## COMPLEX NUMBERS & MATRICES (Q 3, PAPER 1)

## 2007

3 (a) Let $A = \begin{pmatrix} \frac{1}{2} & \frac{1}{4} \\ 3 & \frac{3}{2} \end{pmatrix}$. Find $A^2 - 2A$.

(b) Let $z = -1 + i$, where $i^2 = -1$.
   (i) Use De Moivre's theorem to evaluate $z^5$ and $z^9$.

   (ii) Show that $z^5 + z^9 = 12z$.

(c) (i) Find the two complex numbers $a + bi$ for which $(a + bi)^2 = 15 + 8i$.

   (ii) Solve the equation $iz^2 + (2 - 3i)z + (-5 + 5i) = 0$.

**ANSWERS**

3 (a) $\begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$

(b) (i) $z^5 = 4 - 4i, z^9 = -16 + 16i$

(c) (i) $\pm(4 + i)$    (ii) $2 - i, 1 + 3i$