

2.2) Modulus and argument

Worked example

Determine the modulus and argument:

$$4 + 3i$$

$$-1 + i$$

$$-2i$$

$$-1 - 3i$$

Your turn

Determine the modulus and argument:

$$8 + 6i$$

$$\text{Modulus} = 10$$

$$\text{Argument} = 0.644 \text{ (3 sf)}$$

$$1 - i$$

$$\text{Modulus} = \sqrt{2}$$

$$\text{Argument} = -\frac{\pi}{4}$$

$$-2$$

$$\text{Modulus} = 2$$

$$\text{Argument} = \pm\pi$$

$$-1 + 3i$$

$$\text{Modulus} = \sqrt{10}$$

$$\text{Argument} = 1.25 \text{ (3 sf)}$$

Worked example

$$z = 3 - 2i$$

Find:

a) z^2

b) $|z^2|$

c) $\arg(z^2)$

d) Show z and z^2 on an Argand diagram

Your turn

$$z = 2 - 3i$$

Find:

a) z^2

b) $|z^2|$

c) $\arg(z^2)$

d) Show z and z^2 on an Argand diagram

(a) $-5 - 12i$

(b) 13

(c) -1.97 (3 sf)

(d) Shown

Worked example

$$w = 2 + 3i$$

Given that $\arg(\lambda + 5i + w) = \frac{\pi}{4}$, where λ is a real constant, find the value of λ

Your turn

$$w = 2 + 5i$$

Given that $\arg(\lambda + 3i + w) = \frac{\pi}{4}$, where λ is a real constant, find the value of λ

$$\lambda = 6$$

Worked example

The complex numbers w and z are given by $w = k - i$ and $z = 3 - 5ki$, where k is a real constant. Given that $\arg(w + z) = \frac{\pi}{3}$, find the exact value of k

Your turn

The complex numbers w and z are given by $w = k + i$ and $z = -4 + 5ki$, where k is a real constant. Given that $\arg(w + z) = \frac{2\pi}{3}$, find the exact value of k

$$k = \frac{21\sqrt{3} - 17}{22}$$

Worked example

The complex numbers w and z are defined such that $\arg w = \frac{\pi}{20}$, $|w| = 3$ and $\arg z = \frac{7\pi}{20}$.

Given that $\arg(w + z) = \frac{\pi}{4}$, find the value of $|z|$

Your turn

The complex numbers w and z are defined such that $\arg w = \frac{\pi}{10}$, $|w| = 5$ and $\arg z = \frac{2\pi}{5}$.

Given that $\arg(w + z) = \frac{\pi}{5}$, find the value of $|z|$

2.63 (3 sf)