# Formule trigonometrice

| rad | $0$ | $\frac{\pi}{6}$ | $\frac{\pi}{4}$ | $\frac{\pi}{3}$ | $\frac{\pi}{2}$ | $\frac{2\pi}{3}$ | $\frac{3\pi}{4}$ | $\frac{5\pi}{6}$ | $\pi$ | $\frac{7\pi}{6}$ | $\frac{5\pi}{4}$ | $\frac{4\pi}{3}$ | $\frac{3\pi}{2}$ | $\frac{5\pi}{3}$ | $\frac{7\pi}{4}$ | $\frac{11\pi}{6}$ | $2\pi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **grade** | 0° | 30° | 45° | 60° | 90° | 120° | 135° | 150° | 180° | 210° | 225° | 240° | 270° | 300° | 315° | 330° | 360° |
| $\sin\alpha$ | $0$ | $\frac{1}{2}$ | $\frac{\sqrt{2}}{2}$ | $\frac{\sqrt{3}}{2}$ | $1$ | $\frac{\sqrt{3}}{2}$ | $\frac{\sqrt{2}}{2}$ | $\frac{1}{2}$ | $0$ | $-\frac{1}{2}$ | $-\frac{\sqrt{2}}{2}$ | $-\frac{\sqrt{3}}{2}$ | -1 | $-\frac{\sqrt{3}}{2}$ | $-\frac{\sqrt{2}}{2}$ | $-\frac{1}{2}$ | $0$ |
| $\cos\alpha$ | $1$ | $\frac{\sqrt{3}}{2}$ | $\frac{\sqrt{2}}{2}$ | $\frac{1}{2}$ | $0$ | $-\frac{1}{2}$ | $-\frac{\sqrt{2}}{2}$ | $-\frac{\sqrt{3}}{2}$ | -1 | $-\frac{\sqrt{3}}{2}$ | $-\frac{\sqrt{2}}{2}$ | $-\frac{1}{2}$ | $0$ | $\frac{1}{2}$ | $\frac{\sqrt{2}}{2}$ | $\frac{\sqrt{3}}{2}$ | $1$ |
| $tg\,\alpha$ | $0$ | $\frac{\sqrt{3}}{3}$ | $1$ | $\sqrt{3}$ | N | $-\sqrt{3}$ | -1 | $-\frac{\sqrt{3}}{3}$ | $0$ | $\frac{\sqrt{3}}{3}$ | $1$ | $\sqrt{3}$ | N | $-\sqrt{3}$ | -1 | $-\frac{\sqrt{3}}{3}$ | $0$ |
| $ctg\,\alpha$ | N | $\sqrt{3}$ | $1$ | $\frac{\sqrt{3}}{3}$ | $0$ | $-\frac{\sqrt{3}}{3}$ | -1 | $-\sqrt{3}$ | N | $\sqrt{3}$ | $1$ | $\frac{\sqrt{3}}{3}$ | $0$ | $-\frac{\sqrt{3}}{3}$ | -1 | $-\sqrt{3}$ | N |

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

$tg\alpha\, ctg\alpha = 1$

$\sin\alpha = \cos(\frac{\pi}{2} - \alpha)$ $\quad \cos\alpha = \sin(\frac{\pi}{2} - \alpha)$ $\quad tg\alpha = ctg(\frac{\pi}{2} - \alpha)$ $\quad ctg\alpha = tg(\frac{\pi}{2} - \alpha)$

$\frac{1}{\cos^2 x} = 1 + tg^2 x$ $\quad \frac{1}{\sin^2 x} = 1 + ctg^2 x$ $\quad \cos\alpha = \frac{1 - tg^2\frac{\alpha}{2}}{1 + tg^2\frac{\alpha}{2}}$

$\sin(-x) = -\sin x$ $\quad \cos(-x) = \cos x$ $\quad tg(-x) = -tgx$ $\quad ctg(-x) = -ctgx$

$\sin(\pi - t) = \sin t$ $\quad \cos(\pi - t) = -\cos t$ $\quad \sin(x + 2n\pi) = \sin x$ $\quad \cos(x + 2n\pi) = \cos x$ $\quad \sin\alpha = \frac{2tg\frac{\alpha}{2}}{1 + tg^2\frac{\alpha}{2}}$

$\sin 2\alpha = 2\sin\alpha\cos\alpha$ $\quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$ $\quad \cos 2\alpha = 2\cos^2\alpha - 1$ $\quad \cos 2\alpha = 1 - 2\sin^2\alpha$

$\cos(a - b) = \cos a\cos b + \sin a\sin b$ $\quad \sin p + \sin q = 2\sin\frac{p+q}{2}\cos\frac{p-q}{2}$ $\quad \cos p + \cos q = 2\cos\frac{p+q}{2}\cos\frac{p-q}{2}$ $\quad \sin a\cos b = \frac{\sin(a+b) + \sin(a-b)}{2}$

$\cos(a + b) = \cos a\cos b - \sin a\sin b$ $\quad \cos a\cos b = \frac{\cos(a-b) + \cos(a+b)}{2}$

$\sin(a + b) = \sin a\cos b + \cos a\sin b$ $\quad \sin p - \sin q = 2\cos\frac{p+q}{2}\sin\frac{p-q}{2}$ $\quad \cos p - \cos q = -2\sin\frac{p+q}{2}\sin\frac{p-q}{2}$ $\quad \sin a\sin b = \frac{\cos(a-b) - \cos(a+b)}{2}$

$\sin(a - b) = \sin a\cos b - \cos a\sin b$

$\sin 3\alpha = 3\sin\alpha - 4\sin^3\alpha$ $\quad \cos 3\alpha = 4\cos^3\alpha - 3\cos\alpha$ $\quad \cos\alpha = \pm\sqrt{\frac{1 + \cos 2\alpha}{2}}$ $\quad \sin\alpha = \pm\sqrt{\frac{1 - \cos 2\alpha}{2}}$

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

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

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

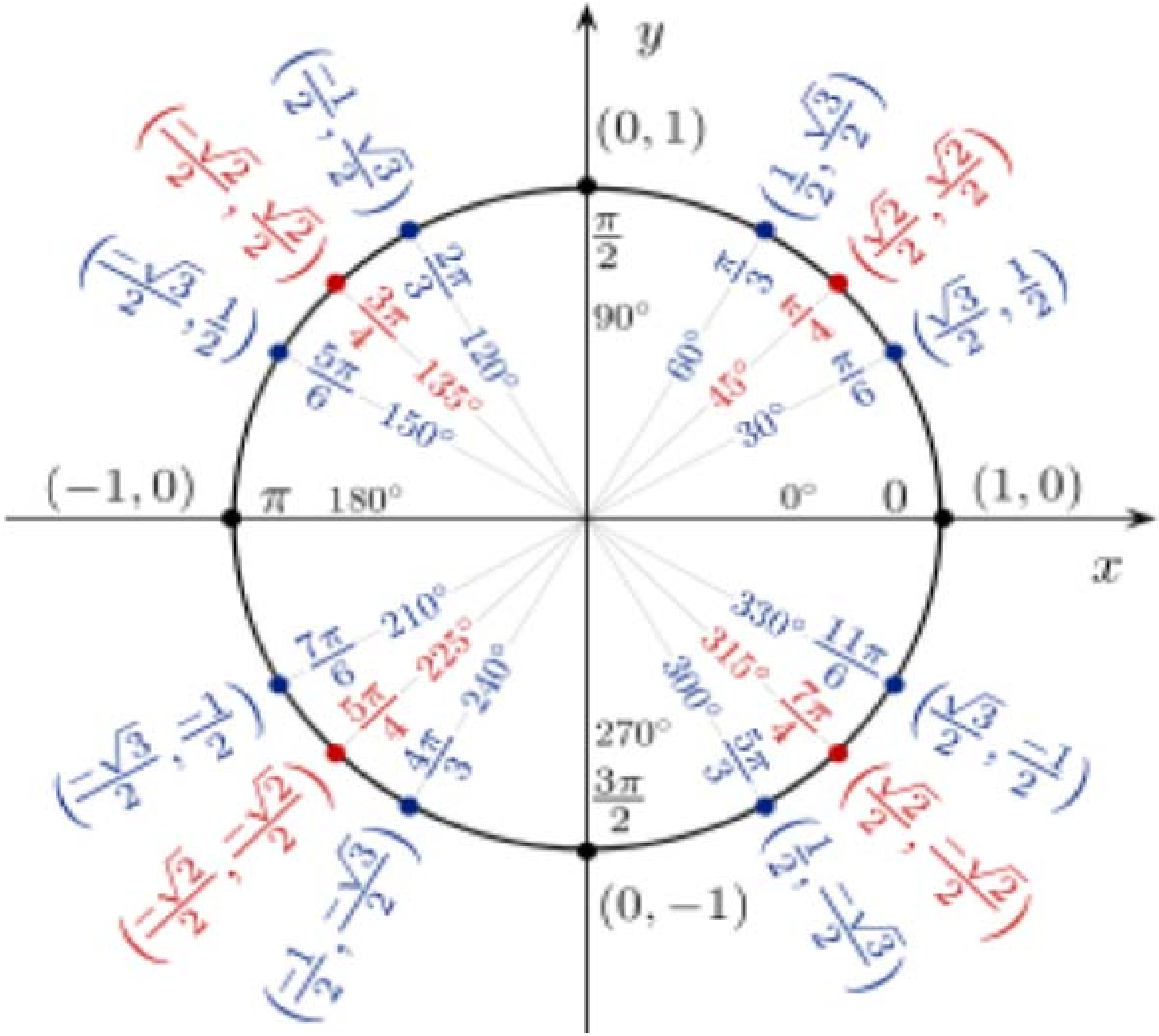
$$tg\,\frac{\alpha}{2}=\frac{\sin\,\alpha}{1+\cos\,\alpha}=\frac{1-\cos\,\alpha}{\sin\,\alpha}$$

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

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

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

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



| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| x | -1 | $-\frac{\sqrt{3}}{2}$ | $-\frac{\sqrt{2}}{2}$ | $-\frac{1}{2}$ | 0 | $\frac{1}{2}$ | $\frac{\sqrt{2}}{2}$ | $\frac{\sqrt{3}}{2}$ | 1 |
| arcsin $x$ | $-\frac{\pi}{2}$ | $-\frac{\pi}{3}$ | $-\frac{\pi}{4}$ | $-\frac{\pi}{6}$ | 0 | $\frac{\pi}{6}$ | $\frac{\pi}{4}$ | $\frac{\pi}{3}$ | $\frac{\pi}{2}$ |

$$\sin x = a$$
$$x = (-1)^K \arcsin a + k\pi; k \in Z$$

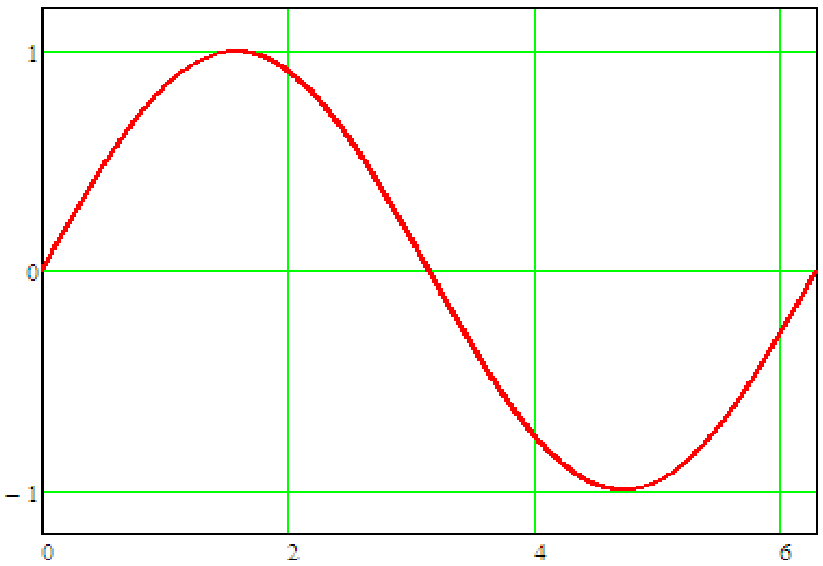
| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| x | -1 | $-\frac{\sqrt{3}}{2}$ | $-\frac{\sqrt{2}}{2}$ | $-\frac{1}{2}$ | 0 | $\frac{1}{2}$ | $\frac{\sqrt{2}}{2}$ | $\frac{\sqrt{3}}{2}$ | 1 |
| arccos$x$ | $\pi$ | $\frac{5\pi}{6}$ | $\frac{3\pi}{4}$ | $\frac{2\pi}{3}$ | $\frac{\pi}{2}$ | $\frac{\pi}{3}$ | $\frac{\pi}{4}$ | $\frac{\pi}{6}$ | 0 |

$$\cos x = b$$
$$x = \pm \arccos b + 2k\pi; k \in Z$$

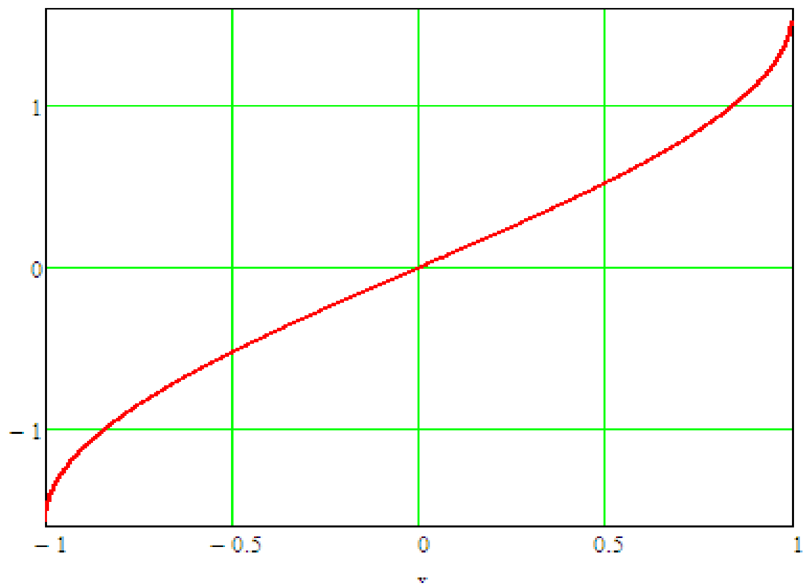
| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| x | -∞ | $-\sqrt{3}$ | -1 | $-\frac{\sqrt{3}}{3}$ | 0 | $\frac{\sqrt{3}}{3}$ | 1 | $\sqrt{3}$ | +∞ |
| *arctgx* | $-\frac{\pi}{2}$ | $-\frac{\pi}{3}$ | $-\frac{\pi}{4}$ | $-\frac{\pi}{6}$ | 0 | $\frac{\pi}{6}$ | $\frac{\pi}{4}$ | $\frac{\pi}{3}$ | $\frac{\pi}{2}$ |

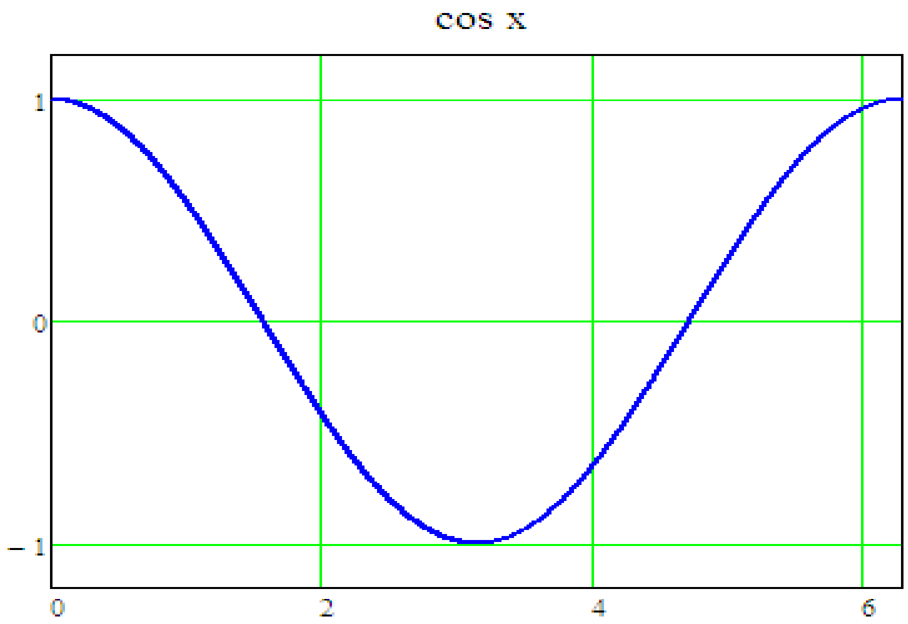
$$tgx = c$$
$$x = arctgc + k\pi; k \in Z$$

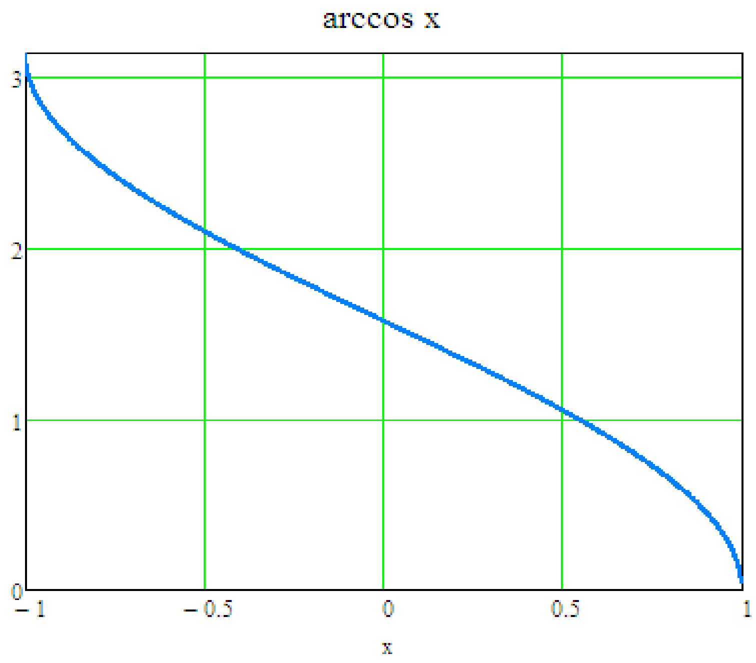
sin x

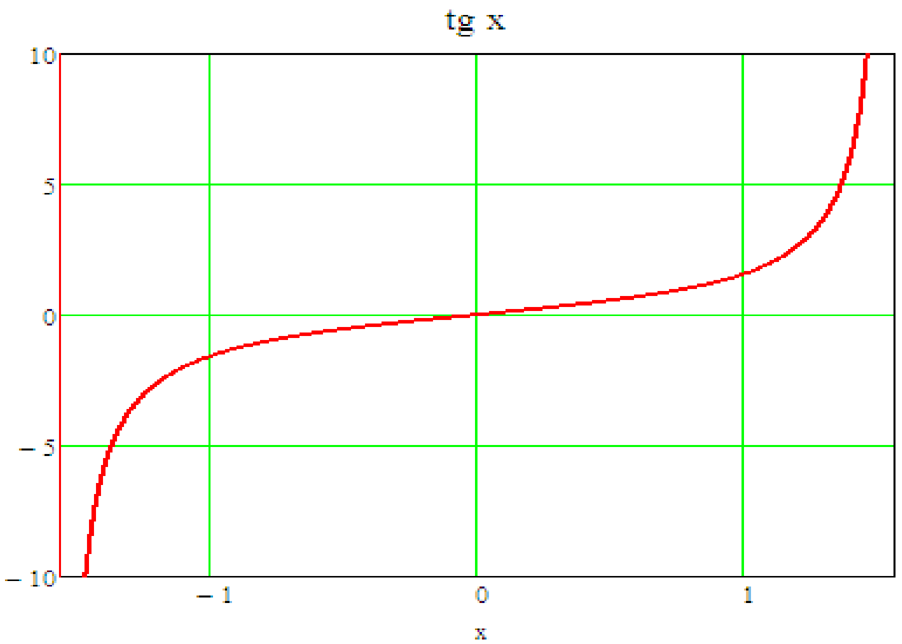


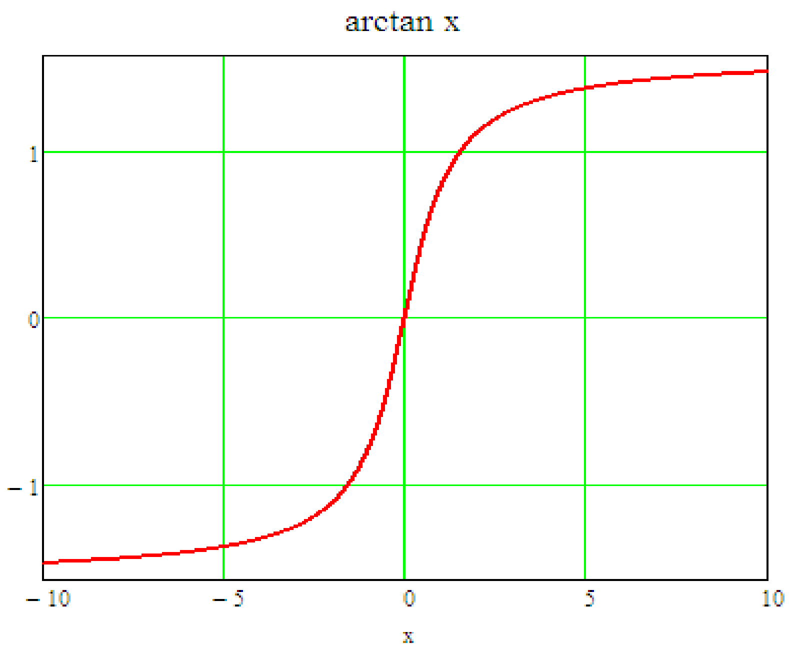

arcsin x




cos x
1
0
– 1
0
2
4
6


arccos x
3
2
1
0
– 1
– 0.5
0
0.5
1
x


tg x
10
5
0
– 5
– 10
– 1
0
1
x


arctan x
1
0
– 1
– 10
– 5
0
5
10
x