

2017 Azerbaijan Junior National Olympiad

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P1 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

P2 For all $n > 1$ let $f(n)$ be the sum of the smallest factor of n that is not 1 and n . The computer prints $f(2), f(3), f(4), \dots$ with order: 4, 6, 6, ... (Because $f(2) = 2 + 2 = 4$, $f(3) = 3 + 3 = 6$, $f(4) = 4 + 2 = 6$ etc.). In this infinite sequence, how many times will be 2015 and 2016 written? (Explain your answer)

P3 Show that $\frac{(x+y+z)^2}{3} \geq x\sqrt{yz} + y\sqrt{zx} + z\sqrt{xy}$ for all non-negative reals x, y, z .

P4 A Rhombus and an Isosceles trapezoid that has same area is drawn in the same circle's outside. Compare their acute angles

(explain your answer)

P5 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:
