

Problem 1

[6 marks]

Consider the complex numbers $z_1 = 1 + \sqrt{3}i$, $z_2 = 1 + i$ and $w = \frac{z_1}{z_2}$.

(a) By expressing z_1 and z_2 in modulus-argument form write down

(i) the modulus of w ;

(ii) the argument of w .

[4]

(b) Find the smallest positive integer value of n , such that w^n is a real number.

[2]

Problem 2

[6 marks]

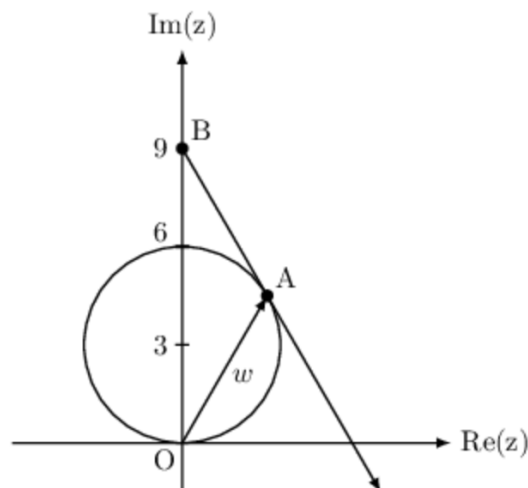
It is given that $z = 5 + qi$ satisfies the equation $z^2 + iz = -p + 25i$, where $p, q \in \mathbb{R}$.

Find the value of p and the value of q .

Problem 3

[6 marks]

A circle of radius 3 and centre (0,3) is drawn on an Argand diagram. The tangent to the circle from the point B(0,9) meets the circle at the point A as shown. Let $w = \overrightarrow{OA}$.



(a) Show that $|w| = 3\sqrt{3}$.

[2]

(b) Find $\arg w$.

[2]

(c) Hence write w in the form $a + bi$ where $a, b \in \mathbb{R}$.

[2]