Complex Numbers & Matrices (Q 3, Paper 1)

Lesson No. 2: Complex Number Equations

2006

3 (a) Given that $z = 2 + i$, where $i^2 = -1$, find the real number d such that $z + \frac{d}{z}$ is real.

2005

3 (b) Solve the quadratic equation $2iz^2 + (6 + 2i)z + (3 - 6i) = 0$, where $i^2 = -1$.

2004

3 (a) Find the real numbers p and q such that $2(p + iq) + i(p - iq) = 5 + i$, where $i^2 = -1$.

2003

3 (b) (ii) k is a real number such that $\frac{-1 + i\sqrt{3}}{-4\sqrt{3} - 4i} = ki$. Find k.

2002

3 (b) (ii) w is a complex number such that $w\bar{w} - 2iw = 7 - 4i$, where $\bar{w}$ is the complex conjugate of w.
Find two possible values of w. Express each in the form $p + qi$, where $p, q \in \mathbf{R}$.

2001

3 (b) (ii) Show that $z^2 - 16$ is a factor of $z^3 + (1 + i)z^2 - 16z - 16(1 + i)$ and hence, find the three roots of $z^3 + (1 + i)z^2 - 16z - 16(1 + i) = 0$.

Answers

2006 3 (a) $d = 5$

2005 3 (b) $z = \frac{1 + 3i}{2}, \frac{-3 + 3i}{2}$

2004 3 (a) $p = 3, q = -1$

2003 3 (b) (ii) $k = -\frac{1}{4}$

2002 3 (b) (i) $t = -4$ (ii) $2 - 3i, 2 + i$

2001 3 (a) (i) $u = \frac{3}{5} + \frac{4}{5}i$ (ii) $|u| = 1$