Russian School of Math: Lesson 1

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Abstract

This note reviews a small number of problems from the Russian School of Math test. Written for personal use.

1

Find the number of solution-pairs in positive integers of the equation

$$3x + 4y = 93$$

2

Solve the following DE

$$\frac{xy}{x+y} = 2017$$

3

Find the sum of all positive integers for which $n^2 - 19n + 99$ is a perfect square.

4

Solve in integers:

$$3x + 3y + 5z = 1$$
$$4x + 5y - 2z = 4$$

5

Prove that the equation $20x - 19y = 2019$ has no solution, where x and y are perfect squares of integers.

6

Solve in integers using factorization

$$x + y = xy$$

7

Solve in integers using factorization

$$y^3 - x^3 = 91$$

8

Solve in integers using factorization

$$xy = x + y + 3$$

9

Solve in integers using factorization

$$x^2 - y^2 = 2019$$

10

Solve in integers using factorization

$$2(x + 7)(y + 1) = 3xy$$

11

Solve in integers using factorization

$$x^3 - xy - 7x + 2y + 23 = 0$$