

Section 1: Modulus and argument

Exercise level 1

1. Given that $z = 4 - 3i$ and $w = 1 + 2i$ find

(i) $|z|$ (ii) $|2w|$ (iii) $\left| \frac{z}{w} \right|$

2. Find the exact value of the following

(i) $\arg(1+i)$ (ii) $\arg(-i)$ (iii) $\arg(3-3i)$

3. Write each of the following in modulus-argument form

(i) $3 + 4i$
(ii) $1 - i$
(iii) $-\sqrt{3} - i$

4. Write each complex number in the form $x + yi$.

(i) $|z| = 3, \arg z = \frac{\pi}{4}$ (ii) $|z| = 6, \arg z = \frac{2\pi}{3}$
(iii) $|z| = 2, \arg z = -\frac{\pi}{6}$

5. The complex numbers z and w are defined as

$$z = 2(\cos 1.2 + i \sin 1.2) \text{ and } w = 3(\cos 0.5 + i \sin 0.5).$$

Write the following complex numbers in the form $r(\cos \theta + i \sin \theta)$, where $r > 0$ and $-\pi < \theta \leq \pi$.

(i) zw (ii) $\frac{z}{w}$ (iii) $\frac{w}{z}$

6. The complex numbers z and w are defined as

$$z = 6\left(\cos \frac{5\pi}{6} + i \sin \frac{5\pi}{6}\right) \text{ and } w = 4\left(\cos\left(-\frac{\pi}{4}\right) + i \sin\left(-\frac{\pi}{4}\right)\right).$$

Write the following complex numbers in the form $r(\cos \theta + i \sin \theta)$, where $r > 0$ and $-\pi < \theta \leq \pi$.

(i) zw (ii) $\frac{z}{w}$ (iii) $\frac{w}{z}$