

## Class Test 2 : 1A

1. C

2. C

3. B

4. D

5. C

### Q2

a)  $-2x^2 - 12x - 9 = 0$

$$x^2 + 6x + \frac{9}{2} = 0$$

$$x^2 + 6x + 3^2 = 9 - \frac{9}{2} \quad | \quad x$$

$$(x + 3)^2 = \frac{9}{2} \quad |$$

$$x + 3 = \pm \sqrt{\frac{9}{2}} \quad |$$

$$x = -3 \pm \sqrt{\frac{9}{2}} \quad |$$

$$x = -3 \pm \frac{3}{\sqrt{2}}$$

$$= -3 \pm \frac{3\sqrt{2}}{2} \quad |$$

b)  $2x^2 + 3x + 5 = x^2$

$$x^2 + 3x + 5 = 0$$

$$x^2 + 3x = -5$$

$$x^2 + 3x + \left(\frac{3}{2}\right)^2 = -5 + \left(\frac{3}{2}\right)^2 \quad | \quad -5 + \frac{9}{4}$$

$$\left(x + \frac{3}{2}\right)^2 = -\frac{11}{4}$$

$$x + \frac{3}{2} = \pm \sqrt{-\frac{11}{4}}$$

$$x = -\frac{3}{2} \pm \frac{\sqrt{11}i}{2}$$

$$= \frac{-3 \pm \sqrt{11}i}{2}$$

QN 3

$$\begin{aligned} \textcircled{a} \vec{AB} &= \vec{OB} - \vec{OA} \\ &= (3-2)\mathbf{i} + (-2+1)\mathbf{j} + (5-4)\mathbf{k} \\ &= \mathbf{i} - \mathbf{j} + \mathbf{k}. \end{aligned}$$

$$\begin{aligned} \vec{BC} &= \vec{OC} - \vec{OB} \\ &= (-1-3)\mathbf{i} + (6+2)\mathbf{j} + (2-5)\mathbf{k} \\ &= -4\mathbf{i} + 8\mathbf{j} - 3\mathbf{k}. \end{aligned}$$

$$\begin{aligned} \vec{CA} &= \vec{OA} - \vec{OC} \\ &= (2+1)\mathbf{i} + (-1-6)\mathbf{j} + (4-2)\mathbf{k} \\ &= 3\mathbf{i} - 7\mathbf{j} + 2\mathbf{k}. \end{aligned}$$

$$\textcircled{b} |\vec{AB}| = \sqrt{1^2 + (-1)^2 + 1^2} = \sqrt{3},$$

$$\begin{aligned} |\vec{BC}| &= \sqrt{(-4)^2 + 8^2 + (-3)^2} \\ &= \sqrt{16 + 64 + 9} \\ &= \sqrt{89} \end{aligned}$$

$$\begin{aligned} |\vec{CA}| &= \sqrt{3^2 + (-7)^2 + 2^2} \\ &= \sqrt{9 + 49 + 4} \\ &= \sqrt{62}. \end{aligned}$$

$$\begin{aligned} \textcircled{c} \cos \theta &= \frac{\vec{AB} \cdot \vec{BC}}{|\vec{AB}| |\vec{BC}|} = \frac{-4 - 8 - 3}{\sqrt{3} \sqrt{89}} \\ &= \frac{-15}{\sqrt{267}} = -0,917985 \\ \theta &= 156,63^\circ. \end{aligned}$$

④. Not parallel, not orthogonal; dot product is not zero; cross product is not a zero vector  $(0, 0, 0)$

Q N 4:

$x$  = no of student tickets.

$y$  = no of adult tickets

$z$  = no of children's tickets

①  $12x + 16y + 7z = 33043$  b

$y + z = \frac{1}{2}x$   $\therefore 2y + 2z = x$

②  $\therefore x - 2y - 2z = 0$

$y = 4z$

③  $y - 4z = 0$

$$\begin{array}{r} 6 \quad 2\frac{1}{2} \\ 4 \frac{1}{2} \\ 2 \\ 2 \\ \hline 3 \end{array}$$

$$\begin{pmatrix} 12 & 16 & 7 \\ 1 & -2 & -2 \\ 0 & 1 & -4 \end{pmatrix} \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 33043 \\ 0 \\ 0 \end{pmatrix}$$

Det:  $12(8+2) - 16(-4-0) + 7(1-0)$   
 $= 120 + 64 + 7$   
 $= 191.$

Cofactors:  $\begin{bmatrix} + (8+2) & - (-4-0) & + (1-0) \\ - (-64-7) & + (-48-0) & - (12-0) \\ + (-32+14) & - (-24-7) & + (-24-16) \end{bmatrix}$

$$= \begin{pmatrix} 10 & 4 & 1 \\ 71 & -48 & -12 \\ -18 & 31 & -40 \end{pmatrix}$$

Adjunct  $\begin{pmatrix} 10 & 71 & -18 \\ 4 & -48 & 31 \\ 1 & -12 & -40 \end{pmatrix}$

Inverse:  $\frac{1}{191} \begin{pmatrix} 10 & 71 & -18 \\ 4 & -48 & 31 \\ 1 & -12 & -40 \end{pmatrix}$

$$\frac{1}{191} \begin{pmatrix} 10 & 71 & -18 \\ 4 & -48 & 31 \\ 1 & -12 & -40 \end{pmatrix} \begin{pmatrix} 33043 \\ 0 \\ 0 \end{pmatrix}$$

$$\frac{1}{191} \begin{pmatrix} 330 & 430 \\ 132 & 172 \\ 33 & 043 \end{pmatrix} = \begin{pmatrix} 1730 \\ 692 \\ 173 \end{pmatrix} = \begin{pmatrix} x \\ y \\ z \end{pmatrix}$$

1730 student tickets 692 adult tickets 173 = chn tickets

Qn 5.

$$a) \begin{pmatrix} 8 & 4 & 8 \\ 2 & 10 + \sqrt{2} & 3 \\ 5 & -3 & 10^{2/3} \end{pmatrix} \Rightarrow \begin{pmatrix} 8 & 4 & 8 \\ 2 & 11,41 & 3 \\ 5 & -3 & 10,67 \end{pmatrix}$$

$$b) \begin{bmatrix} -11 & 8,5 & 17 \\ 2,5 & -0,7574 & 12,5 \\ 8 & -12,5 & -3 \end{bmatrix}$$

$$c) \begin{pmatrix} 30 + 1,5 & -18 \\ 3 + 15 + 9 \\ 6 + 1,5 & -90 \end{pmatrix} = \begin{pmatrix} 13,5 \\ 27 \\ -82,5 \end{pmatrix}$$