

Complex Nos Question – Possible Solution

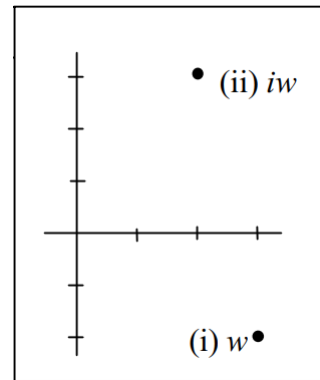
(a) Let  $w = 3 - 2i$ , where  $i^2 = -1$

Plot

(i)  $w$  and

(ii)  $iw$  on an Argand diagram.

Label each point clearly.



(a) (ii) plot  $iw$

$$\begin{aligned} i.w &= i.(3 - 2i) = 3i - 2i^2 \\ &= 2 + 3i \end{aligned}$$

(b) Solve  $(x + 2yi)(1 - i) = 7 + 5i$  for real  $x$  and for real  $y$ .

	$x - xi + 2yi - 2yi^2 = 7 + 5i$ $x - xi + 2yi + 2y = 7 + 5i$ <p>or:</p> $(x + 2y) + (-x + 2y)i = 7 + 5i$ $\begin{array}{r} x + 2y = 7 \\ -x + 2y = 5 \end{array} \quad \left. \begin{array}{l} \\ - \end{array} \right\}$ $4y = 12$ $\Rightarrow y = 3 \text{ and } x = 1$
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(c) Let  $z_1 = 3 + 4i$  and  $z_2 = 12 - 5i$ .

$\bar{z}_1$  and  $\bar{z}_2$  are the complex conjugates of  $z_1$  and  $z_2$ , respectively.

Show that  $z_1\bar{z}_2 + \bar{z}_1z_2$  is a real number.

	$\begin{aligned} z_1\bar{z}_2 &= (3 + 4i)(12 + 5i) \\ &= 36 + 15i + 48i + 20i^2 \\ &= 16 + 63i \end{aligned}$ $\begin{aligned} \bar{z}_1z_2 &= (3 - 4i)(12 - 5i) \\ &= 36 - 15i - 48i + 20i^2 \\ &= 16 - 63i \end{aligned}$ $\Rightarrow z_1\bar{z}_2 + \bar{z}_1z_2 = 32 \dots$
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