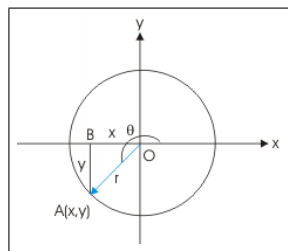
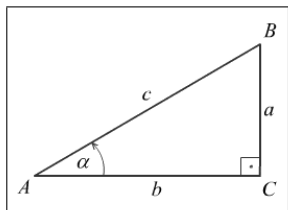


## Definicije trigonometrijskih funkcija



$$\sin \alpha = \frac{a}{c} \quad \cos \alpha = \frac{b}{c} \quad \sin \theta = \frac{y}{r} \quad \cos \theta = \frac{x}{r}$$

$$\operatorname{tg} \alpha = \frac{a}{b} \quad \operatorname{ctg} \alpha = \frac{b}{a} \quad \operatorname{tg} \theta = \frac{y}{x} \quad \operatorname{ctg} \theta = \frac{x}{y}$$

## Formule za tangens i kotangens

$$\operatorname{tg} t = \frac{\sin t}{\cos t}; \quad \operatorname{ctg} t = \frac{\cos t}{\sin t}; \quad \operatorname{tg} t \cdot \operatorname{ctg} t = 1,$$

pri čemu je tangens definisan za  $t \neq \frac{\pi}{2} + n\pi, n \in \mathbb{Z}$ , a kotangens za  $t \neq n\pi, n \in \mathbb{Z}$ .

## Osnovni identitet

$$\sin^2 t + \cos^2 t = 1$$

## Osnovne nejednakosti

$$-1 \leq \sin t \leq 1; \quad -1 \leq \cos t \leq 1$$

## Parnosti i neparnost

$$\sin(-t) = -\sin t; \quad \cos(-t) = \cos t$$

$$\operatorname{tg}(-t) = -\operatorname{tg} t; \quad \operatorname{ctg}(-t) = -\operatorname{ctg} t$$

## Periodičnost

$$\sin(t + 2\pi) = \sin t; \quad \cos(t + 2\pi) = \cos t$$

$$\operatorname{tg}(t + \pi) = \operatorname{tg} t; \quad \operatorname{ctg}(t + \pi) = \operatorname{ctg} t$$

## Formule svođenja

$$\sin\left(\frac{\pi}{2} + t\right) = \cos t; \quad \sin\left(\frac{\pi}{2} - t\right) = \cos t; \quad \sin\left(t - \frac{\pi}{2}\right) = -\cos t$$

$$\sin(\pi + t) = -\sin t; \quad \sin(\pi - t) = \sin t; \quad \sin(t - \pi) = -\sin t$$

$$\sin\left(\frac{3\pi}{2} + t\right) = -\cos t; \quad \sin\left(\frac{3\pi}{2} - t\right) = -\cos t; \quad \sin\left(t - \frac{3\pi}{2}\right) = \cos t$$

$$\cos\left(\frac{\pi}{2} + t\right) = -\sin t; \quad \cos\left(\frac{\pi}{2} - t\right) = \sin t; \quad \cos\left(t - \frac{\pi}{2}\right) = \sin t$$

$$\cos(\pi + t) = -\cos t; \quad \cos(\pi - t) = -\cos t; \quad \cos(t - \pi) = -\cos t$$

$$\cos\left(\frac{3\pi}{2} + t\right) = \sin t; \quad \cos\left(\frac{3\pi}{2} - t\right) = \sin t; \quad \cos\left(t - \frac{3\pi}{2}\right) = -\sin t$$

## Formule za zbir i razliku

$$\sin(s + t) = \sin s \cos t + \cos s \sin t$$

$$\sin(s - t) = \sin s \cos t - \cos s \sin t$$

$$\cos(s + t) = \cos s \cos t - \sin s \sin t$$

$$\cos(s - t) = \cos s \cos t + \sin s \sin t$$

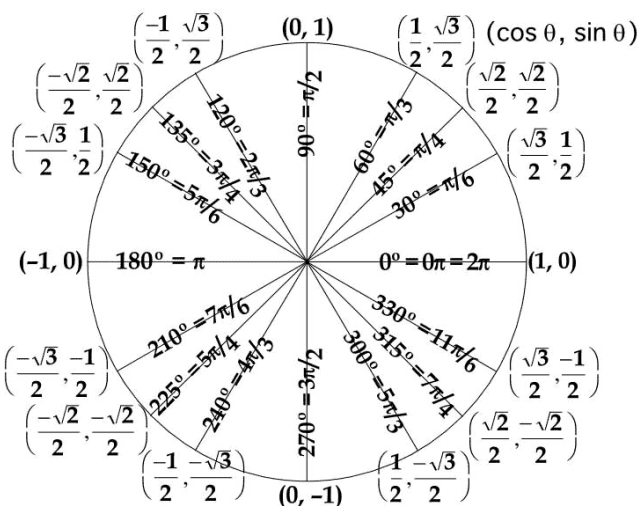
$$\operatorname{tg}(s + t) = \frac{\operatorname{tg} s + \operatorname{tg} t}{1 - \operatorname{tg} s \operatorname{tg} t}; \quad \operatorname{tg}(s - t) = \frac{\operatorname{tg} s - \operatorname{tg} t}{1 + \operatorname{tg} s \operatorname{tg} t}$$

$$\operatorname{ctg}(s + t) = \frac{\operatorname{ctg} s \operatorname{ctg} t - 1}{\operatorname{ctg} s + \operatorname{ctg} t}; \quad \operatorname{ctg}(s - t) = \frac{\operatorname{ctg} s \operatorname{ctg} t + 1}{\operatorname{ctg} t - \operatorname{ctg} s}$$

## Formule za polovinu argumenta

$$\sin^2 \frac{t}{2} = \frac{1 - \cos t}{2}; \quad \cos^2 \frac{t}{2} = \frac{1 + \cos t}{2}$$

$$\operatorname{tg}^2 \frac{t}{2} = \frac{1 - \cos t}{1 + \cos t}; \quad \operatorname{ctg}^2 \frac{t}{2} = \frac{1 + \cos t}{1 - \cos t}$$



## Formule dvostrukog argumenta

$$\sin(2t) = 2 \sin t \cos t$$

$$\cos(2t) = \cos^2 t - \sin^2 t = 2 \cos^2 t - 1 = 1 - 2 \sin^2 t$$

$$\operatorname{tg}(2t) = \frac{2 \operatorname{tg} t}{1 - \operatorname{tg}^2 t}; \quad \operatorname{ctg}(2t) = \frac{\operatorname{ctg}^2 t - 1}{2 \operatorname{ctg} t}$$

## Transformacije u proizvod

$$\sin s + \sin t = 2 \sin\left(\frac{s+t}{2}\right) \cos\left(\frac{s-t}{2}\right)$$

$$\sin s - \sin t = 2 \sin\left(\frac{s-t}{2}\right) \cos\left(\frac{s+t}{2}\right)$$

$$\cos s + \cos t = 2 \cos\left(\frac{s+t}{2}\right) \cos\left(\frac{s-t}{2}\right)$$

$$\cos s - \cos t = -2 \sin\left(\frac{s+t}{2}\right) \sin\left(\frac{s-t}{2}\right)$$

## Transformacije proizvoda

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

$$\cos s \cos t = \frac{1}{2} [\cos(s+t) + \cos(s-t)]$$

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

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

## Univerzalna trigonometrijska smena

Ako je  $t = \operatorname{tg} \frac{x}{2}$  onda je

$$\sin x = \frac{2t}{1+t^2}; \quad \cos t = \frac{1-t^2}{1+t^2}$$

$$\operatorname{tg} x = \frac{2t}{1-t^2}; \quad \operatorname{ctg} t = \frac{1-t^2}{2t}$$

**Sinusna i kosinusna teorema** Ako su  $a, b$  i  $c$  dužine stranica, a  $\alpha, \beta$  i  $\gamma$  odgovarajući uglovi trougla onda važe formule:

$$\frac{a}{\sin \alpha} = \frac{b}{\sin \beta} = \frac{c}{\sin \gamma} \quad (\text{Sinusna teorema})$$

$$c^2 = a^2 + b^2 - 2ab \cos \gamma \quad (\text{Kosinusna teorema})$$