SKILL #23

CODE: SQ.2

Solving Quadratic Equations Using the Quadratic Formula

Core Concept

When you can't factor a quadratic equation easily, you can still solve it using the Quadratic Formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

This works for any equation in the form: $ax^2 + bx + c = 0$

Why is it Important?

Solves any quadratic equation, even with messy numbers.

Special cases

If $b^2 - 4ac$ is a perfect square, your equation could have been factored!

If $b^2 - 4ac = 0$ --> has one real solution and can be factored as a perfect square trinomial! (but not always)

GULDEN RULE

1. Write in standard form first: $ax^2 + bx + c = 0$.
2. Identify a, b, c correctly (with signs!).
3. Calculate discriminant ($D = b^2 - 4ac$) to check solutions:
   - $D > 0$: Two real solutions.
   - $D = 0$: One real solution.
   - $D < 0$: No real solutions (but complex ones!).
4. Simplify $\sqrt{D}$ fully before dividing.

Example

MORE EXAMPLES

Example 1 – Simple Quadratic: Solve: $2x^2 - 7x + 3 = 0$

Step 1: Identify a, b, c

- $a = 2, b = -7, c = 3$

Step 2: Discriminant $b^2 - 4ac$

--> $(-7)^2 - 4(2)(3)$ --> $49 - 24 = 25$

$25 > 0$ --> two real solutions:

Step 2: Apply the formula carefully with negatives:

$x = \frac{b \pm \sqrt{b^2-4ac}}{2a}$ --> $x = \frac{-(-7) \pm \sqrt{25}}{2(2)}$ --> $x = \frac{7 \pm 5}{4}$

$$x_1 = \frac{12}{4} = 3\,, \quad x_2 = \frac{2}{4} = \frac{1}{2}$$

Common Mistakes to Avoid

- ❌ Not writing the equation in the form: $ax^2 + bx + c = 0$.
- ❌ Making mistakes with negative signs.
- ❌ Forgetting to use both $+$ and $-$ in the formula.
- ❌ Not checking if the discriminant is negative (no real solutions)

Additional Resources

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