



STEP II, 1998, Q5

- 5 Define the modulus of a complex number z and give the geometric interpretation of $|z_1 - z_2|$ for two complex numbers z_1 and z_2 . On the basis of this interpretation establish the inequality

$$|z_1 + z_2| \leq |z_1| + |z_2|.$$

Use this result to prove, by induction, the corresponding inequality for $|z_1 + \cdots + z_n|$.

The complex numbers a_1, a_2, \dots, a_n satisfy $|a_i| \leq 3$ ($i = 1, 2, \dots, n$). Prove that the equation

$$a_1z + a_2z^2 \cdots + a_nz^n = 1$$

has no solution z with $|z| \leq 1/4$.



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