1 OSNOVNE FORMULE

SKUPOVI

Univerzalni skup (U): skup svih elemenata koje promatramo u danom trenutku.

RELACIJE

Biti podskup-inkluzija: Skup A je *podskup* skupa B, u oznaci ($A \subset B$), ako i samo ako svaki element skupa A pripada i skupu B. $A \subset B \Leftrightarrow (\forall x): (x \in A \Rightarrow x \in B)$.

Jednakost: Skup A je *jednak* skupu B, u oznaci ($A = B$), ako i samo ako svaki element skupa A je i element skupa B i obrnuto. $A = B \Leftrightarrow (\forall x): (x \in A \Leftrightarrow x \in B)$.

Disjunktni skupovi A i B nemaju ni jedan zajednički element.

Različiti skupovi A i B: postoji element u A koji nije u B ili obrnuto.

OPERACIJE

Presjek skupa A i skupa B (zajednički elementi): $A \cap B = \{x \in U | \ x \in A \ i \ x \in B\}$.

Unija skupa A i skupa B (svi elementi): $A \cup B = \{x \in U | x \in A \ ili \ x \in B\}$.

Razlika skupa A i skupa B: $A \backslash B = A \cap B^c = \{x \in U | x \in A \ i \ x \notin B\}$.

Simetrična razlika skupa A i B: $A \Delta B = A \backslash B \cup B \backslash A = \{x \in U \mid x \in A \backslash B \ ili \ x \in B \backslash A\}$.

Komplement skupa A: $A^c = \{x \in U \mid x \notin A\}$.

SVOJSTVA

komutativnost: $A \cap B = B \cap A, \quad A \cup B = B \cup A$

asocijativnost: $(A \cup B) \cup C = A \cup (B \cup C)$, $(A \cap B) C = A \cap (B \cap C)$

idempotentnost: $A \cup A = A, \ A \cap A = A$

distributivnost: $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$, $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

involutivnost: $(A^c)^c = A$

De Morgan: $(A \cup B)^c = A^c \cap B^c, (A \cap B)^c = A^c \cup B^c$

KVADRATNA JEDNADŽBA

$$ax^2 + bx + c = 0, \qquad a \neq 0$$

$$x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$ax^2 + bx + c = a\,(x - x_1)\,(x - x_2)$$

ALGEBARSKI IZRAZI

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$
$$(a \pm b)^3 = a^3 \pm 3a^2 b + 3ab^2 + b^3$$
$$a^2 - b^2 = (a - b)(a + b)$$
$$a^3 \pm b^3 = (a \pm b)(a^2 \mp ab + b^2)$$
$$a^4 - b^4 = (a - b)(a + b)(a^2 + b^2)$$
$$(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2ac + 2bc$$

POTENCIJE

$$a^0 = 1, a \neq 0$$
$$a^m a^n = a^{m+n}$$
$$a^m : a^n = a^{m-n}, a \neq 0$$
$$(ab)^n = a^n b^n$$
$$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$$
$$(a^m)^n = a^{mn}$$
$$a^{-n} = \frac{1}{a^n}, a \neq 0$$

KORIJENI

$$a^n = b \leftrightarrow a = \sqrt[n]{b}$$
$$\sqrt[n]{ab} = \sqrt[n]{a}\ \sqrt[n]{b}$$
$$\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[a]{b}}$$
$$\sqrt[n]{a^m} = \sqrt[np]{a^{mp}}$$
$$\sqrt[n]{\sqrt[m]{a}} = \sqrt[nm]{a} = a^{\frac{1}{nm}}$$
$$\sqrt[m]{a^n} = a^{\frac{n}{m}}$$

POTENCIRANJE IMAGINARNE JEDINICE

$$i = \sqrt{-1}$$
$$i^2 = -1$$
$$i^3 = -i$$
$$i^4 = 1$$

$$i^{4k} = 1$$
$$i^{4k+1} = i$$
$$i^{4k+2} = -1$$
$$i^{4k+3} = -i \ \ k \in N_0$$

Co-funded by the Erasmus+ Programme of the European Union

FAKTORIJELE I BINOMNA FORMULA

$n! = 1 \cdot 2 \cdot 3 \cdot 4 \cdot \cdots \cdot (n-2) \cdot (n-1) \cdot n \,, n \epsilon N \;\; ; \;\; 0! = 1$

$$\binom{n}{k} = \frac{n!}{k!\,(n-k)!} = \frac{n(n-1)(n-2)\ldots\big(n-(k-1)\big)}{k!} \,, k \le n, \;\; n, k \in N_0$$

$$\binom{n}{0} = 1 \,, \; \binom{n}{n} = 1 \,, \; \binom{n}{1} = \binom{n}{n-1} = n \,, \; \binom{n}{k} = \binom{n}{n-k}$$

$$(\boldsymbol{a+b})^{\boldsymbol{n}} = \binom{n}{0} a^n b^0 + \binom{n}{1} a^{n-1} b^1 + \binom{n}{2} a^{n-2} b^2 + \cdots \binom{n}{k} a^{n-k} b^k + \cdots$$

$$+ \binom{n}{n-1} a^1 b^{n-1} + \binom{n}{n} a^0 b^n = \sum_{\boldsymbol{k=0}}^{\boldsymbol{n}} \binom{\boldsymbol{n}}{\boldsymbol{k}} \boldsymbol{a^k b^{n-k}} \;\; , n \epsilon \, N$$

VRIJEDNOST TRIGONOMETRIJSKIH FUNKCIJA NEKIH ARGUMENATA

	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	π	$\frac{3\pi}{2}$	2π
	0	*30°*	*45°*	*60°*	*90°*	*180°*	*270°*	*360°*
sin	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	0	-1	0
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	-1	0	1
tg	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	$\pm\infty$	0	$\pm\infty$	0
ctg	$\pm\infty$	$\sqrt{3}$	1	$\frac{\sqrt{3}}{3}$	0	$\pm\infty$	0	$\pm\infty$

KOMPLEKSNI BROJEVI $z = x + yi \,, \; x, y \; \in \boldsymbol{R} \,, \quad |z| = \sqrt{x^2 + y^2}$ *modul ili apsolutna vrijednost od z*

KONJUGIRANJE

$z = x + yi$

$\bar{z} = x - yi$

$\overline{z_1 + z_2} = \bar{z_1} + \bar{z_2}$

$\overline{z_1 \cdot z_2} = \bar{z_1} \cdot \bar{z_2}$

$\overline{\left(\frac{z_1}{z_2}\right)} = \frac{\bar{z_1}}{\bar{z_2}}$

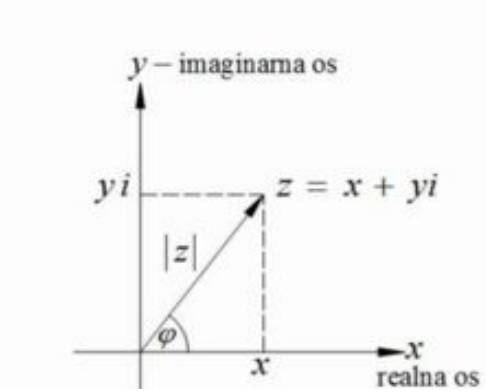
TRIGONOMETRIJSKI PRIKAZ

$z = x + yi = r\,(\cos\varphi + i\,\sin\varphi)$

$r = |z| = \sqrt{x^2 + y^2}$

$Arg\, z = \varphi$

$\mathrm{tg}\varphi = \frac{\mathrm{y}}{\mathrm{x}}, \varphi \in [0, 2\pi >$



ALGEBARSKE OPERACIJE

$(a + b \cdot i) \pm (c + d \cdot i)$
$= (a \pm c) + (b \pm d) \cdot i$

$(a + b \cdot i)\,(c + d \cdot i)$
$= (ac - bd)\,(ad + bc)\,i$

$$\frac{a + b\,i}{c + d\,i} = \frac{ac + bd + (bc - ad)\,i}{c^2 + d^2}$$

$$z_1 \cdot z_2 = r_1 r_2 \left(\cos(\varphi_1 + \varphi_2) + \mathrm{i}\,\sin(\varphi_1 + \varphi_2) \right)$$

$$\frac{z_1}{z_2} = \frac{r_1}{r_2} \left(\cos(\varphi_1 - \varphi_2) + \mathrm{i}\,\sin(\varphi_1 - \varphi_2) \right)$$

$$z^n = r^n \left(\cos(\mathrm{n}\varphi) + \mathrm{i}\,\sin(\mathrm{n}\varphi) \right)$$

$$\sqrt[n]{z} = \sqrt[n]{r} \left(\cos\frac{\varphi + 2\mathrm{k}\pi}{n} + i\,\sin\frac{\varphi + 2\mathrm{k}\pi}{n} \right), k = 0, 1, \ldots, n-1.$$