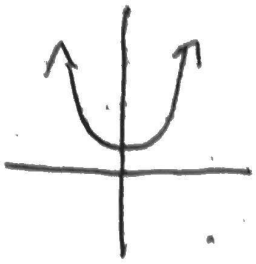
LTAA7a

Quadratic Formula

How do we solve for roots



$y = x^2 + 25$

$0 = x^2 + 25$

$-25 \quad -25$

$\sqrt{-25} = \sqrt{x^2}$

$i\sqrt{25} = x$

$\pm 5i$ or $-5i, 5i$

$y = x^2 + 32$

$0 = x^2 + 32$

$-32 \quad -32$

$-32 = x^2$

$i\sqrt{32} = \sqrt{x^2}$

$i\sqrt{16 \cdot 2} = x$

$i\sqrt{16} \cdot \sqrt{2} = x$

$\boxed{\pm 4i\sqrt{2} = x}$

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

Ex 1: $x^2 + 6x + 13 = 0$

$a = 1 \quad b = 6 \quad c = 13$

$$x = \frac{-b \pm \sqrt{(b)^2 - 4(a)(c)}}{2(a)}$$

1. Set up Quadratic Formula

$$x = \frac{-6 \pm \sqrt{(6)^2 - 4(1)(13)}}{2(1)}$$

2. Calculate discriminant (under square root)

$$x = \frac{-6 \pm \sqrt{-16}}{2}$$

$$x = \frac{-6 \pm i\sqrt{16}}{2}$$

$6^2 - 4(1)(13)$

3. Take out i.

$$x = \frac{-6 \pm 4i}{2}$$

4. Simplify

$$= \frac{-6}{2} \pm \frac{4i}{2}$$

$$x = -3 \pm 2i$$

Ex 2:

$$x^2 - 4x + 13 = 0$$

$a = 1 \quad b = -4 \quad c = 13$

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(13)}}{2(1)}$$

$$x = \frac{4 \pm \sqrt{-36}}{2}$$

$$x = \frac{4 \pm i\sqrt{36}}{2}$$

$$x = \frac{4 \pm 6i}{2}$$

$$x = \frac{4}{2} \pm \frac{6i}{2}$$

$$\boxed{x = 2 \pm 3i}$$

$2 + 3i$, $2 - 3i$

↑ ↑

complex conjugate

$$\frac{6-4i}{2-i} \cdot \frac{2+i}{2+i} = \frac{(6-4i)(2+i)}{(2-i)(2+i)}$$

$$= \frac{12+6i-8i-4i^2}{4+2i-2i-i^2}$$

$$-(-1)$$

equivalent

$$= \frac{12-2i-(-4)}{4+1}$$

$$= \boxed{\frac{16-2i}{5}}$$