Math Diversion Problem 203

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That's the problem with false proofs of true theorems;
it's not easy to produce a counterexample.
— Jeffrey Shallit

1 The Problem

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Source: https://www.youtube.com/watch?v=eDlv67bAdXA
Title: Germany | Can you solve this?
 Presenter: Master T Maths Class
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Given the relations

$$x + y = 10\,, \tag{1a}$$
$$xy = 50\,, \tag{1b}$$

find the values of x, y.

2 The Solution

Perhaps we should begin by multiplying (1a) through by x and then using (1b), to get

$$x^2 - 10x + 50 = 0\,. \tag{2}$$

Using the quadratic formula gives us

$$x = 5 \pm 5i\,. \tag{3}$$

Using (1a) we can determine y for each x, thus,

$$(x, y) = (5 + 5i, 5 - 5i),\ (5 - 5i, 5 + 5i)\,. \tag{4}$$