

Quadratic Formula

Solve each equation using the quadratic formula:

$$2x^2 - 2x - 1 = 0$$

$$3x - x^2 = 1$$

$$x^2 - 4x = -4$$

So let's briefly review the quadratic formula. It's a way to solve a quadratic equation that cannot be "cleanly" factored like in the following example:

$$2x^2 - 7x - 60 = 0$$

$$(2x - 15)(x + 4) = 0$$

$$x = \frac{15}{2} \text{ or } x = -4$$

The quadratic formula is written as: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

This formula assumes that the quadratic equation you're trying to solve is in the form:

$$ax^2 + bx + c = 0$$

Notice that all the terms of the polynomial are placed to one side, all set equal to zero. Putting your equation in this form is essential in applying the quadratic formula.

Let's look at your questions now:

$$2x^2 - 2x - 1 = 0$$

This is already in correct form. Note that I'm assuming that it's $-2x$ since it's ambiguous from your message.

$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(2)(-1)}}{2(2)} = \frac{2 \pm \sqrt{4 - (-8)}}{4} = \frac{2 \pm \sqrt{12}}{4} = \frac{1}{2} \pm \frac{\sqrt{3}}{2}$$

$$3x - x^2 = 1$$

$$-x^2 + 3x - 1 = 0$$

This is NOT in correct form. So we have to place all the terms to one side, and set equal to zero before using the quadratic formula.

$$x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(-1)(-1)}}{2(-1)} = \frac{-3 \pm \sqrt{9 - (4)}}{-2} = \frac{-3 \pm \sqrt{5}}{-2} = \frac{3}{2} \pm \frac{\sqrt{5}}{2}$$

$$x^2 - 4x = -4$$

$$x^2 - 4x + 4 = 0$$

This is NOT in correct form. But also note that you can factor this expression. However, the quadratic formula is foolproof and will still give you the correct answer

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(4)}}{2(1)} = \frac{4 \pm \sqrt{16 - (16)}}{2} = \frac{4 \pm 0}{2} = 2$$