

Numeri complessi

$$x-1=0 \Rightarrow x=1 \quad \mathbb{N}$$

$$x+1=0 \Rightarrow x=-1 \quad \mathbb{Z}$$

$$2x-1=0 \Rightarrow x=\frac{1}{2} \quad \mathbb{Q}$$

$$x^2-2=0 \Rightarrow x=\pm\sqrt{2} \quad \mathbb{R}$$

$$x^2+1=0 \Rightarrow x^2=-1 \quad \mathbb{C}$$

$$x=\pm\sqrt{-1}=\pm i$$

$$i=\sqrt{-1} \Rightarrow i^2=-1$$

i unità immaginaria

$$\mathbb{C} = \{a+ib : a, b \in \mathbb{R}\}$$

$$\underline{3} - \underline{2}i \in \mathbb{C} \quad 3 + 2i \in \mathbb{C}$$

$$x^2 = -2, \quad x = \pm\sqrt{-2} = \pm\sqrt{2}\sqrt{-1} = \pm\sqrt{2}i$$

$$x^2 = -7, \quad x = \pm\sqrt{7}i$$

$$x^2 = -4, \quad x = \pm 2i$$

$$a+ib \quad a-ib$$

conjugate

$$(2+3i) + (4-2i) = 6+i$$

$$(2+3i)(4-2i) = 8-4i+12i-6i^2 = 8+8i-6(-1) = 14+8i$$

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

$$\Delta = 1 - 4 = -3 \quad -\frac{1}{2} + \frac{\sqrt{3}}{2}i$$

$$x_{1,2} = \frac{-1 \pm \sqrt{3}i}{2} \rightarrow \begin{matrix} -\frac{1}{2} + \frac{\sqrt{3}}{2}i \\ -\frac{1}{2} - \frac{\sqrt{3}}{2}i \end{matrix}$$

Eq. di grado sup. al 2°

$$x^3 - 5x^2 + 6x = 0$$

$$x(x^2 - 5x + 6) = 0$$

$$x(x-2)(x-3) = 0$$

$$x_1 = 0 \quad x_2 = 2 \quad x_3 = 3$$

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

$$(x-1)^3 = 0 \quad x = 1$$

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

$$R(1) = 1 + 3 - 1 \neq 0$$

$$R(-1) = -1 - 3 - 1 \neq 0$$

$$9x^3 - 9x^2 - x + 1 = 0$$

$$9x^2(x-1) - (x-1) = 0$$

$$(x-1)(\underline{9x^2-1}) = 0$$

$$(x-1)(\underline{3x-1})(3x+1) = 0$$

$$x_1 = 1 \quad x_2 = \frac{1}{3} \quad x_3 = -\frac{1}{3}$$

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

$$(\sqrt{3}x - 1)(\sqrt{3}x + 1) = 0$$

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

$$(\sqrt{3}x - \sqrt{2})(\sqrt{3}x + \sqrt{2}) = 0$$

$$x^3 - 7x^2 + 4x + 12 = 0$$

$$R(-1) = -1 - 7 - 4 + 12 = 0$$

$$\begin{array}{ccc|c} & 1 & -7 & 4 & 12 \\ -1 & & -1 & 8 & -12 \\ \hline & 1 & -8 & 12 & // \end{array}$$

$$(x+1)(x^2 - 8x + 12) = 0$$

$$(x+1)(x-2)(x-6) = 0$$

$$x_1 = -1 \quad x_2 = 2 \quad x_3 = 6$$

Equazioni binomie

$$ax^m + b = 0$$

$$x^2 - 1 = 0 ; x = \pm 1$$

$$x^4 - 16 = 0 ; x^4 = 16 ; x = \pm \sqrt[4]{16} = \pm 2$$

$$x^4 - 3 = 0 ; x^4 = 3 ; x = \pm \sqrt[4]{3}$$

$$x^4 + 16 = 0 ; x^4 = -16 \quad \emptyset$$

$$m \text{ pari} \quad x = \pm \sqrt[m]{-\frac{b}{a}}$$

$$m \text{ dispari} \quad x = \sqrt[m]{-\frac{b}{a}}$$

$$x^3 - 2 = 0 ; x^3 = 2 ; x = \sqrt[3]{2}$$

$$x^3 - 1 = 0; x^3 = 1; x = 1$$

$$(x-1)(x^2+x+1) = 0$$

$$\begin{array}{l} \downarrow \\ x_1 = 1 \end{array} \quad \begin{array}{l} \Delta = 1 - 4 = -3 \\ x_{2,3} = \frac{-1 \pm \sqrt{3}i}{2} \end{array}$$

$$x^4 + 16 = 0 \quad \mathbb{R}$$

$$x^4 = -16 \quad \emptyset$$

$$x^4 - 16 = 0$$

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

$$\begin{array}{l} \downarrow \\ x = \pm 2 \end{array} \quad \begin{array}{l} \downarrow \\ x = \pm 2i \end{array}$$

$$x^2 > 0$$

$$i^2 < 0$$

$$-1 < 0$$