

Kompleksni brojevi: $i^2 = -1, z = a + bi, \bar{z} = a - bi, |z| = \sqrt{a^2 + b^2}, a, b \in \mathbb{R}$
 $z = r(\cos \varphi + i \sin \varphi), z_1 z_2 = r_1 r_2 (\cos(\varphi_1 + \varphi_2) + i \sin(\varphi_1 + \varphi_2)),$
 $\frac{z_1}{z_2} = \frac{r_1}{r_2} (\cos(\varphi_1 - \varphi_2) + i \sin(\varphi_1 - \varphi_2)), z^n = r^n (\cos n\varphi + i \sin n\varphi)$
 $\sqrt[n]{z} = \sqrt[n]{r} \left(\cos \left(\frac{\varphi + 2k\pi}{n} \right) + i \sin \left(\frac{\varphi + 2k\pi}{n} \right) \right), k = 0, 1, \dots, n-1$

Potencije:

$$a^n \cdot a^m = a^{n+m}, \quad a^n : a^m = a^{n-m} \quad (a \neq 0), \quad a^{-m} = \frac{1}{a^m} \quad (a \neq 0) \quad \sqrt[n]{a^n} = a^{\frac{n}{m}}$$

$$(a \pm b)^2 = a^2 \pm 2ab + b^2, \quad (a \pm b)^3 = a^3 \pm 3a^2b + 3ab^2 \pm b^3$$

$$a^2 - b^2 = (a - b)(a + b), \quad a^3 \pm b^3 = (a \pm b)(a^2 \mp ab + b^2)$$

$$(a + b)^n = a^n + \binom{n}{1} a^{n-1}b + \dots + \binom{n}{k} a^{n-k}b^k + \dots + \binom{n}{n-1} ab^{n-1} + b^n$$

Kvadratna jednadžba: $ax^2 + bx + c = 0, a \neq 0 \Rightarrow x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a};$

Vieteove formule: $x_1 + x_2 = -\frac{b}{c}, \quad x_1 \cdot x_2 = \frac{c}{a}$

Tjeme: $T \left(-\frac{b}{2a}, \frac{4ac - b^2}{4a} \right)$

Logaritamska i eksponencijalna funkcija: $b^x = a \Leftrightarrow x = \log_b a, \quad \log_b b^x = x = b^{\log_b x}$
 $\log_b(xy) = \log_b x + \log_b y, \quad \log_b \frac{x}{y} = \log_b x - \log_b y, \quad \log_b x^y = y \log_b x, \quad \log_a x = \frac{\log_b x}{\log_b a}$

Geometrija:

Površina trokuta: $P = \frac{a \cdot v_a}{2}, P = \sqrt{s \cdot (s - a) \cdot (s - b) \cdot (s - c)}, s = \frac{a+b+c}{2} \quad P = \frac{ab \sin \gamma}{2} \quad P = \frac{abc}{4r_0} \quad P = r_u s$

Jednakostraničan trokut: $P = \frac{a^2 \sqrt{3}}{4} \quad v = \frac{a \sqrt{3}}{2} \quad r_0 = \frac{2}{3} v \quad r_u = \frac{1}{3} v$

Površina paralelograma: $P = av$ **Površina trapeza:** $P = \frac{a+c}{2} v$

Površina kruga: $P = r^2 \pi$ **Opseg kruga:** $O = 2r\pi$

Površina kružnog isječka: $P = \frac{r^2 \pi \alpha}{360}$ **Duljina kružnog luka:** $l = \frac{r \pi \alpha}{180}$

Geometrija prostora:

$B = \text{površina osnovke (baze)}, \quad P = \text{površina pobočja}, \quad h = \text{duljina visine} \quad r = \text{polumjer osnovke stošca}$
Obujam (volumen) prizme i valjka: $V = Bh$ **Oplošje prizme i valjka:** $O = 2B + P$
Obujam (volumen) piramide i stošca: $V = \frac{1}{3} Bh$ **Oplošje piramide:** $O = B + P$
Oplošje stošca: $O = r^2 \pi + r \pi s,$
Oplošje (volumen) kugle: $V = \frac{4}{3} r^3 \pi$ **Oplošje kugle:** $O = 4r^2 \pi, \quad r = \text{polumjer kugle}$

U pravokutnom trokutu:

$\sinus \text{ kuta} = \frac{\text{nasuprotna kateta}}{\text{hipotenuza}} \quad \cosinus \text{ kuta} = \frac{\text{priležeća kateta}}{\text{hipotenuza}} \quad \text{tangens kuta} = \frac{\text{nasuprotna kateta}}{\text{priležeća kateta}}$

Trigonometrija:

Poučak o sinusima: $\frac{a}{\sin \alpha} = \frac{b}{\sin \beta} = \frac{c}{\sin \gamma}$ **Poučak o kosinusima:** $c^2 = a^2 + b^2 - 2ab \cos \gamma$

$\sin^2 x + \cos^2 x = 1, \quad \operatorname{tg} x = \frac{\sin x}{\cos x}$

$\sin 2x = 2 \sin x \cos x \quad \cos 2x = \cos^2 x - \sin^2 x$
 $\sin(x \pm y) = \sin x \cos y \pm \sin y \cos x \quad \cos(x \pm y) = \cos x \cos y \mp \sin x \sin y$
 $\operatorname{tg}(x \pm y) = \frac{\operatorname{tg} x \pm \operatorname{tg} y}{1 \mp \operatorname{tg} x \cdot \operatorname{tg} y}$

$$\sin x + \sin y = 2 \sin \frac{x+y}{2} \cos \frac{x-y}{2}$$

$$\cos x + \cos y = 2 \cos \frac{x+y}{2} \cos \frac{x-y}{2}$$

$$\sin x - \sin y = 2 \cos \frac{x+y}{2} \sin \frac{x-y}{2}$$

$$\cos x - \cos y = -2 \sin \frac{x+y}{2} \sin \frac{x-y}{2}$$

$$\sin x \sin y = \frac{1}{2} [\cos(x-y) - \cos(x+y)] \quad \cos x \cos y = \frac{1}{2} [\cos(x-y) + \cos(x+y)]$$

$$\sin x \cos y = \frac{1}{2} [\sin(x-y) + \sin(x+y)]$$

$$\sin \frac{\pi}{6} = \frac{1}{2}$$

$$\sin \frac{\pi}{4} = \frac{\sqrt{2}}{2}$$

$$\sin \frac{\pi}{3} = \frac{\sqrt{3}}{2}$$

Analitička geometrija:

Udaljenost točaka T_1, T_2 : $d(T_1, T_2) = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Polovište dužine $\overline{T_1 T_2}$: $P\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

Vektor: $\overrightarrow{T_1 T_2} = \vec{a} = (x_2 - x_1)\vec{i} + (y_2 - y_1)\vec{j} = a_1\vec{i} + a_2\vec{j}$

Skalarni umnožak vektora: $\vec{a} \cdot \vec{b} = |\vec{a}||\vec{b}| \cos \alpha, \vec{a} \cdot \vec{b} = a_1 b_1 + a_2 b_2$

Jednadžba pravca: $y - y_1 = k(x - x_1), \quad k = \frac{y_2 - y_1}{x_2 - x_1}$

Kut α između dvaju pravaca: $\operatorname{tg} \alpha = \left| \frac{k_2 - k_1}{1 + k_1 k_2} \right|$

Udaljenost točke $T(x_1, y_1)$ i pravca $p \dots Ax + By + C = 0$: $d(T, p) = \frac{|Ax_1 + By_1 + C|}{\sqrt{A^2 + B^2}}$

Krivulja drugog reda

	Jednadžba	Tangenta u točki krivulje (x_1, y_1)	Uvjet dodira krivulje s pravcem $y = kx + l$
Kružnica središte $S(p, q)$	$(x - p)^2 + (y - q)^2 = r^2$	$(x_1 - p)(x - p) + (y_1 - q)(y - q) = r^2$	$r^2(1 + k^2) = (kp - q + l)^2$
Elipsa fokusi $F_{1,2}(\pm e, 0)$ $e^2 = a^2 - b^2$	$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$	$\frac{xx_1}{a^2} + \frac{yy_1}{b^2} = 1$	
Hiperbola fokusi $F_{1,2}(\pm e, 0)$ $e^2 = a^2 + b^2$ asimptote $y = \pm \frac{b}{a}x$	$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$	$\frac{xx_1}{a^2} - \frac{yy_1}{b^2} = 1$	
Parabola fokus $F\left(\frac{p}{2}, 0\right)$	$y^2 = 2px$	$yy_1 = p(x + x_1)$	

Nizovi:

Aritmetički niz: $a_n = a_1 + (n - 1)d \quad S_n = \frac{n}{2}(a_1 + a_n)$

Geometrijski niz: $a_n = a_1 q^{n-1} \quad S_n = a_1 \frac{q^n - 1}{q - 1}$

Geometrijski red: $S = \frac{a_1}{1 - q}, \quad |q| < 1$

Derivacije:

Derivacija umnoška: $(f \cdot g)' = f' \cdot g + f \cdot g'$ Derivacija kvocijenta: $\left(\frac{f}{g}\right)' = \frac{f' \cdot g - f \cdot g'}{g^2}$

Derivacija kompozicije: $(f \circ g)'(x) = f'(g(x)) \cdot g'(x)$

Tangenta na graf funkcije f u $T(x_1, y_1)$: $y - y_1 = f'(x_1)(x - x_1)$

Derivacije:

$c' = 0 \quad x^n = nx^{n-1}, \quad n \neq 0 \quad (\sin x)' = \cos x \quad (\cos x)' = -\sin x \quad (\operatorname{tg} x)' = \frac{1}{\cos^2 x}$