SOHCAHTOA

A way of remembering how to compute the **sine**, **cosine**, and **tangent** of an angle.

SOH stands for **S**ine equals **O**pposite over **H**ypotenuse.

CAH stands for **C**osine equals **A**djacent over **H**ypotenuse.

TOA stands for **T**angent equals **O**pposite over **A**djacent.

SOH $\sin\alpha = \dfrac{Opposite}{Hypotenuse} = \dfrac{opp}{hyp}$

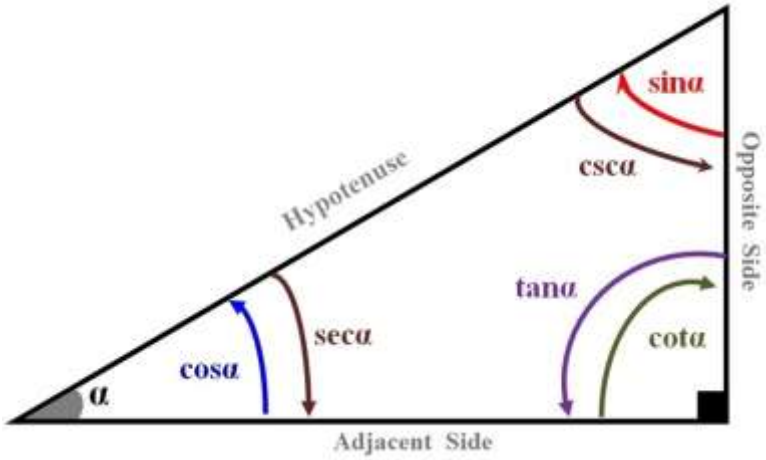
CAH $\cos\alpha = \dfrac{Adjacent}{Hypotenuse} = \dfrac{adj}{hyp}$

TOA $\tan\alpha = \dfrac{opposite}{adjacent} = \dfrac{opp}{adj} = \dfrac{\sin\theta}{\cos\theta}$

$\cot\alpha = \dfrac{adj}{opp} = \dfrac{\cos\alpha}{\sin\alpha} = \dfrac{1}{\tan\alpha}$

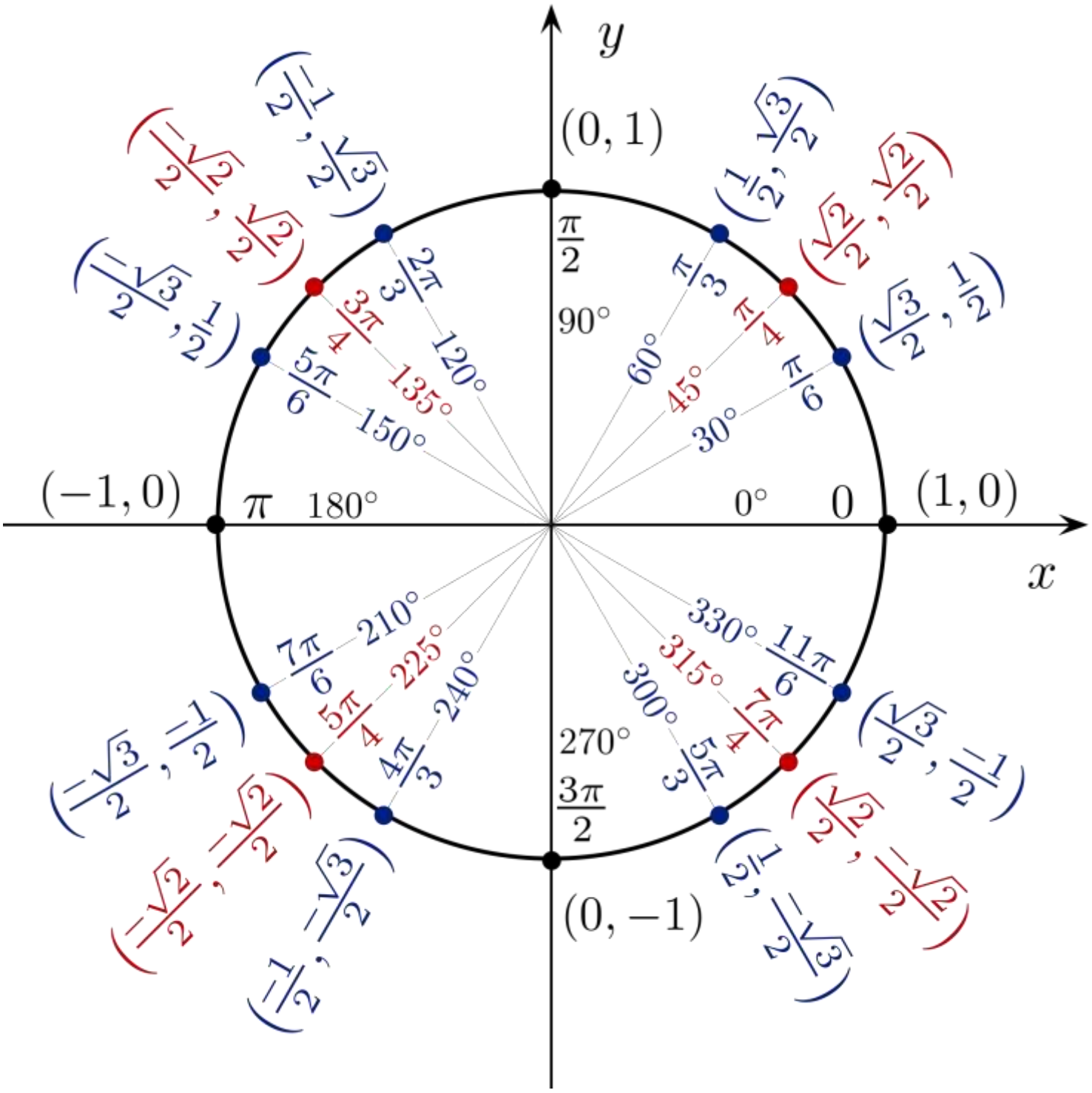
$\sec\alpha = \dfrac{hyp}{adj} = \dfrac{1}{\cos\alpha}$

$\csc\alpha = \dfrac{hyp}{opp} = \dfrac{1}{\sin\alpha}$



Angle θ in *degree*	Angle θ in *radian*	*sin θ*	*cos θ*	*tan θ*	*cot θ*	*sec θ*	*csc θ*
0°	0	0	1	0	∞ (*undefined*)	1	∞ (*undefined*)
30°	π/6	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{3}}{3}$	$\sqrt{3}$	$\frac{2\sqrt{3}}{3}$	2
45°	π/4	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$	1	1	$\sqrt{2}$	$\sqrt{2}$
60°	π/3	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$	$\frac{\sqrt{3}}{3}$	2	$\frac{2\sqrt{3}}{3}$
90°	π/2	1	0	± ∞	0	± ∞	1
120°	2π/3	$\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$	$-\sqrt{3}$	$-\frac{\sqrt{3}}{3}$	–2	$\frac{2\sqrt{3}}{3}$
135°	3π/4	$\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{2}}{2}$	–1	–1	$-\sqrt{2}$	$\sqrt{2}$
150°	5π/6	$\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{3}}{3}$	$-\sqrt{3}$	$-\frac{2\sqrt{3}}{3}$	2
180°	π	0	–1	0	± ∞	–1	± ∞

Function	**Domain ($n \in Z$)**	**Range**	**I**	**II**	**III**	**IV**
$y = \sin t$	$\{t \mid -\infty < t < \infty\}$	$-1 \le y \le 1$	+	+	–	–
$y = \cos t$	$\{t \mid -\infty < t < \infty\}$	$-1 \le y \le 1$	+	–	**v**	+
$y = \tan t$	$\{t \mid -\infty < t < \infty, t \ne (2n+1)\,\pi/2\}$	$-\infty < y < \infty$	+	–	+	–
$y = \cot t$	$\{t \mid -\infty < t < \infty, t \ne n\pi\}$	$-\infty < y < \infty$	+	–	+	–
$y = \csc t$	$\{t \mid -\infty < t < \infty, t \ne n\pi\}$	$y \le -1, y \ge 1$	+	+	–	–
$y = \sec t$	$\{t \mid -\infty < t < \infty, t \ne (2n+1)\,\pi/2\}$	$y \le -1, y \ge 1$	+	–	–	+

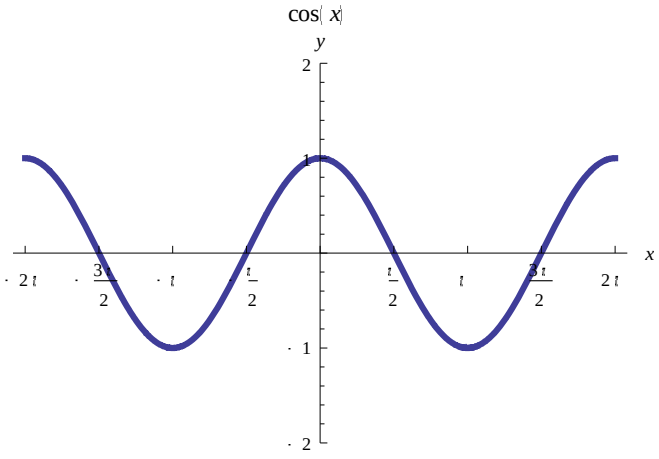

y
x
(0, 1)
(1, 0)
(−1, 0)
(0, −1)
π/2
90°
π/3
60°
π/4
45°
π/6
30°
0°
0
π
180°
2π/3
120°
3π/4
135°
5π/6
150°
7π/6
210°
5π/4
225°
4π/3
240°
3π/2
270°
5π/3
300°
7π/4
315°
11π/6
330°
(1/2, √3/2)
(√2/2, √2/2)
(√3/2, 1/2)
(−1/2, √3/2)
(−√2/2, √2/2)
(−√3/2, 1/2)
(−√3/2, −1/2)
(−√2/2, −√2/2)
(−1/2, −√3/2)
(1/2, −√3/2)
(√2/2, −√2/2)
(√3/2, −1/2)

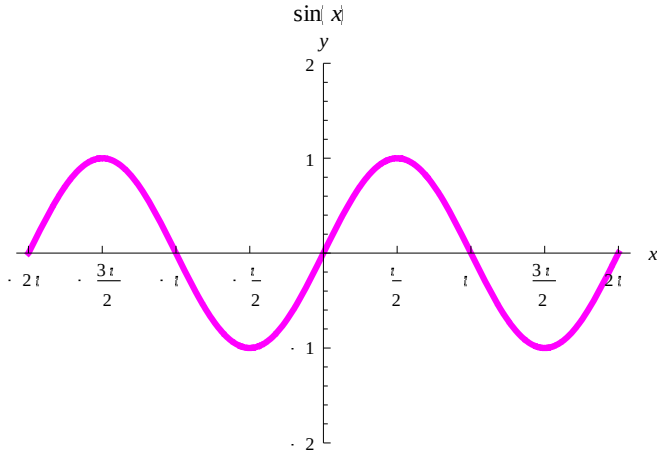
	sin	***cos***
0°	0	4
30°	1	3
45°	2	2
60°	3	1
90°	4	0

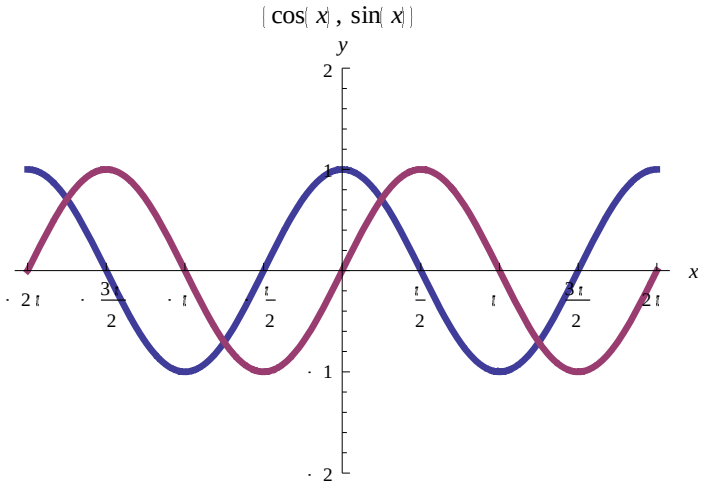
0°	$\frac{0}{4}$	$\frac{4}{4}$
30°	$\frac{1}{4}$	$\frac{3}{4}$
45°	$\frac{2}{4}$	$\frac{2}{4}$
60°	$\frac{3}{4}$	$\frac{1}{4}$
90°	$\frac{4}{4}$	$\frac{0}{4}$

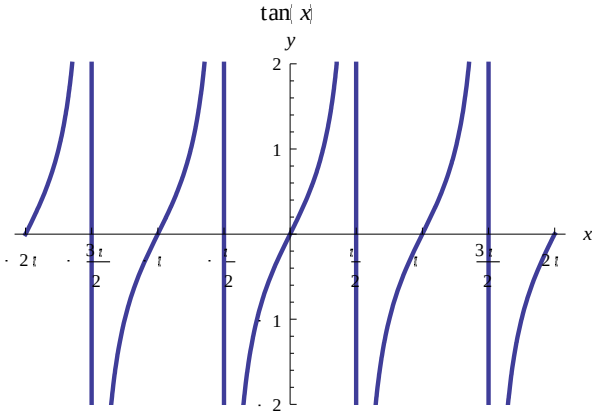
0°	$\sqrt{\frac{0}{4}}$	$\sqrt{\frac{4}{4}}$
30°	$\sqrt{\frac{1}{4}}$	$\sqrt{\frac{3}{4}}$
45°	$\sqrt{\frac{2}{4}}$	$\sqrt{\frac{2}{4}}$
60°	$\sqrt{\frac{3}{4}}$	$\sqrt{\frac{1}{4}}$
90°	$\sqrt{\frac{4}{4}}$	$\sqrt{\frac{0}{4}}$

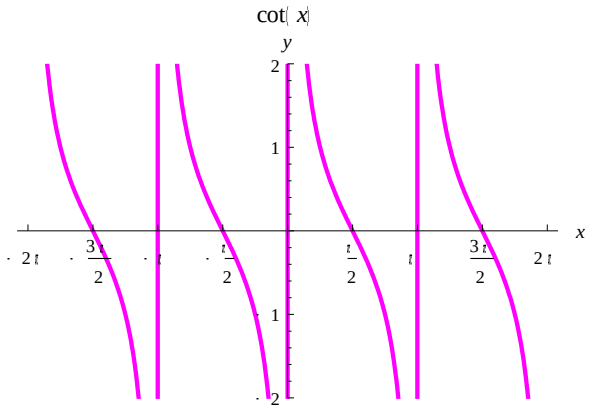
	sin	***cos***
0°	0	1
30°	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$
45°	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$
60°	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$
90°	1	0

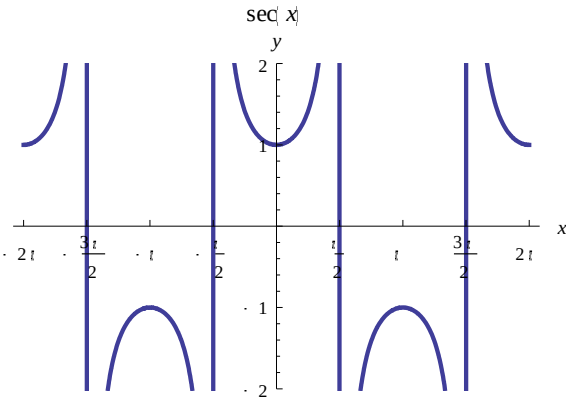

cos(x)
y
x
2
1
· 1
· 2
· 2 π
· 3π/2
· π
· π/2
π/2
π
3π/2
2 π

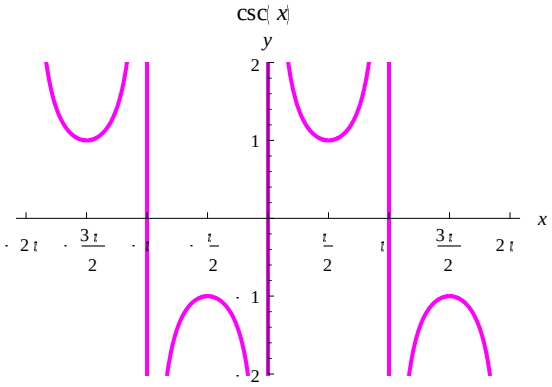

sin(x)
y
x
2
1
· 1
· 2
· 2 π
· 3π/2
· π
· π/2
π/2
π
3π/2
2 π


[cos(x) , sin(x)]
y
x
2
1
· 1
· 2
· 2 π
· 3π/2
· π
· π/2
π/2
π
3π/2
2 π

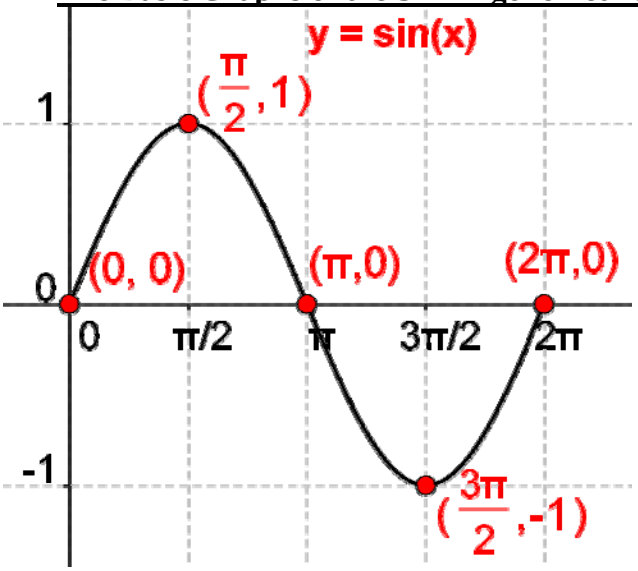

tan(x)
y
x
2
1
· 1
· 2
· 2 π
· 3π/2
· π
· π/2
π/2
π
3π/2
2 π


cot(x)
y
x
2
1
· 1
· 2
· 2 π
· 3π/2
· π
· π/2
π/2
π
3π/2
2 π

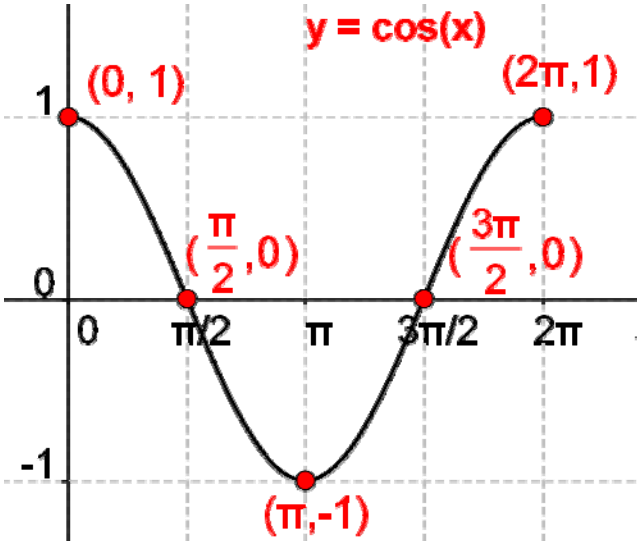

sec(x)
y
x
2
1
· 1
· 2
· 2 π
· 3π/2
· π
· π/2
π/2
π
3π/2
2 π


csc(x)
y
x
2
1
· 1
· 2
· 2 π
· 3π/2
· π
· π/2
π/2
π
3π/2
2 π

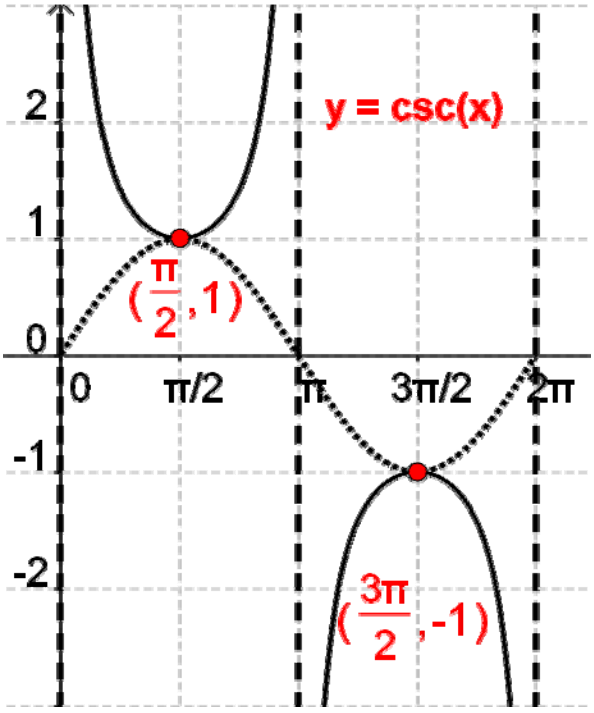
The Basic Graphs of the Six Trigonometric Functions



Domain: All real numbers
Range: $[-1, 1]$
Period: 2π
Amplitude: 1



Domain: All real numbers
Range: $[-1, 1]$
Period: 2π
Amplitude: 1



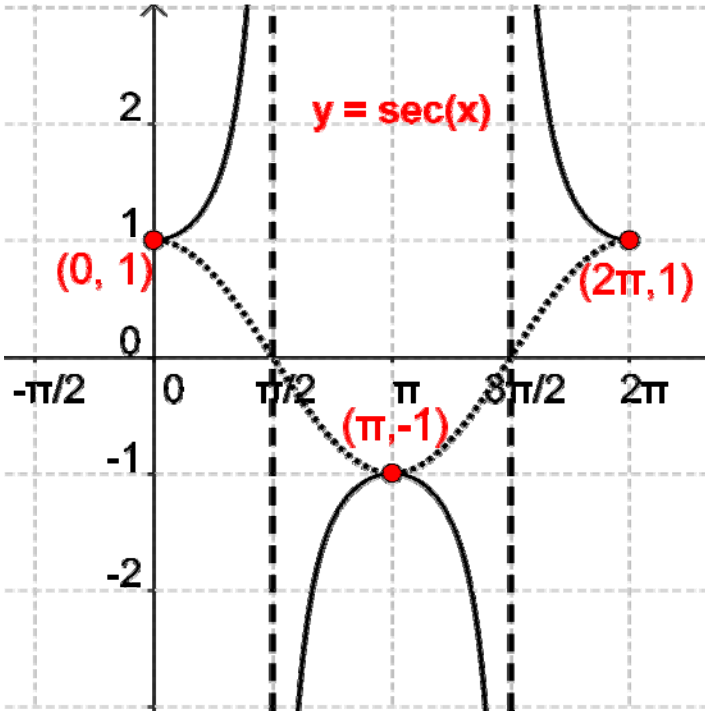
Domain: All real numbers except $x = k\pi$

Range: $(-\infty, -1] \cup [1, \infty)$

Period: 2π

Amplitude: Not defined

Asymptotes: $x = k\pi$



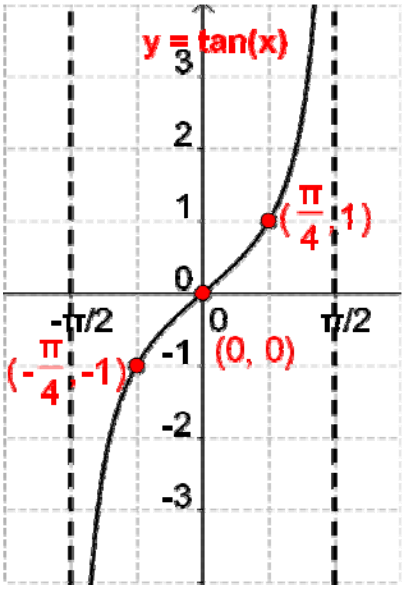
Domain: All real numbers except $x = \frac{\pi}{2} + k\pi$

Range: $(-\infty, -1] \cup [1, \infty)$

Period: 2π

Amplitude: Not defined

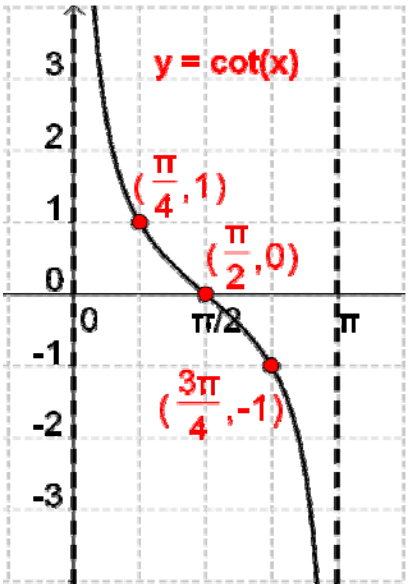
Asymptotes: $x = \frac{\pi}{2} + k\pi$



Domain: All real numbers except $x = \frac{\pi}{2} + k\pi$

Range: All real numbers
Period: π
Amplitude: Not defined

Asymptotes: $x = \frac{\pi}{2} + k\pi$



Domain: All real numbers except $x = k\pi$

Range: All real numbers
Period: π
Amplitude: Not defined

Asymptotes: $x = k\pi$