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6. The complex number z is defined by

$$z = -\lambda + 3\mathrm{i} \quad \text{where } \lambda \text{ is a positive real constant}$$

Given that the modulus of z is 5

(a) write down the value of λ

(1)

(b) determine the argument of z, giving your answer in radians to one decimal place.

(2)

In part (c) you must show detailed reasoning.

Solutions relying on calculator technology are not acceptable.

(c) Express in the form $a + \mathrm{i}b$ where a and b are real,

(i) $\dfrac{z + 3\mathrm{i}}{2 - 4\mathrm{i}}$

(ii) z^2

(5)

(d) Show on a single Argand diagram the points A, B, C and D that represent the complex numbers

$$z,\ z^*,\ \frac{z + 3\mathrm{i}}{2 - 4\mathrm{i}} \text{ and } z^2$$

(3)

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Question 6 continued

Q6

(Total 11 marks)