1) = 0$$

$$\therefore \quad (x - 1)(x - 2) = 0$$

$$\therefore \quad \boxed{x = 1} \quad \text{or} \quad \boxed{x = 2}$$