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3. (i) Given that

$$z^* - 3z = \frac{5\mathrm{i}}{3 - \mathrm{i}}$$

find z, giving your answer in the form $a + b\mathrm{i}$, where a and b are real constants. You must show all your working.

(5)

(ii)

$$w = -4 + 5\mathrm{i}$$

(a) Find arg w, giving your answer in radians correct to 2 decimal places.

(2)

Given that

$$\arg(w + k) = \frac{\pi}{2}, \text{ where } k \text{ is a real constant}$$

(b) write down the value of k.

(1)

Given that

$$|w + c\mathrm{i}| = 4\sqrt{5}, \text{ where } c \text{ is a real constant}$$

(c) find the possible values of c.

(4)

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Question 3 continued

Q3

(Total 12 marks)