

STEP II, 2000, Q3

- 3 The lengths of the sides BC , CA , AB of the triangle ABC are denoted by a , b , c , respectively. Given that

$$b = 8 + \epsilon_1, \quad c = 3 + \epsilon_2, \quad A = \pi/3 + \epsilon_3,$$

where ϵ_1 , ϵ_2 , and ϵ_3 are small, show that $a \approx 7 + \eta$, where $\eta = (13\epsilon_1 - 2\epsilon_2 + 24\sqrt{3}\epsilon_3)/14$.

Given now that

$$|\epsilon_1| \leq 2 \times 10^{-3}, \quad |\epsilon_2| \leq 4 \cdot 9 \times 10^{-2}, \quad |\epsilon_3| \leq \sqrt{3} \times 10^{-3},$$

find the range of possible values of η .



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