Numere complexe – Formule

$$z = a + bi = (a, b)$$

Conjugatul: $\bar{z} = a - bi$

- $i^2 = -i$
  $z = 0 => a = 0, b = 0$
  $z_1 = z_2 => a_1 = a, b_1 = b_2$
  $\overline{z} = z => z \in \mathbb{R}$
  $\overline{z} = -z => z \in i\mathbb{R}$
  $\overline{\overline{z}} = z$

- $|z| = \sqrt{a^2 + b^2}$
  $|z| = 1 => \overline{z} = \frac{1}{z}$
  $|z|^2 = z * \overline{z}$

- $\overline{z_1 + z_2} = \overline{z_1} + \overline{z_2}$
  $\overline{z_1 - z_2} = \overline{z_1} - \overline{z_2}$
  $\overline{z_1 * z_2} = \overline{z_1} * \overline{z_2}$
  $\overline{(\frac{z_1}{z_2})} = \frac{\overline{z_1}}{\overline{z_2}}$

- $|z_1 + z_2|^2 + |z_1 - z_2|^2 = 2(|z_1|^2 + |z_2|^2)$
  $|z_1 + z_2|^2 = (z_1 + z_2)(\overline{z_1} + \overline{z_2})$

- Ecuația: $\underbrace{i + i^2 + i^3 + i^4}_{=0} + i^5 + \cdots + i^{100} = \mathbf{0}$

  $i * i^2 * i^3 * i^4 * i^5 * \ldots * i^{100} = \mathbf{-1}$

- Ecuația de gradul doi:

  $Dacă\ \Delta < 0 \ => \ x_{1,2} = \frac{-b \pm i\sqrt{-\Delta}}{2a}$

Ecuația de gradul doi cu coeficienți complexși

$$\Delta = u^2 \qquad x_{1,2} = \frac{-b \pm u}{2a}$$

Adunare: $(a,b) + (c,d) = (a+c, b+d)$

- comutativa
- asociativa
- el neutru $(0,0)$
- opus $(a,b) + (-a,-b) = (0,0)$

Inmultire: $(a,b) * (c,d) = (ac - bd, ad + bc)$

- comutativa
- asociativa
- el neutru $(1,0)$
- opus $(a,b) * (a',b') = (1,0)$

Radaciniile de ordinal *n* ale unui numar complex:

$z^n = a = r(\cos t + i \sin t)$

$z_k = \sqrt[n]{r}\left(\cos\frac{t+2k\pi}{n} + i \sin\frac{t+2k\pi}{n}\right) \quad ; \quad k = \overline{0, n-1}$

$EX: \ \sqrt[3]{8} = 2$