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2. The complex numbers z_1, z_2 and z_3 are given by

$$z_1 = 2 - \mathrm{i} \quad z_2 = p - \mathrm{i} \quad z_3 = p + \mathrm{i}$$

where p is a real number.

(a) Find $\dfrac{z_2 z_3}{z_1}$ in the form $a + b\mathrm{i}$ where a and b are real. Give your answer in its simplest form in terms of p.

(3)

Given that $\left|\dfrac{z_2 z_3}{z_1}\right| = 2\sqrt{5}$

(b) find the possible values of p.

(4)

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(Total 7 marks)