CURVES AND REGIONS ON THE ARGAND DIAGRAM

1 If $z = x + iy$, the Cartesian equation $x - y = 0$ represents:

A $\arg z = \frac{\pi}{4}$ **B** $|z + 2i| = |z + 2|$ **C** $\arg z = -\frac{3\pi}{4}$ **D** $|z + 2i| = |z - 2|$

3 On Argand diagrams, show the curves or regions described by the following.

(a) $|z| = 4$ **(b)** $|z| \leq 2$ **(c)** $1 \leq |z| \leq 3$ **(d)** $\left|z - (1 + \sqrt{3}i)\right| = 2$ **(e)** $|z - 2 + 2i| = 3$

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4 On Argand diagrams, show the curves or regions described by the following.

(a) $\arg z = \frac{\pi}{3}$ **(b)** $\arg z = \frac{2\pi}{3}$ **(c)** $-\frac{\pi}{3} \leq \arg z \leq \frac{2\pi}{3}$

5 Show the following on the complex plane.

(a) $\text{Re}(z) = 2$ **(b)** $\text{Im}(z) = -1$ **(c)** $\text{Re}(z) + \text{Im}(z) = 1$ **(d)** $\text{Re}(z) < \text{Im}(z)$ **(e)** $z + \bar{z} = 6$

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(f) $z - \overline{z} = 4i$ **(g)** $2|z| = z + \overline{z} + 4$ **(h)** $|z^2 - (\overline{z})^2| \geq 16$ **(i)** $|z + 2 - 4i| = 2|z - 4 - i|$

6 On Argand diagrams, show:

(a) the region where $|z-1| \leq 1$ and $\text{Im}(z) \geq 0$ are both true

(b) the intersection of $2 \leq |z| \leq 3$ and $-\frac{\pi}{2} \leq \arg z \leq \frac{\pi}{4}$

(c) the intersection of $-\frac{\pi}{3} \leq \arg z \leq \frac{\pi}{3}$ and $\text{Re}(z) < 2$

(d) the intersection of $|z| \leq 3$ and $\text{Re}(z) + \text{Im}(z) \leq 3$

(e) the region common to $z\bar{z} \leq 4$ and $z + \bar{z} \leq 2$.