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9. The complex numbers z_1 and z_2 are given by

$$z_1 = -1 - \mathrm{i} \text{ and } z_2 = 3 - 4\mathrm{i}$$

(a) Find the argument of the complex number $z_1 - z_2$. Give your answer in radians to 3 decimal places.

(3)

(b) Find the complex number $\frac{z_1}{z_2}$ in the form $a + \mathrm{i}b$, where a and b are rational numbers.

(3)

(c) Find the modulus of $\frac{z_1}{z_2}$, giving your answer as a simplified surd.

(2)

(d) Find the values of the real constants p and q such that

$$\frac{p + \mathrm{i}q - 8z_1}{p - \mathrm{i}q - 8z_2} = 3\mathrm{i}$$

(5)

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