2017 Azerbaijan National Olympiad for grades 10-11

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by Iora

A1 Solve the system of equation for $(x, y) \in \mathbb{R}$

$$\begin{cases} \sqrt{x^2+y^2}+\sqrt{(x-4)^2+(y-3)^2}=5 \\ 3x^2+4xy=24 \end{cases}$$

Explain your answer

C3 A student firstly wrote $x=3$ on the board. For each procces, the stutent deletes the number x and replaces it with either $(2x+4)$ or $(3x+8)$ or (x^2+5x). Is this possible to make the number $(20^{17}+2016)$ on the board?

(Explain your answer)

This type of the question is well known but I am going to make a collection so, :blush:

G4 İn convex hexagon $ABCDEF$'s diagonals AD, BE, CF intercepts each other at point O. If the area of triangles AOB, COD, EOF are $4, 6$ and 9 respectively, find the minimum possible value of area of hexagon $ABCDEF$

A5 $a, b, c \in (0,1)$ and $x, y, z \in (0, \infty)$ reals satisfies the condition $a^x=bc, b^y=ca, c^z=ab$. Prove that

$$\frac{1}{2+x}+\frac{1}{2+y}+\frac{1}{2+z} \leq \frac{3}{4}$$
