5: The complex number z_1 is given by

$$z_1 = r\left(\cos\frac{7\pi}{6} + i\sin\frac{7\pi}{6}\right)$$

where r is a positive constant.

The complex number z_2 has modulus 5

Given that $|z_1 z_2| = 15$

(a) state the value of r.

(1)

Given further that $z_1 + z_2$ is a real number,

(b) determine the possible complex numbers z_2 in the form $a + bi$ where a and b are constants.

(5)

(c) Show z_1 and the possible complex numbers z_2 on a single Argand diagram.

(2)

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Question 5 continued

(Total for Question 5 is 8 marks)