

COMPLEX NUMBERS & MATRICES (Q 3, PAPER 1)

LESSON NO. 5: MATRIX EQUATIONS

2006

3 (b) (i) Use matrix methods to solve the simultaneous equations

$$4x - 2y = 5$$

$$8x + 3y = -4$$

(ii) Find the two values of k which satisfy the matrix equation

$$(1 \quad k) \begin{pmatrix} 3 & 4 \\ -2 & 1 \end{pmatrix} \begin{pmatrix} 1 \\ k \end{pmatrix} = 11$$

2004

3 (c) Let $A = \begin{pmatrix} 1 & -3 \\ -1 & 2 \end{pmatrix}$ and $P = \begin{pmatrix} 4 & 3 \\ -2 & -1 \end{pmatrix}$.

(i) Evaluate $A^{-1}PA$ and hence $(A^{-1}PA)^{10}$.

(ii) Use the fact that $(A^{-1}PA)^{10} = A^{-1}P^{10}A$ to evaluate P^{10} .

2001

3 (b) (i) Write the simultaneous equations

$$x - \sqrt{3}y = -2$$

$$\sqrt{3}x + y = 2\sqrt{3}$$

in the form $A \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} -2 \\ 2\sqrt{3} \end{pmatrix}$ where A is a 2×2 matrix.

(ii) Then, find A^{-1} and use it to solve the equations for x and y .

ANSWERS

2006 3 (b) (i) $x = \frac{1}{4}$, $y = -2$ (ii) $k = -4, 2$

2004 3 (c) (i) $\begin{pmatrix} 1 & 0 \\ 0 & 1024 \end{pmatrix}$ (ii) $\begin{pmatrix} 3070 & 3069 \\ -2046 & -2045 \end{pmatrix}$

2001 3 (b) (i) $A = \begin{pmatrix} 1 & -\sqrt{3} \\ \sqrt{3} & 1 \end{pmatrix}$ (ii) $A^{-1} = \frac{1}{4} \begin{pmatrix} 1 & \sqrt{3} \\ -\sqrt{3} & 1 \end{pmatrix}$; $x = 1$, $y = \sqrt{3}$