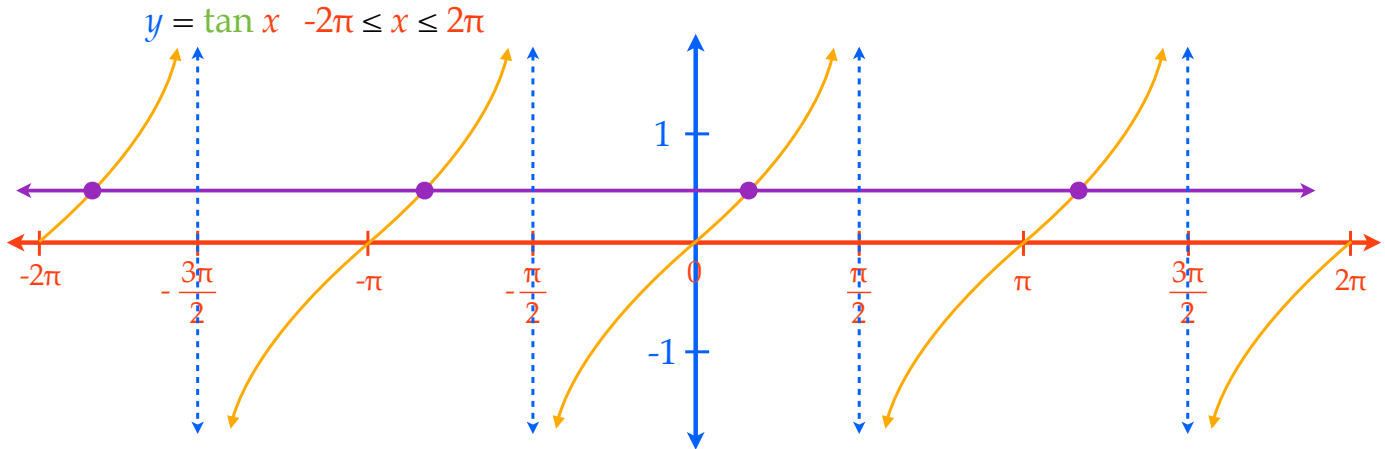
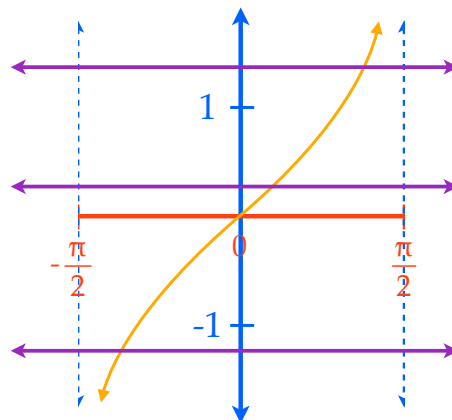


Graph of $y = \tan x$ For a function to have an inverse, it must pass the **horizontal line test**.Graph of $y = \tan x$ For a function to have an inverse, it must pass the **horizontal line test**.Restrict the domain of $y = \tan x$ to $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$ $y = \tan x$ 

Graph of $y = \tan x$

Properties of $y = \tan x$

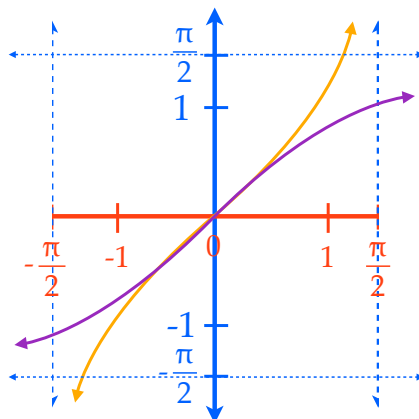
$$y = \tan x$$

Domain: $-\frac{\pi}{2} < x < \frac{\pi}{2}$

Input $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

Range: $-\infty < y < \infty$

Output $(-\infty, \infty)$



Properties $y = \tan^{-1} x$

$$y = \tan^{-1} x$$

Domain: $-\infty < x < \infty$

Input $(-\infty, \infty)$

Range: $-\frac{\pi}{2} < y < \frac{\pi}{2}$

Output $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

θ	$-\frac{\pi}{2}$	$-\frac{\pi}{3}$	$-\frac{\pi}{4}$	$-\frac{\pi}{6}$	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
$\tan \theta$	und	$-\sqrt{3}$	-1	$-\frac{\sqrt{3}}{3}$	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	und

Evaluate the following:

$$y = \tan \frac{\pi}{6}$$

$$y = \tan \frac{\pi}{3}$$

$$\theta = \tan^{-1} \frac{\sqrt{3}}{3}$$

$$\theta = \tan^{-1} \sqrt{3}$$

θ	$-\frac{\pi}{2}$	$-\frac{\pi}{3}$	$-\frac{\pi}{4}$	$-\frac{\pi}{6}$	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
$\tan \theta$	und	$-\sqrt{3}$	-1	$-\frac{\sqrt{3}}{3}$	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	und

Evaluate the following:

$$y = \tan -\frac{\pi}{4}$$

$$y = \tan 0$$

$$\theta = \tan^{-1} -1$$

$$\theta = \tan^{-1} 0$$

θ	$-\frac{\pi}{2}$	$-\frac{\pi}{3}$	$-\frac{\pi}{4}$	$-\frac{\pi}{6}$	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
$\tan \theta$	und	$-\sqrt{3}$	-1	$-\frac{\sqrt{3}}{3}$	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	und

Evaluate the following:

Since the $\tan -\frac{\pi}{3}$ is $-\sqrt{3}$

the $\tan^{-1} -\sqrt{3}$ is $-\frac{\pi}{3}$

Since the $\tan \frac{\pi}{4}$ is 1

the $\tan^{-1} 1$ is $\frac{\pi}{4}$

Since the $\tan -\frac{\pi}{6}$ is $-\frac{\sqrt{3}}{3}$

the $\tan^{-1} -\frac{\sqrt{3}}{3}$ is $-\frac{\pi}{6}$

θ	$-\frac{\pi}{2}$	$-\frac{\pi}{3}$	$-\frac{\pi}{4}$	$-\frac{\pi}{6}$	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
$\tan \theta$	und	$-\sqrt{3}$	-1	$-\frac{\sqrt{3}}{3}$	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	und

Evaluate the following:

$$\tan^{-1} -1$$

$$\tan^{-1} \frac{\sqrt{3}}{3}$$

θ	$-\frac{\pi}{2}$	$-\frac{\pi}{3}$	$-\frac{\pi}{4}$	$-\frac{\pi}{6}$	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
$\tan \theta$	und	$-\sqrt{3}$	-1	$-\frac{\sqrt{3}}{3}$	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	und

$$y = \tan x$$

$$y = \tan^{-1} x$$

Input

$$\text{Domain: } -\frac{\pi}{2} < x < \frac{\pi}{2}$$

$$\text{Domain: } -\infty < x < \infty$$

Input

Output

$$\text{Range: } -\infty < y < \infty$$

$$\text{Range: } -\frac{\pi}{2} < y < \frac{\pi}{2}$$

Output

$$\text{if } y = \tan x, \text{ then } \tan^{-1} y = x$$