Quadratic Equations (chapter 2)

Ex. $x^2 - 1 = 0$

$x^2 = 1$

$\boxed{x = \pm 1}$

$x^2 - 1 = 0$

$(x-1)(x+1) = 0$ zero product property

$x - 1 = 0$ or $x + 1 = 0$

$\boxed{x = 1 \text{ or } x = -1}$

Ex. $x^2 + x + 5 = 0$

$$x = \frac{-1 \pm \sqrt{1 - 20}}{2}$$

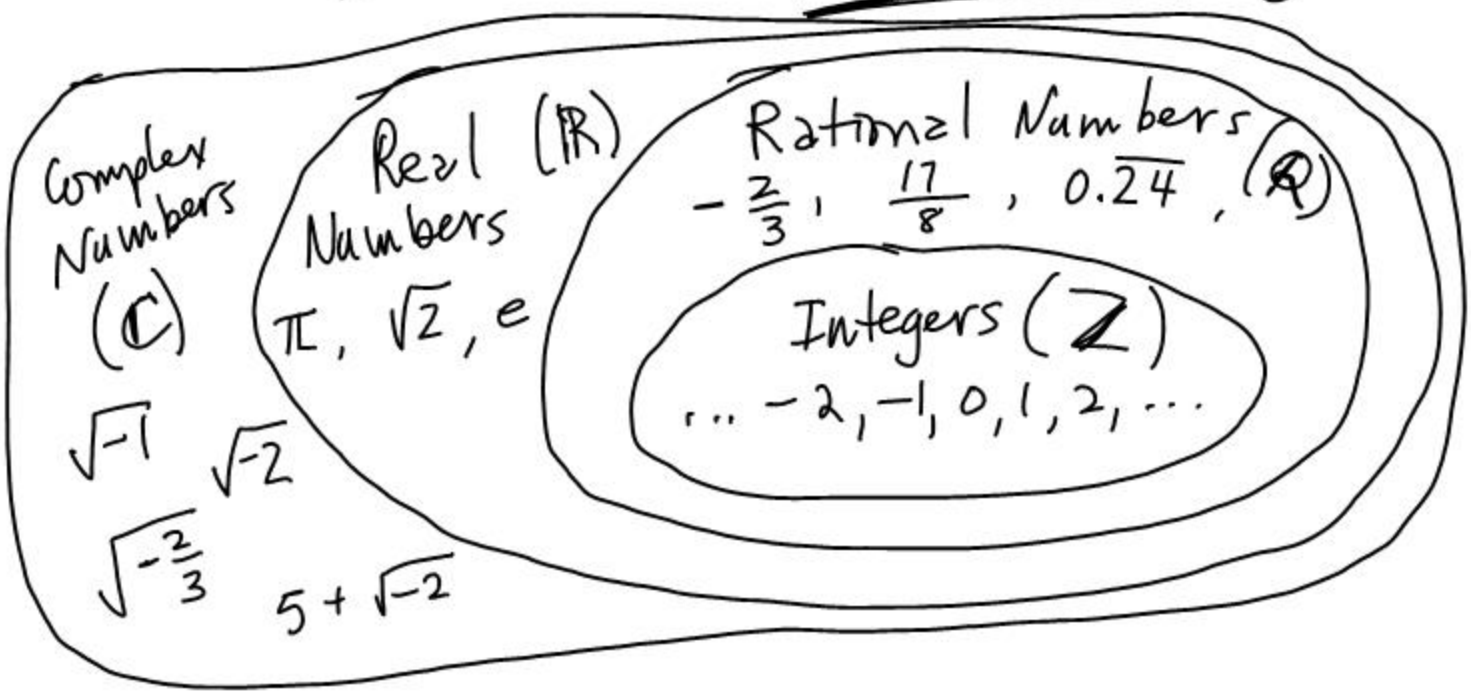
$$x = \frac{-1 \pm \sqrt{-19}}{2}$$

The Quadratic formula

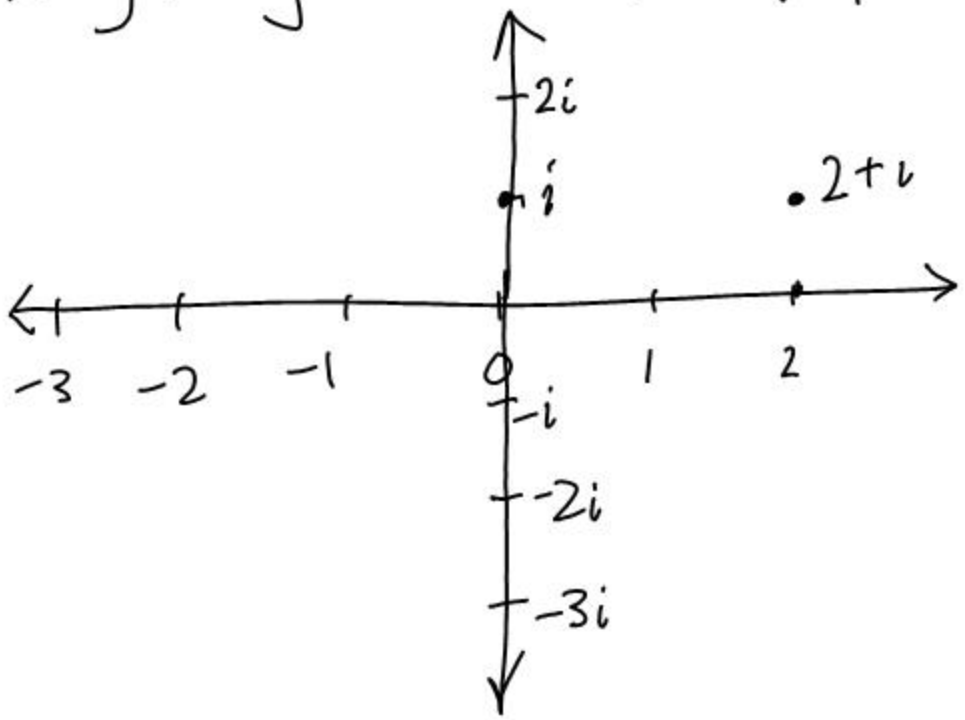
If $ax^2 + bx + c = 0$,

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

MEMORIZE



The imaginary unit: $i = \sqrt{-1}$



Arithmetic of Complex Numbers

Adding

Ex. $(3-4i) + (-2+5i) = 1+i$

Multiplication

Ex. $(3-4i)(-2+5i)$

$= -6 + 15i + 8i - 20i^2$ (+20)

$= 14 + 23i$

$i^2 = -1$

$i^3 = i^2 \cdot i = -i$

$i^4 = i^2 \cdot i^2 = 1$

$\vdots$

$i^{19} = i^{16} \cdot i^3 = -i$

Division

$$\frac{2i}{3+i} \cdot \left(\frac{3-i}{3-i}\right) \quad \leftarrow 1$$

$3+i$ and $3-i$ are complex conjugates

$$= \frac{6i - 2i^2}{9 - i^2} = \frac{2 + 6i}{10} = \frac{1}{5} + \frac{3}{5}i$$

$+2$; -1

$a + bi$

2.1 #38 $\quad \frac{-12 + \sqrt{-28}}{32} = \frac{-12 + 2\sqrt{7}\,i}{32}$

$\sqrt{-28} = \sqrt{-1 \cdot 4 \cdot 7}$

$= 2\sqrt{7}\,i$

$$= -\frac{3}{8} + \frac{\sqrt{7}}{16}i$$

$a + bi$

HW p. 284 # 5, 11, 13, 17, 21, 25, 37, 40, 46, 47

* quadratic formula