

Mathematical maturity in solving mathematics problems

Suppose you are confronted with the following math problem:

$$x + 3 + |2x - 3| = 5$$

And you solve it in the following way:

$$|2x - 3| = 5 - x - 3 = 2 - x$$

$$(2x - 3)^2 = (2 - x)^2$$

$$4x^2 - 12x + 9 = 4 - 4x + x^2$$

$$3x^2 - 8x + 5 = 0$$

$$x = \frac{8 \pm \sqrt{64 - 60}}{6}$$

$$x = \frac{5}{3}, 1$$

And to check your answer, you plug in the values for x:

$$5/3 + 3 + |2 \times 5/3 - 3| = 5$$

$$1 + 3 + |2 - 3| = 5$$

You have solved the problem satisfactorily, yet inefficiently. There was no need to go through the process of squaring the absolute value and solving the quadratic equation. You should have solved it instead in the following manner:

$$|2x - 3| = 5 - x - 3 = 2 - x$$

$$2x - 3 = 2 - x, \quad -(2x - 3) = 2 - x$$

$$3x = 5, \quad -2x + 3 = 2 - x$$

$$x = \frac{5}{3}, \quad x = -1$$

$$x = \frac{5}{3}, 1$$

Again, to check your answer, you plug in the values for x:

$$5/3 + 3 + |2 \times 5/3 - 3| = 5$$

$$1 + 3 + |2 - 3| = 5$$

This way is much simpler. Solving mathematics and theoretical physics problems involves more than making tedious calculations. It requires both mathematical sense and thoughtful planning so as not to solve problems in unnecessarily complicated ways.

When I was young, I read about a class of equations called cubic equations. The book stated that their solutions are known, but since no solution was actually presented in the books pages, I undertook the task to find one myself. After many tedious calculations, I thought I had succeeded. Months later, however, I found mistakes in my work. Now that I have reached a level of what I would call mathematical maturity, I know that the approach I used in my youth would never have yielded the solution. As I continue to study theoretical physics, in which mathematics is an indispensable tool, I am aware that I still need to become much more mathematically mature, and I hold out hope that my continuous efforts in theoretical physics will develop someday into a mathematical sixth sense.