

2. Matrices

1. $C = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ <p>Let $\begin{pmatrix} 1 & 1 & 3 \\ 4 & 1 \end{pmatrix} \begin{pmatrix} a & b \\ c & d \end{pmatrix} = \begin{pmatrix} 2 & 4 \\ 3 & 6 \end{pmatrix}$</p> $(11a + 3c = 2) \times 1 \quad (11b + 3d = 4) \times 1$ $(4a + c = 3) \times 3 \quad (4b + d = 6) \times 3$ $11a + 3c = 2 \quad 11b + 3d = 4$ $12a + 3c = 9 \quad 12b + 3d = 18$ $a = 7 \quad b = 14$ $c = -25 \quad d = -50$ $\therefore C = \begin{pmatrix} 7 & 14 \\ -25 & -50 \end{pmatrix}$	M ₁ M ₁ A ₁ 3	Alternative $C = B^{-1}A$ ✓ equations B^{-1} $\begin{pmatrix} -1 & 3 \\ 4 & -11 \end{pmatrix}$ allow any two ✓ solving of equations $\begin{pmatrix} -1 & 3 \\ 4 & -11 \end{pmatrix} \begin{pmatrix} 2 & 4 \\ 3 & 6 \end{pmatrix}$ or equivalent
2. $\begin{pmatrix} 2 & 3 \\ -3 & 2 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 13 \\ 0 \end{pmatrix}$ <p>Det $4 - (-9) = 13$</p> $\frac{1}{13} \begin{pmatrix} 2 & -3 \\ 3 & 2 \end{pmatrix} \begin{pmatrix} 2 & 3 \\ -3 & 2 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{13} \begin{pmatrix} 2 & -3 \\ 3 & 2 \end{pmatrix} \begin{pmatrix} 13 \\ 0 \end{pmatrix}$ $\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$ $x = 2, y = 3$	M1 M1 A1	
	03	

I.

$$\begin{bmatrix} \quad \end{bmatrix} \begin{bmatrix} \quad \end{bmatrix} = \begin{bmatrix} \quad \end{bmatrix}$$

Premultiplication by the inverse.

Simplification.

C.A.O

$$\begin{bmatrix} \quad \end{bmatrix} \begin{bmatrix} \quad \end{bmatrix} \begin{bmatrix} \quad \end{bmatrix} = \begin{bmatrix} \quad \end{bmatrix} \begin{bmatrix} \quad \end{bmatrix} \begin{bmatrix} \quad \end{bmatrix}$$

$$\begin{bmatrix} \quad & \end{bmatrix} \begin{bmatrix} \quad \\ \nu \end{bmatrix} = \begin{bmatrix} \quad \end{bmatrix}$$

$$\begin{bmatrix} \quad \end{bmatrix} = \begin{bmatrix} \quad \end{bmatrix}$$

$a = 2 \checkmark$ and $b = 3 \checkmark$

2. $(x-3) - (2x) = 0$

$$x-3-2x = 0$$

$$-2x + x - 3 = 0$$

$$-x - 3 = 0$$

$$x = 3$$

3.

$$\begin{bmatrix} \quad & \end{bmatrix} \begin{bmatrix} \quad \\ \text{Determinant} \end{bmatrix} = \begin{bmatrix} \quad \end{bmatrix}$$

$$\text{Determinant} = +65 - 49 = 16$$

$$C^I = \begin{bmatrix} 1 & -5 & 7 \end{bmatrix}$$

$$\begin{bmatrix} \quad \end{bmatrix}$$

4.

$$\begin{bmatrix} 3 & 2 \\ 2 & 2 \end{bmatrix} \begin{bmatrix} \quad \end{bmatrix} = \begin{bmatrix} \quad \end{bmatrix}$$

$$\underbrace{\begin{bmatrix} \quad \\ \quad \end{bmatrix}}_{\begin{matrix} a \\ c \end{matrix}} \begin{matrix} 9 \\ = 2 \end{matrix}$$

$$a = 7$$

$$c = -6$$

$$3b + 2d = -3$$

$$\underline{2b + 2d = 1}$$

$$b = -4$$

$$d = 4.5$$

$$A = \begin{bmatrix} \quad \end{bmatrix}$$

5. $20x (-3 - 8)$

100 area of 1st image.

$$100x (4 - 3)$$

700 area of 2nd image

6. Det. $9 + 2 = 11$

$$A^I = \frac{1}{11} \begin{bmatrix} \quad \end{bmatrix}$$

$$\begin{bmatrix} \quad \end{bmatrix} \begin{bmatrix} \quad \end{bmatrix} = \begin{bmatrix} \quad \end{bmatrix}$$

$$\begin{pmatrix} 3 & -I & y \\ \end{pmatrix} = \frac{I}{II} \begin{pmatrix} & & \\ & & \\ \end{pmatrix} \begin{pmatrix} & & \\ & & \\ \end{pmatrix}$$

$$\begin{pmatrix} & & \\ & & \\ \end{pmatrix} = \frac{I}{II} \begin{pmatrix} & & \\ & & \\ \end{pmatrix}$$

$$\begin{pmatrix} & & \\ & & \\ \end{pmatrix} = \begin{pmatrix} & & \\ & & \\ \end{pmatrix}$$

$$P(2, 2)$$

7. $PQ = \begin{pmatrix} & & \\ & & \\ \end{pmatrix} \begin{pmatrix} & & \\ & & \\ \end{pmatrix} = \begin{pmatrix} & & \\ & & \\ \end{pmatrix}$

$$\begin{pmatrix} & & \\ & & \\ \end{pmatrix} \begin{pmatrix} & & \\ & & \\ \end{pmatrix} \begin{pmatrix} & & \\ & & \\ \end{pmatrix} = \begin{pmatrix} & & \\ & & \\ \end{pmatrix} \begin{pmatrix} & & \\ & & \\ \end{pmatrix}$$

$$\begin{pmatrix} & & \\ & & \\ \end{pmatrix} = \begin{pmatrix} & & \\ & & \\ \end{pmatrix}$$

$$x = I \quad y = -2$$

8. $\begin{array}{rcl} \frac{1}{2}x - \frac{1}{4}y = 2 \\ \frac{2}{5} + \frac{1}{6} = 6 \\ 2x - y = 8 \end{array}$

$$12x + 5y = 180$$

$$\underline{10x - 5y = 40} \quad +$$

$$22x = 220$$

$$x = 10$$

$$\frac{1}{4}y = \frac{1}{2}(10) - 2$$

$$\frac{1}{4}y = 5 - 2 = 3$$

$$Y = 12$$

9. $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$

$$= \begin{pmatrix} & & \\ & & \\ \end{pmatrix} \begin{pmatrix} X^1 & Y^1 & Z^1 \\ -1 & -2 & -6 \\ 1 & 4 & 9 \end{pmatrix}$$

$$= \begin{pmatrix} & & \\ & & \\ \end{pmatrix}$$

$$= \begin{vmatrix} 1 & 4 & 9 \\ -1 & -2 & -6 \end{vmatrix}$$

Final image $X^{II} Y^{II} Z^{II}$

$X^{II}(1, -1), Y^{II}(4, -2), Z^{II}(9, -6)$

10.

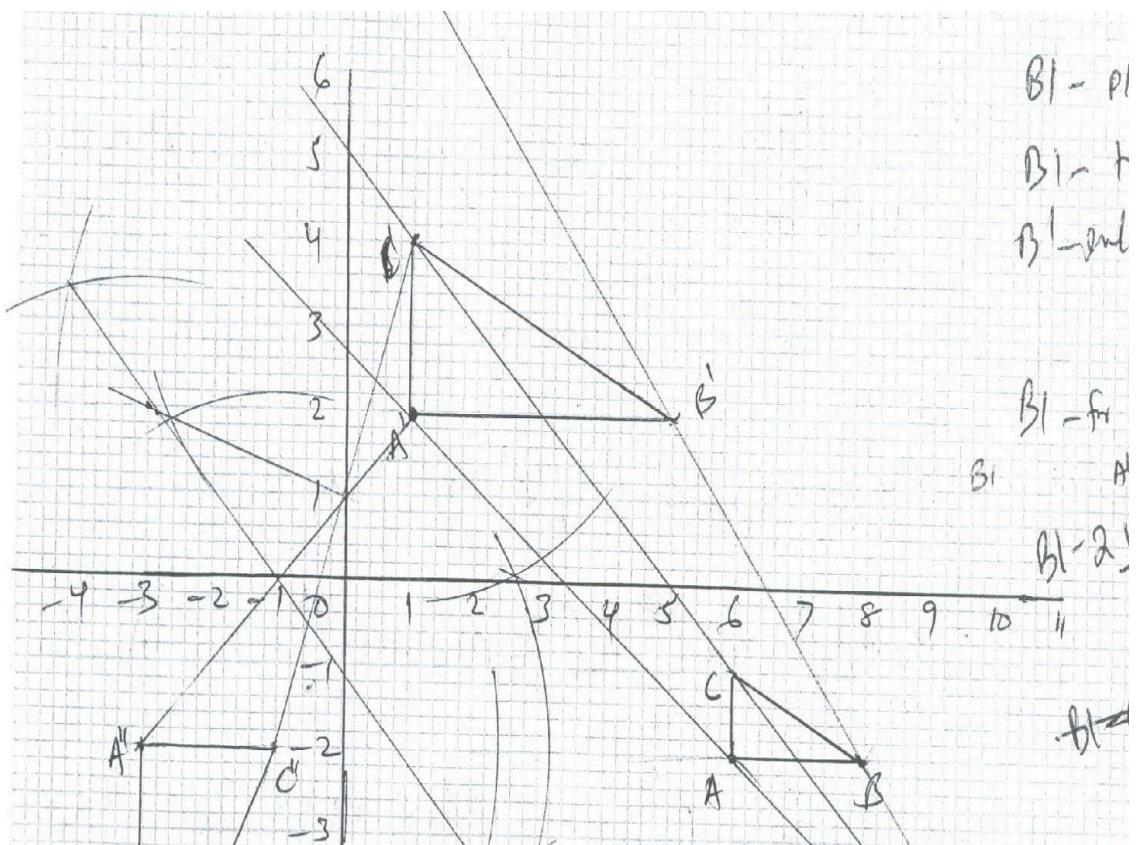
$P \quad Q \quad R \quad A \quad B \quad C$

$$a): \begin{bmatrix} \quad \\ v \end{bmatrix} \begin{bmatrix} \quad \\ -1 \quad -2 \end{bmatrix} = \begin{bmatrix} \quad \\ 2 \quad 2 \end{bmatrix}$$

(c) Centre (-3,2)

$$a) \begin{bmatrix} \quad \\ \end{bmatrix} \begin{bmatrix} A & B & C \\ \end{bmatrix} = \begin{bmatrix} \quad \\ \end{bmatrix}$$

Angle + 90°



$$11. \quad \text{Det} \begin{vmatrix} 2 & -3 \\ 1 & 5 \end{vmatrix} = 5$$

$$\text{Area of } A^I B^I C^I = 5 \times 15$$

$$= 75 \text{ cm}^2$$

$$12. \quad A.S.F = \frac{110}{10} = 11$$

$$5X(X) - 6 = 11$$

$$5X^2 + 6 = 11$$

$$5X^2 = 5$$

$$X^2 = 1$$

$$X = \pm 1$$

13. Area of the image = Area of the object \times Det.

$$\text{Det. } (\Delta) = 15 - 18 = -3$$

$$54 \text{ cm}^2 = A \times -3$$

$$\frac{54}{3} \text{ cm}^2 = A$$

$$\text{Area of } \Delta ABC = 18 \text{ cm}^2$$

$$14. \quad \text{Det. } 9 + 2 = 11$$

$$A^I = \frac{I}{II} \begin{bmatrix} & \\ & \end{bmatrix}$$

$$\begin{bmatrix} & \end{bmatrix} \begin{bmatrix} & \end{bmatrix} \begin{bmatrix} & \end{bmatrix}$$

$$\begin{bmatrix} & \end{bmatrix} = \frac{I}{II} \begin{bmatrix} & \\ & \end{bmatrix} \begin{bmatrix} & \end{bmatrix}$$

$$\begin{bmatrix} & \end{bmatrix} = \frac{I}{II} \begin{bmatrix} & \end{bmatrix}$$

$$\begin{bmatrix} & \end{bmatrix} = \begin{bmatrix} & \end{bmatrix}$$

$$P(2, 2)$$