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4. $z_1 = p + 5\mathrm{i}, \quad z_2 = 9 + 8\mathrm{i} \quad \text{and} \quad z_3 = \dfrac{z_1}{z_2}$

where p is a real constant.

(a) Determine z_3 in the form $x + \mathrm{i}y$, where x and y are in terms of p

(3)

(b) Determine the exact value of the modulus of z_2

(1)

Given that the argument of z_1 is $\dfrac{\pi}{3}$

(c) (i) determine the exact value of p

(ii) determine the exact value of the modulus of z_3

(3)

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Question 4 continued

Q4

(Total 7 marks)