Two equals one

At the end of my grade 11 math class, in place of the major final exam we had all expected, the teacher entered the room and wrote the following sequence on the chalkboard, explaining what he was doing in each step. At the end, he pointed out that there obviously had to be a flaw somewhere – otherwise, he said, the whole edifice of mathematics would come tumbling down. Our job, he said, was to find the error. *"You have one hour. Those of you who correctly identify the error will pass – those who do not, I'll see you again in grade 11 math next year."*

I have since shown this to dozens of people; most have been unable to correctly identify the error – including high school math teachers. Only three people spotted the error straight away.

$$x = 1$$

as x = 1, (x) and (1) can be used interchangeably

square both sides

$$x^2 = 1$$

subtract 1 from both sides

$$x^2 - 1 = x - 1$$

factor both sides

$$(x-1)(x+1) = x-1$$

divide both sides by the expression (x–1)

$$x+1 = 1$$

simplify

$$1+1 = 1$$

$$2 = 1$$