COMPLEX NUMBERS & MATRICES (Q 3, PAPER 1)

2008

3 (a) Let A be the matrix $\begin{pmatrix} 3 & 5 \\ 1 & 2 \end{pmatrix}$.

Find the matrix B, such that $AB = \begin{pmatrix} 4 & 6 \\ 3 & 2 \end{pmatrix}$.

(b) (i) Let $z = \dfrac{5}{2+i} - 1$, where $i^2 = -1$.

Express z in the form $a + bi$ and plot it on an Argand diagram.

(ii) Use De Moivre's theorem to evaluate z^6.

(c) Prove, by induction, that
$$(\cos\theta + i\sin\theta)^n = \cos n\theta + i\sin n\theta \text{ for } n \in \mathbf{N}.$$

ANSWERS

3 (a) $\begin{pmatrix} -7 & 2 \\ 5 & 0 \end{pmatrix}$

(b) (i) $z = 1 - i$ (ii) $8i$