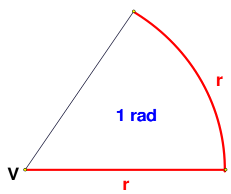
TRIGONOMETRIJA (m©h)

mjerne jedinice

veličinu kuta izražavamo u

- stupnjevima (°), 1° = 60' (minuta), 1' = 60" (sekundi), 1° = 3600"
- radijanima (rad)

definicija radijana



veličina kuta je 1 rad ako je duljina pridruženog luka jednaka duljini polumjera kružnice

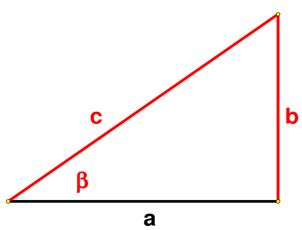
veza stupnjeva i radijana

$$180^0 = \pi \ rad \ \Rightarrow \ 1^0 = \frac{\pi}{180} \ rad \ \Rightarrow \ \alpha^0 = \frac{180^0}{\pi} \cdot \alpha(rad)$$

veza radijana i stupnjeva

$$\pi \ rad = 180^0 \ \Rightarrow \ 1 \ rad = \frac{180^0}{\pi} \approx 57^0 17' 45'' \ \Rightarrow \ \alpha(rad) = \frac{\pi}{180^0} \cdot \alpha^0$$

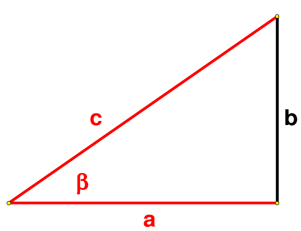
definicija trigonometrijskih funkcija na pravokutnom trokutu



sinus

sinus šiljastog kuta je kvocijent nasuprotne katete i hipotenuze

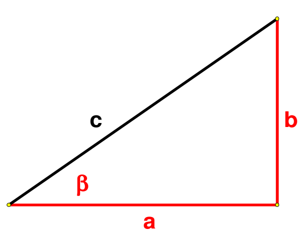
$$\sin \beta = \frac{b}{c}$$



kosinus

kosinus šiljastog kuta je kvocijent priležeće katete i hipotenuze

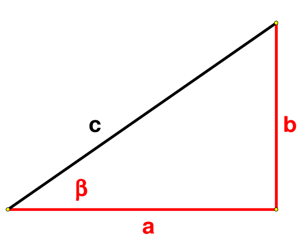
$$\cos \beta = \frac{a}{c}$$



tangens

tangens šiljastog kuta je kvocijent nasuprotne i priležeće katete

$$tg \ \beta = \frac{b}{a}$$



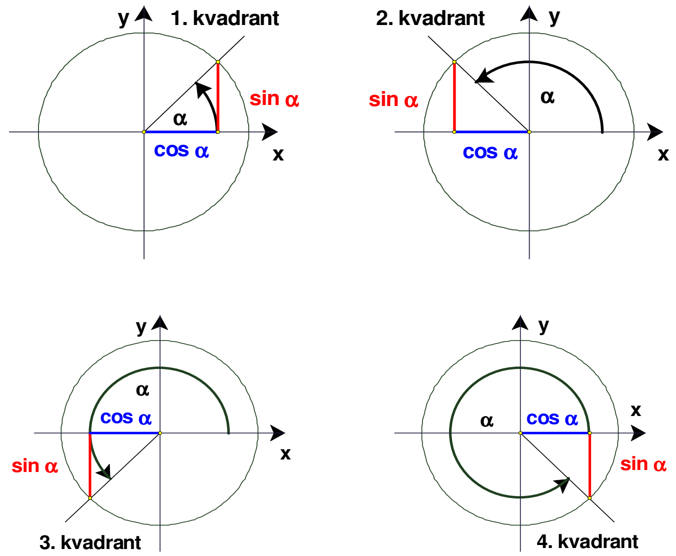
kotangens

kotangens šiljastog kuta je kvocijent priležeće i nasuprotne katete

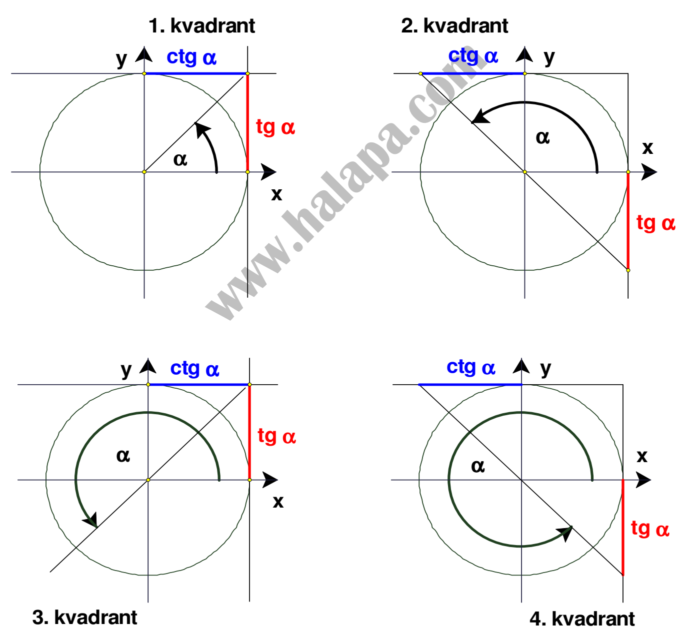
$$ctg \ \beta = \frac{a}{b}$$

definicije trigonometrijskih funkcija na trigonometrijskoj (jediničnoj, brojevnoj) kružnici

sinus i kosinus



tangens i kotangens



funkcije i kofunkcije

$$\sin\left(\frac{\pi}{2}-x\right)=\cos x \;,\; \sin\left(90^0-x\right)=\cos x$$

$$\cos\left(\frac{\pi}{2}-x\right)=\sin x \;,\; \cos\left(90^0-x\right)=\sin x$$

$$tg\left(\frac{\pi}{2}-x\right)=ctg\ x \;,\; tg\left(90^0-x\right)=ctg\ x$$

$$ctg\left(\frac{\pi}{2}-x\right)=tg\ x \;,\; ctg\left(90^0-x\right)=tg\ x$$

periodičnost funkcija

$$\sin\left(\alpha+k\cdot 360^0\right)=\sin\ \alpha\ ,\ \sin\left(\alpha+k\cdot 2\pi\right)=\sin\ \alpha$$

$$\cos\left(\alpha+k\cdot 360^0\right)=\cos\ \alpha\ ,\ \cos\left(\alpha+k\cdot 2\pi\right)=\cos\ \alpha$$

$$tg\left(\alpha+k\cdot 180^0\right)=tg\ \alpha\ ,\ tg\left(\alpha+k\cdot \pi\right)=tg\ \alpha$$

$$ctg\left(\alpha+k\cdot 180^0\right)=ctg\ \alpha\ ,\ ctg\left(\alpha+k\cdot \pi\right)=ctg\ \alpha$$

svođenje na prvi kvadrant

- iz drugog u prvi

$$\sin\left(180^0-\alpha\right)=\sin\ \alpha\ ,\ \sin\left(\pi-\alpha\right)=\sin\ \alpha$$

$$\cos\left(180^0-\alpha\right)=-\cos\ \alpha\ ,\ \cos\left(\pi-\alpha\right)=-\cos\ \alpha$$

$$tg\left(180^0-\alpha\right)=-tg\ \alpha\ ,\ tg\left(\pi-\alpha\right)=-tg\ \alpha$$

$$ctg\left(180^0-\alpha\right)=-ctg\ \alpha\ ,\ ctg\left(\pi-\alpha\right)=-ctg\ \alpha$$

- iz trećeg u prvi

$$\sin\left(180^0+\alpha\right)=-\sin\ \alpha\ ,\ \sin\left(\pi+\alpha\right)=-\sin\ \alpha$$

$$\cos\left(180^0+\alpha\right)=-\cos\ \alpha\ ,\ \cos\left(\pi+\alpha\right)=-\cos\ \alpha$$

$$tg\left(180^0+\alpha\right)=tg\ \alpha\ ,\ tg\left(\pi+\alpha\right)=tg\ \alpha$$

$$ctg\left(180^0+\alpha\right)=ctg\ \alpha\ ,\ ctg\left(\pi+\alpha\right)=ctg\ \alpha$$

- iz četvrtog u prvi

$$\sin\left(360^0-\alpha\right)=-\sin\ \alpha\ ,\ \sin\left(2\pi-\alpha\right)=-\sin\ \alpha$$

$$\cos\left(360^0-\alpha\right)=\cos\ \alpha\ ,\ \cos\left(2\pi-\alpha\right)=\cos\ \alpha$$

$$tg\left(360^0-\alpha\right)=-tg\ \alpha\ ,\ tg\left(2\pi-\alpha\right)=-tg\ \alpha$$

$$ctg\left(360^0-\alpha\right)=-ctg\ \alpha\ ,\ ctg\left(2\pi-\alpha\right)=-ctg\ \alpha$$

(ne)parnost

$$\sin\left(-\alpha\right)=-\sin\ \alpha\ ,\ \cos\left(-\alpha\right)=\cos\ \alpha\ ,\ tg\left(-\alpha\right)=-tg\ \alpha\ ,\ ctg\left(-\alpha\right)=-ctg\ \alpha$$

vrijednosti trigonometrijskih funkcija za neke kutove

α	0 ili 0°	$\frac{\pi}{6}$ ili 30°	$\frac{\pi}{4}$ ili 45°	$\frac{\pi}{3}$ ili 60°	$\frac{\pi}{2}$ ili 90°
sin α	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
cos α	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
tg α	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	$\pm\infty$
ctg α	$\pm\infty$	$\sqrt{3}$	1	$\frac{\sqrt{3}}{3}$	0

osnovni trigonometrijski identiteti

$$\cos^2\alpha+\sin^2\alpha=1 \ , \ tg\,\alpha=\frac{\sin\alpha}{\cos\alpha} \ , \ ctg\,\alpha=\frac{\cos\alpha}{\sin\alpha} \ , \ tg\,\alpha\cdot ctg\,\alpha=1$$

$$1+tg^2\alpha=\frac{1}{\cos^2\alpha} \ , \ 1+ctg^2\alpha=\frac{1}{\sin^2\alpha}$$

predznaci trigonometrijskih funkcija

kvadrant		sin	cos	tg	ctg
I.	0° – 90°	+	+	+	+
II.	90° – 180°	+	–	–	–
III.	180° – 270°	–	–	+	+
IV.	270° – 360°	–	+	–	–

izračunavanje jedne trigonometrijske funkcije pomoću ostalih

$$\sin\alpha=\pm\sqrt{1-\cos^2\alpha}=\frac{tg\,\alpha}{\pm\sqrt{1+tg^2\alpha}}=\frac{1}{\pm\sqrt{1+ctg^2\alpha}}$$

$$\cos\alpha=\pm\sqrt{1-\sin^2\alpha}=\frac{1}{\pm\sqrt{1+tg^2\alpha}}=\frac{ctg\,\alpha}{\pm\sqrt{1+ctg^2\alpha}}$$

$$tg\,\alpha=\frac{\sin\alpha}{\pm\sqrt{1-\sin^2\alpha}}=\frac{\pm\sqrt{1-\cos^2\alpha}}{\cos\alpha}=\frac{1}{ctg\,\alpha}$$

$$ctg\,\alpha=\frac{\pm\sqrt{1-\sin^2\alpha}}{\sin\alpha}=\frac{\cos\alpha}{\pm\sqrt{1-\cos^2\alpha}}=\frac{1}{tg\,\alpha}$$

funkcije zbroja i razlike

$$\sin(\alpha+\beta)=\sin\alpha\cdot\cos\beta+\cos\alpha\cdot\sin\beta$$

$$\sin(\alpha-\beta)=\sin\alpha\cdot\cos\beta-\cos\alpha\cdot\sin\beta$$

$$\cos(\alpha+\beta)=\cos\alpha\cdot\cos\beta-\sin\alpha\cdot\sin\beta$$

$$\cos(\alpha-\beta)=\cos\alpha\cdot\cos\beta+\sin\alpha\cdot\sin\beta$$

$$tg(\alpha+\beta)=\frac{tg\,\alpha+tg\,\beta}{1-tg\,\alpha\cdot tg\,\beta}$$

$$tg(\alpha-\beta)=\frac{tg\,\alpha-tg\,\beta}{1+tg\,\alpha\cdot tg\,\beta}$$

$$ctg(\alpha+\beta)=\frac{ctg\,\alpha\cdot ctg\,\beta-1}{ctg\,\alpha+ctg\,\beta}$$

$$ctg(\alpha-\beta)=\frac{ctg\,\alpha\cdot ctg\,\beta+1}{ctg\,\alpha-ctg\,\beta}$$

$$\sin(\alpha+\beta+\gamma)=\sin\alpha\cdot\cos\beta\cdot\cos\gamma+\cos\alpha\cdot\sin\beta\cdot\cos\gamma+\cos\alpha\cdot\cos\beta\cdot\sin\gamma-\sin\alpha\cdot\sin\beta\cdot\sin\gamma$$

$$\cos(\alpha+\beta+\gamma)=\cos\alpha\cdot\cos\beta\cdot\cos\gamma-\sin\alpha\cdot\sin\beta\cdot\cos\gamma-\sin\alpha\cdot\cos\beta\cdot\sin\gamma-\cos\alpha\cdot\sin\beta\cdot\sin\gamma$$

funkcije višestrukih kutova

$$\sin 2\alpha = 2\cdot\sin\alpha\cdot\cos\alpha \ ,\ \cos 2\alpha = \cos^2\alpha - \sin^2\alpha = 2\cdot\cos^2\alpha - 1 = 1 - 2\cdot\sin^2\alpha$$

$$tg\,2\alpha = \frac{2\cdot tg\,\alpha}{1 - tg^2\,\alpha} \ ,\ ctg\,2\alpha = \frac{ctg^2\,\alpha - 1}{2\cdot ctg\,\alpha}$$

$$\sin 3\alpha = 3\cdot\sin\alpha - 4\cdot\sin^3\alpha \ ,\ \cos 3\alpha = 4\cdot\cos^3\alpha - 3\cdot\cos\alpha$$

$$tg\,3\alpha = \frac{3\cdot tg\,\alpha - tg^3\,\alpha}{1 - 3\cdot tg^2\,\alpha} \ ,\ ctg\,3\alpha = \frac{ctg^3\,\alpha - 3\cdot ctg\,\alpha}{3\cdot ctg^2\,\alpha - 1}$$

funkcije polukutova

$$\sin\alpha = 2\cdot\sin\frac{\alpha}{2}\cdot\cos\frac{\alpha}{2} \ ,\ \cos\alpha = \cos^2\frac{\alpha}{2} - \sin^2\frac{\alpha}{2}$$

$$tg\alpha = \frac{2\cdot tg\frac{\alpha}{2}}{1 - tg^2\frac{\alpha}{2}} \ ,\ ctg\alpha = \frac{ctg^2\frac{\alpha}{2} - 1}{2\cdot ctg\frac{\alpha}{2}}$$

$$1 - \cos\alpha = 2\cdot\sin^2\frac{\alpha}{2} \ ,\ 1 + \cos\alpha = 2\cdot\cos^2\frac{\alpha}{2}$$

$$\frac{1 - \cos\alpha}{1 + \cos\alpha} = tg^2\frac{\alpha}{2} \ ,\ \frac{1 + \cos\alpha}{1 - \cos\alpha} = ctg^2\frac{\alpha}{2}$$

$$\frac{1 - \cos\alpha}{\sin\alpha} = \frac{\sin\alpha}{1 + \cos\alpha} = tg\frac{\alpha}{2} \ ,\ \frac{1 + \cos\alpha}{\sin\alpha} = \frac{\sin\alpha}{1 - \cos\alpha} = ctg\frac{\alpha}{2}$$

formule pretvorbe

$$\sin\alpha\cdot\sin\beta = \frac{1}{2}\cdot\left[\cos(\alpha-\beta) - \cos(\alpha+\beta)\right] \ ,\ \cos\alpha\cdot\cos\beta = \frac{1}{2}\cdot\left[\cos(\alpha-\beta) + \cos(\alpha+\beta)\right]$$

$$\sin\alpha\cdot\cos\beta = \frac{1}{2}\cdot\left[\sin(\alpha-\beta) + \sin(\alpha+\beta)\right]$$

$$tg\,\alpha\cdot tg\,\beta = \frac{tg\,\alpha + tg\,\beta}{ctg\,\alpha + ctg\,\beta} \ ,\ ctg\,\alpha\cdot ctg\,\beta = \frac{ctg\,\alpha + ctg\,\beta}{tg\,\alpha + tg\,\beta} \ ,\ tg\,\alpha\cdot ctg\,\beta = \frac{tg\,\alpha + ctg\,\beta}{tg\,\beta + ctg\,\alpha}$$

$$\sin\alpha + \sin\beta = 2\cdot\sin\frac{\alpha+\beta}{2}\cdot\cos\frac{\alpha-\beta}{2} \ ,\ \sin\alpha - \sin\beta = 2\cdot\cos\frac{\alpha+\beta}{2}\cdot\sin\frac{\alpha-\beta}{2}$$

$$\cos\alpha + \cos\beta = 2\cdot\cos\frac{\alpha+\beta}{2}\cdot\cos\frac{\alpha-\beta}{2} \ ,\ \cos\alpha - \cos\beta = -2\cdot\sin\frac{\alpha+\beta}{2}\cdot\sin\frac{\alpha-\beta}{2}$$

$$\cos\alpha + \sin\alpha = \sqrt{2}\cdot\cos\left(\frac{\pi}{4} - \alpha\right) \ ,\ \cos\alpha - \sin\alpha = \sqrt{2}\cdot\sin\left(\frac{\pi}{4} - \alpha\right)$$

$$\sin\alpha - \cos\alpha = \sqrt{2}\cdot\sin\left(\alpha - \frac{\pi}{4}\right)$$

$$tg\alpha + tg\,\beta = \frac{\sin(\alpha+\beta)}{\cos\alpha\cdot\cos\beta} \ ,\ tg\alpha - tg\,\beta = \frac{\sin(\alpha-\beta)}{\cos\alpha\cdot\cos\beta} \ ,\ ctg\alpha + ctg\,\beta = \frac{\sin(\alpha+\beta)}{\sin\alpha\cdot\sin\beta}$$

$$ctg\alpha - ctg\,\beta = \frac{\sin(\beta-\alpha)}{\sin\alpha\cdot\sin\beta} \ ,\ tg\alpha + ctg\,\beta = \frac{\cos(\alpha-\beta)}{\sin\alpha\cdot\cos\beta} \ ,\ ctg\alpha - tg\,\beta = \frac{\cos(\alpha+\beta)}{\sin\alpha\cdot\cos\beta}$$

odnosi između trigonometrijskih funkcija u trokutu (α + β + γ = 180°)

$$\sin\alpha+\sin\beta+\sin\gamma=4\cdot\cos\frac{\alpha}{2}\cdot\cos\frac{\beta}{2}\cdot\cos\frac{\gamma}{2}$$

$$\cos\frac{\alpha}{2}+\cos\frac{\beta}{2}+\cos\frac{\gamma}{2}=4\cdot\cos\frac{\alpha+\beta}{4}\cdot\cos\frac{\alpha+\gamma}{4}\cdot\cos\frac{\beta+\gamma}{4}$$

$$tg\,\alpha+tg\,\beta+tg\,\gamma=tg\,\alpha\cdot tg\,\beta\cdot tg\,\gamma$$

$$ctg\frac{\alpha}{2}+ctg\frac{\beta}{2}+ctg\frac{\gamma}{2}=ctg\frac{\alpha}{2}\cdot ctg\frac{\beta}{2}\cdot ctg\frac{\gamma}{2}$$

univerzalna supstitucija

$$\mathrm{tg}\frac{\alpha}{2}=t\;\Rightarrow\;\sin\alpha=\frac{2t}{1+t^2}\;,\;\cos\alpha=\frac{1-t^2}{1+t^2}\;,\;tg\,\alpha=\frac{2t}{1-t^2}$$

potencije trigonometrijskih funkcija

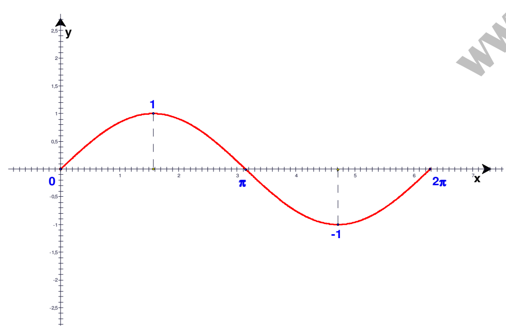
$$\sin^2\alpha=\frac{1}{2}\cdot[1-\cos 2\alpha]\;,\;\cos^2\alpha=\frac{1}{2}\cdot[1+\cos 2\alpha]$$

$$\sin^3\alpha=\frac{1}{4}\cdot[3\cdot\sin\alpha-\sin 3\alpha]\;,\;\cos^3\alpha=\frac{1}{4}\cdot[\cos 3\alpha+3\cdot\cos\alpha]$$

$$\sin^4\alpha=\frac{1}{8}\cdot[\cos 4\alpha-4\cdot\cos 2\alpha+3]\;,\;\cos^4\alpha=\frac{1}{8}\cdot[\cos 4\alpha+4\cdot\cos 2\alpha+3]$$

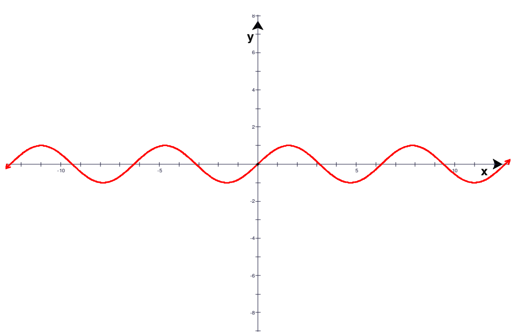
sinusoida

graf funkcije sinus, f(x) = sin x, sin : $R\rightarrow[-1,\,1]$



sinusoida na $[0,\,2\pi]$

- temeljna perioda je 2π
- nultočke su 0, π, 2π
- maksimum je 1 u točki $\frac{\pi}{2}$
- minimum je – 1 u točki $\frac{3\pi}{2}$

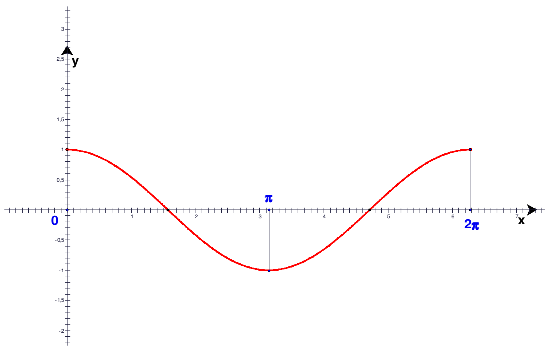


sinusoida na $\langle-\infty,\,+\infty\rangle$

- temeljna perioda je 2π
- nultočke su $k\cdot\pi$, $k\in Z$
- maksimum je 1 u $\frac{\pi}{2}+k\cdot 2\pi$, $k\in Z$
- minimum je – 1 u $-\frac{\pi}{2}+k\cdot 2\pi$, $k\in Z$
- centralno je simetrična s obzirom na ishodište

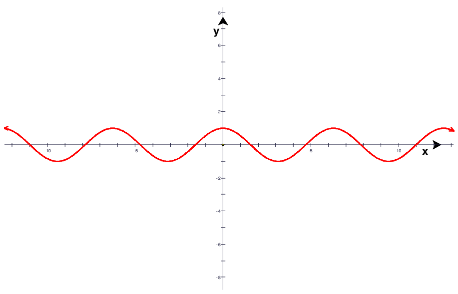
kosinusoida

graf funkcije kosinus, f(x) = cos x, $\sin : R \to [-1, 1]$



kosinusoida na $[0, 2\pi]$

- temeljna perioda je 2π
- nultočke su $\frac{\pi}{2}, \frac{3\pi}{2}$
- maksimum je 1 u točkama 0, 2π
- minimum je – 1 u točki π

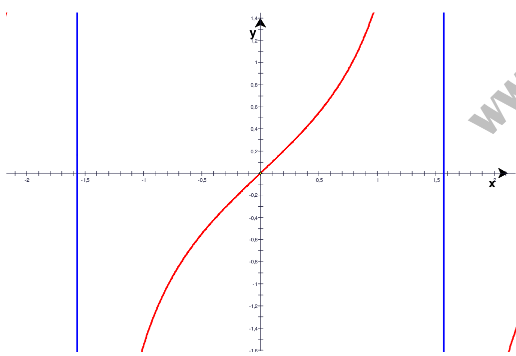


kosinusoida na $\langle -\infty, +\infty \rangle$

- temeljna perioda je 2π
- nultočke su $\frac{\pi}{2} + k \cdot \pi$, $k \in Z$
- maksimum je 1 u $k \cdot 2\pi$, $k \in Z$
- minimum je – 1 $\pi + k \cdot 2\pi$, $k \in Z$
- kosinusoida je simetrična obzirom na y-os

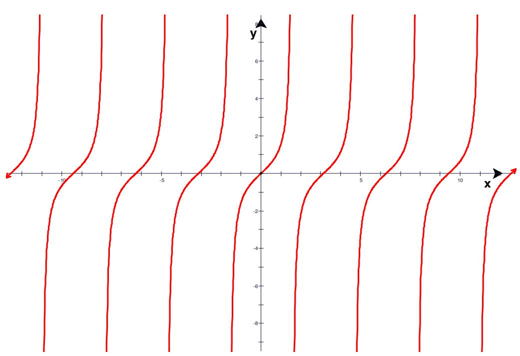
tangensoida

graf funkcije tangens, f(x) = tg x, $tg : R \setminus \left\{ \frac{\pi}{2} + k \cdot \pi : k \in Z \right\} \to R$



tangensoida na $\left[-\frac{\pi}{2}, \frac{\pi}{2} \right]$

- temeljna perioda je π
- nultočka u 0
- maksimum i minimum ne postoje
- funkcija je rastuća
- asimptote su pravci $x = -\frac{\pi}{2}$, $x = \frac{\pi}{2}$

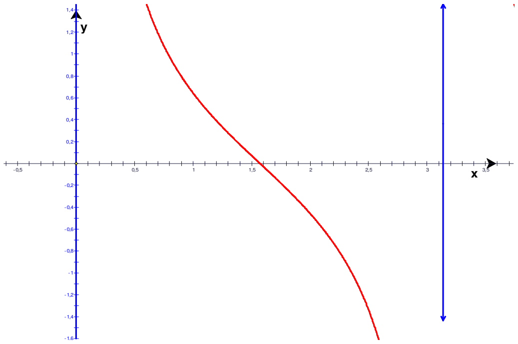


tangensoida na $R \setminus \left\{ \frac{\pi}{2} + k \cdot \pi : k \in Z \right\}$

- temeljna perioda je π
- nultočke su $k \cdot \pi$, $k \in Z$
- maksimum i minimum ne postoje
- funkcija je rastuća na $\left\langle -\frac{\pi}{2} + k \cdot \pi, \frac{\pi}{2} + k \cdot \pi \right\rangle$
- centralno je simetrična s obzirom na ishodište
- asimptote su pravci $x = \frac{\pi}{2} + k \cdot \pi$, $k \in Z$

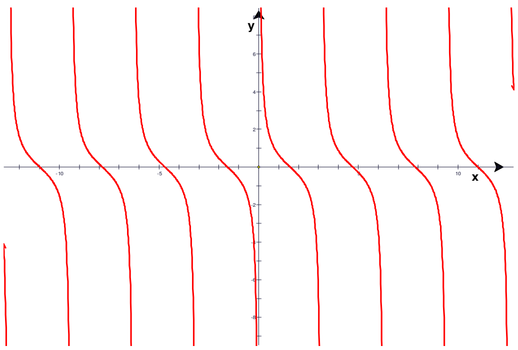
kotangensoida

graf funkcije kotangens, f(x) = ctg x, $ctg : R \setminus \{k \cdot \pi : k \in Z\} \to R$



kotangensoida na $\langle 0,\ \pi \rangle$

- temeljna perioda je π
- nultočka je $\dfrac{\pi}{2}$
- maksimum i minimum ne postoje
- funkcija je padajuća
- asimptote su pravci x = 0, x = π



kotangensoida na $R \setminus \{k \cdot \pi : k \in Z\}$

- temeljna perioda je π
- nultočke su $\dfrac{\pi}{2} + k \cdot \pi \ \ ,\ \ k \in Z$
- maksimum i minimum ne postoje
- funkcija je padajuća na $\langle k \cdot 2\pi,\ \pi + k \cdot 2\pi \rangle$
- centralno je simetrična s obzirom na ishodište
- asimptote su pravci $x = k \cdot \pi \ \ ,\ \ k \in Z$

graf funkcije f(x) = a · sin(b · x + c)

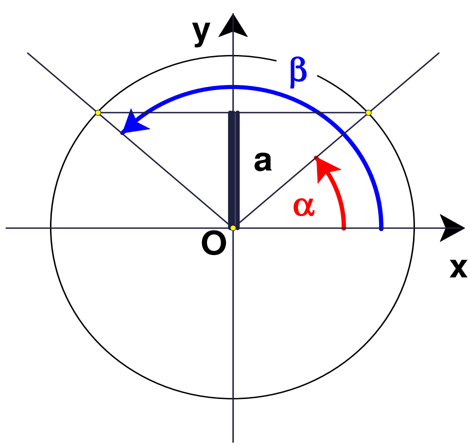
amplituda je broj │a│, maksimum funkcije je │a│, minimum je –│a│

periodičnost temeljna perioda je $\dfrac{2\pi}{|b|}$

fazni pomak sinusoidu počinjemo crtati u točki $-\dfrac{c}{b}$,

graf funkcije f(x) = a · sin (b · x + c) dobivamo translacijom grafa funkcije g(x) = sin (b · x)

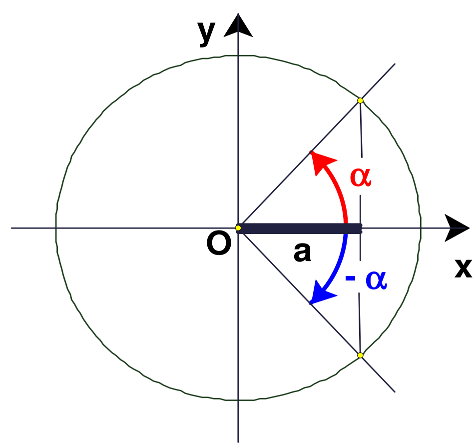
trigonometrijska jednadžba
sin x = a, │a│ ≤ 1



$x_1 = \alpha + k \cdot 2\pi \ \ ,\ \ k \in Z$

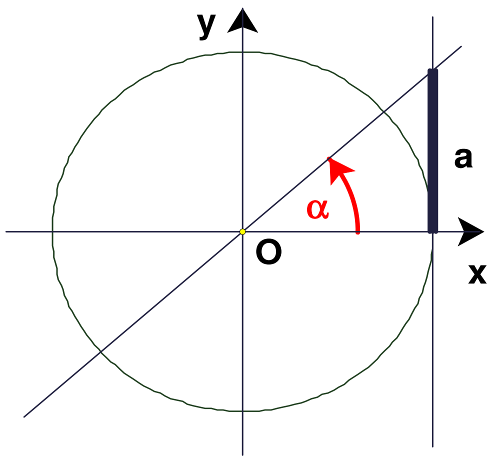
$x_2 = \beta + k \cdot 2\pi = \pi - \alpha + k \cdot 2\pi \ \ ,\ \ k \in Z$

trigonometrijska jednadžba
cos x = a, │a│ ≤ 1



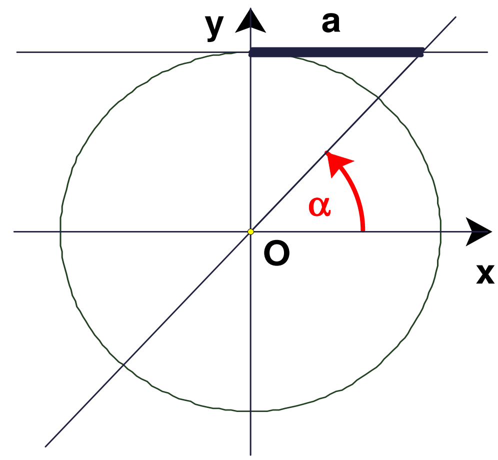
$x_{1,2} = \pm \alpha + k \cdot 2\pi \ \ ,\ \ k \in Z$

trigonometrijska jednadžba
tg x = a, $a \in R$



$$x = \alpha + k \cdot \pi \;,\; k \in Z$$

trigonometrijska jednadžba
ctg x = a, $a \in R$



$$x = \alpha + k \cdot \pi \;,\; k \in Z$$

linearne trigonometrijske jednadžbe homogene s obzirom na sin x i cos x

$$a \cdot \sin x + b \cdot \cos x = 0,\; a \neq 0 \;\; i \;\; b \neq 0$$

postupak rješavanja

$$a \cdot \sin x + b \cdot \cos x = 0 \;/ : cox \;\Rightarrow\; a \cdot tg\, x + b = 0$$

kvadratne trigonometrijske jednadžbe homogene s obzirom na sin x i cos x

$$a \cdot \sin^2 x + b \cdot \sin x \cdot \cos x + c \cdot \cos^2 x = 0,\; a \neq 0 \;\; i \;\; c \neq 0$$

postupak rješavanja

$$a \cdot \sin^2 x + b \cdot \sin x \cdot \cos x + c \cdot \cos^2 x = 0 \;/ : \cos^2 x \;\Rightarrow\; a \cdot tg^2 x + b \cdot tg\, x + c = 0 \;\Rightarrow$$

$$\Rightarrow \left[t = tg\, x \right] \Rightarrow\; a \cdot t^2 + b \cdot t + c = 0$$

$$a \cdot \sin^2 x + b \cdot \sin x \cdot \cos x + c \cdot \cos^2 x = d,\; a \neq 0 \;\; ili \;\; c \neq 0,\; d \neq 0$$

postupak rješavanja

$$a \cdot \sin^2 x + b \cdot \sin x \cdot \cos x + c \cdot \cos^2 x = d \;\Rightarrow\; \text{zamjenom } d = d \cdot \left(\sin^2 x + \cos^2 \right)$$

nakon sređivanja dobije se homogena kvadratna jednadžba

linearna nehomogena s obzirom na sin x i cos x ili projekcijska

$$a \cdot \sin x + b \cdot \cos x = c \;\; \left(a,\; b,\; c \neq 0 \right)$$

postupak rješavanja

1. inačica: univerzalna supstitucija

$$\text{t} = \text{tg} \frac{\text{x}}{2} \;\Rightarrow\; \sin x = \frac{2t}{1+t^2} \;,\; \cos x = \frac{1-t^2}{1+t^2} \;,\; tg\, x = \frac{2t}{1-t^2}$$

2. inačica: $\text{a} \cdot \sin \text{x} + \text{b} \cdot \cos \text{x} = \text{c} \;/ : \text{a} \;\Rightarrow\; \sin \text{x} + \frac{\text{b}}{\text{a}} \cdot \cos x = \frac{c}{a} \;\Rightarrow\; \left[\text{supstitucija, } tg\, \alpha = \frac{\sin \alpha}{\cos \alpha} \right] \Rightarrow$

$$\Rightarrow\; \sin x + \frac{\sin \alpha}{\cos \alpha} \cdot \cos x = \frac{c}{a} \;/ \cdot \cos \alpha \;\Rightarrow\; \sin x \cdot \cos \alpha + \cos x \cdot \sin \alpha = \frac{c}{a} \cdot \cos \alpha \;\Rightarrow$$

$\Rightarrow\; \sin \left(x + \alpha \right) = \frac{c}{a} \cdot \cos \alpha$, osnovna trigonometrijska jednadžba rješiva $za \left| \frac{c}{a} \cdot \cos \alpha \right| \leq 1$