

TRIGONOMEETRIA VALEMID

Trigonomeetriliste funktsioonide väärtuste tabel

α	0°	30°	45°	60°	90°	180°	270°	360°
$\sin \alpha$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	0	-1	0
$\cos \alpha$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	-1	0	1
$\tan \alpha$	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	-	0	-	0
* $\cot \alpha$	-	$\sqrt{3}$	1	$\frac{\sqrt{3}}{3}$	0	-	0	-

Põhivalemid

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

$$\tan \alpha = \frac{\sin \alpha}{\cos \alpha}$$

$$1 + \tan^2 \alpha = \frac{1}{\cos^2 \alpha}$$

$$*\cot \alpha = \frac{1}{\tan \alpha}$$

$$*\cot \alpha = \frac{\cos \alpha}{\sin \alpha}$$

$$*1 + \cot^2 \alpha = \frac{1}{\sin^2 \alpha}$$

Negatiivse nurga trigonomeetrilised funktsioonid

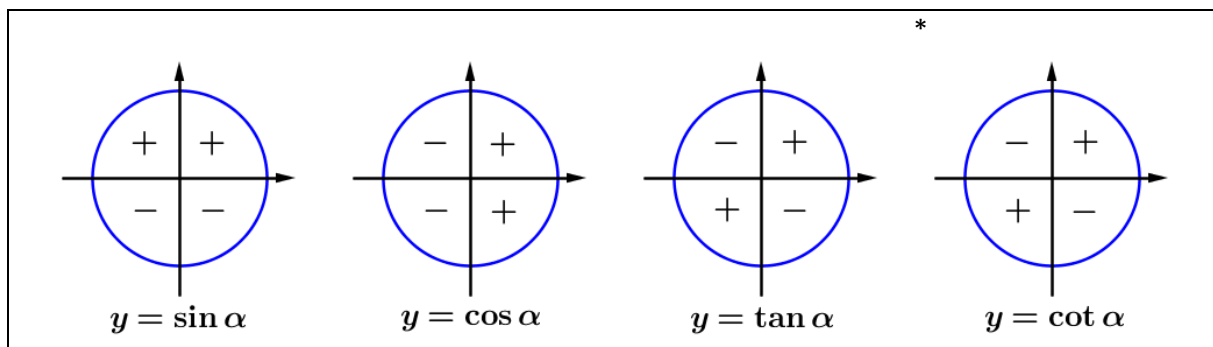
$$\sin(-\alpha) = -\sin \alpha$$

$$\cos(-\alpha) = \cos \alpha$$

$$\tan(-\alpha) = -\tan \alpha$$

$$*\cot(-\alpha) = -\cot \alpha$$

Trigonomeetriliste funktsioonide väärtuste märgid



Nurga suurus

I veerand: $0^\circ - 90^\circ$

II veerand: $90^\circ - 180^\circ$

III veerand: $180^\circ - 270^\circ$

IV veerand: $270^\circ - 360^\circ$

Taandamisvalemid

I veerand: α

II veerand: $180^\circ - \alpha$

III veerand: $180^\circ + \alpha$

IV veerand: $360^\circ + \alpha$

Täiendnurga valemid

$$\sin(90^\circ - \alpha) = \cos \alpha$$

$$\cos(90^\circ - \alpha) = \sin \alpha$$

$$\tan(90^\circ - \alpha) = \frac{1}{\tan \alpha} = * \cot \alpha$$

$$*\cot(90^\circ - \alpha) = \tan \alpha$$

Kahe nurga summa ja vahe valemid

$$\sin(\alpha \pm \beta) = \sin \alpha \cos \beta \pm \cos \alpha \sin \beta$$

$$\cos(\alpha \pm \beta) = \cos \alpha \cos \beta \mp \sin \alpha \sin \beta$$

$$\tan(\alpha \pm \beta) = \frac{\tan \alpha \pm \tan \beta}{1 \mp \tan \alpha \tan \beta}$$

Kahetordse nurga valemid

$$\sin 2\alpha = 2 \sin \alpha \cos \alpha$$

$$\cos 2\alpha = \cos^2 \alpha - \sin^2 \alpha$$

$$\tan 2\alpha = \frac{2 \tan \alpha}{1 - \tan^2 \alpha}$$

* Poolnurga valemid

$$\sin \frac{\alpha}{2} = \pm \sqrt{\frac{1 - \cos \alpha}{2}}$$

$$\cos \frac{\alpha}{2} = \pm \sqrt{\frac{1 + \cos \alpha}{2}}$$

$$\tan \frac{\alpha}{2} = \pm \sqrt{\frac{1 - \cos \alpha}{1 + \cos \alpha}}$$

* Summa ja vahe teisendamine korrutiseks

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

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

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

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

Trigonomeetrilised põhivõrrandid

$$\sin x = m$$

$$x = (-1)^n \arcsin m + n\pi, \quad n \in \mathbb{Z}$$

$$\cos x = m$$

$$x = \pm \arccos m + 2n\pi, \quad n \in \mathbb{Z}$$

$$\tan x = m$$

$$x = \arctan m + n\pi, \quad n \in \mathbb{Z}$$

Arkusfunktsioonide omadused

$$\sin(\arcsin x) = x, \quad \text{kus } |x| \leq 1$$

$$\cos(\arccos x) = x, \quad \text{kus } |x| \leq 1$$

$$\tan(\arctan x) = x$$

$$\arcsin(-x) = -\arcsin x$$

$$\arccos(-x) = \pi - \arccos x$$

$$\arctan(-x) = -\arctan x$$

0°	30°	45°	60°	90°	120°	135°	150°	180°
0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{3\pi}{4}$	$\frac{5\pi}{6}$	π

210°	225°	240°	270°	300°	315°	330°	360°
$\frac{7\pi}{6}$	$\frac{5\pi}{4}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{7\pi}{4}$	$\frac{11\pi}{6}$	2π