COMPLEX NUMBERS (Q 4, PAPER 1)

1996

4 (a) Let $z = 1 - 4i$, where $i^2 = -1$.
Plot z and $2 + z$ on an Argand diagram.

(b) Let $w = (1 - 3i)(2 + i)$.

Express w in the form $p + qi, \quad p, q \in \mathbf{R}$.

Verify that

$$|w + \bar{w}| = |w - \bar{w}|,$$

where $\bar{w}$ is the complex conjugate of w.
For what value of a is

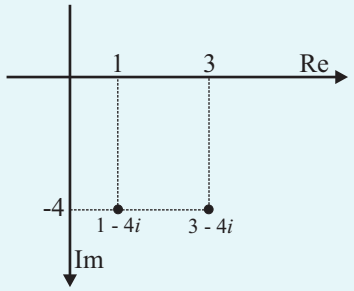
$$\frac{\bar{w}}{2i} = aw,$$

where $a \in \mathbf{R}$?

(c) Let $z = 2 - i$ be one root of the equation $z^2 + pz + q = 0, \quad p, q \in \mathbf{R}$.
Find the value of p and the value of q.

ANSWERS

4 (a)



(b) $w = 5 - 5i, \; a = \frac{1}{2}$

(c) $p = -4, \; q = 5$