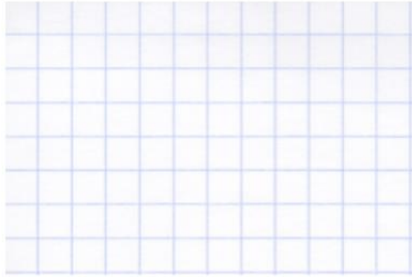


Section 4-6 Inverse Trigonometric Graph

Remember the graph of $y = \cos x$



It is not one-to-one but we could restrict the domain to $0 \leq y \leq \pi$ so that it is one-to-one. Therefore, the inverse is

$$y = \cos^{-1} x \quad \text{meaning } x = \cos y$$

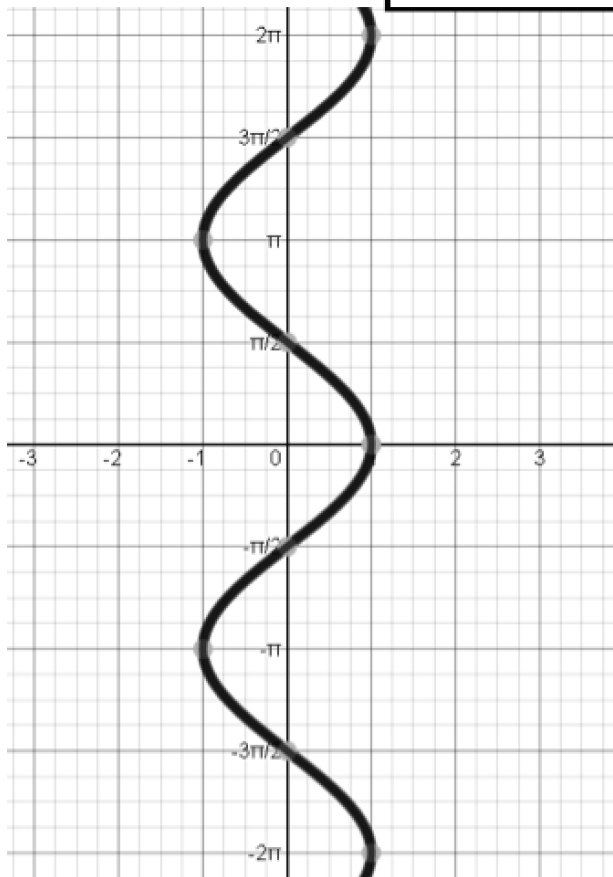
where $-1 \leq x \leq 1$ and $0 \leq y \leq \pi$

$$x = \cos(y)$$

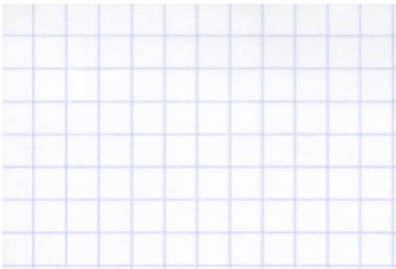
$$y = \cos^{-1}(x)$$

$$x_1 = \cos T$$

$$y_1 = T$$



Remember the graph of $y = \sin x$



It is not one-to-one (fails horizontal line test) but we could restrict the domain to $-\frac{\pi}{2}$ to $\frac{\pi}{2}$ so that it is one-to-one. Therefore, it would have an inverse function.

$$y = \sin^{-1} x \quad \text{meaning } x = \sin y$$
$$\text{where } -1 \leq x \leq 1 \quad \text{and} \quad -\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$$

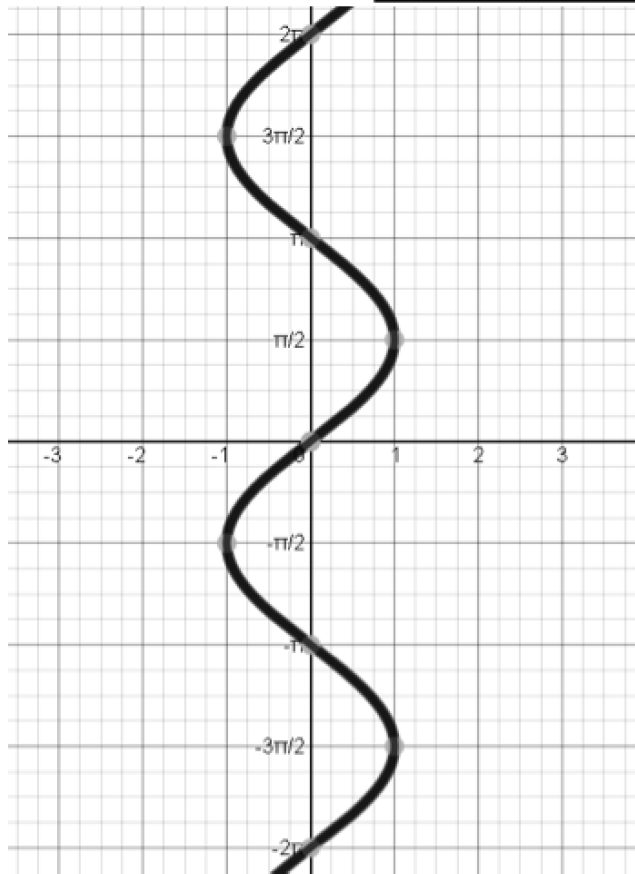
Graph

$$x = \sin(y)$$

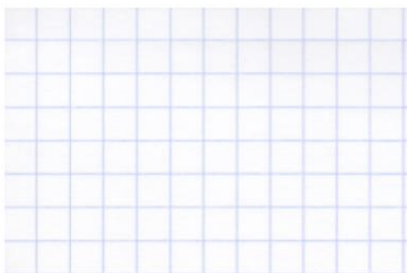
$$y = \sin^{-1}(x)$$

$$x_1 = \sin T$$

$$y_1 = T$$



Remember the graph of $y = \tan x$



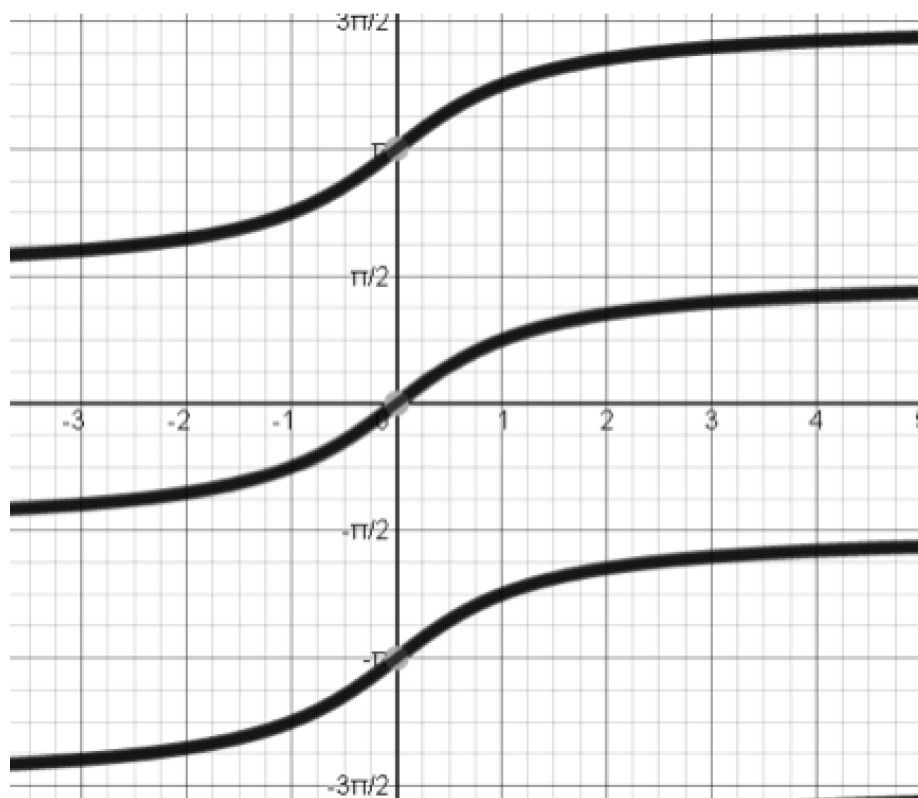
It is not one-to-one but we could restrict the domain to $-\frac{\pi}{2}$ to $\frac{\pi}{2}$ so that it is one-to-one. The inverse is

$$y = \tan^{-1} x \quad \text{meaning } x = \tan y$$

where $-\infty < x < \infty$ and $-\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$

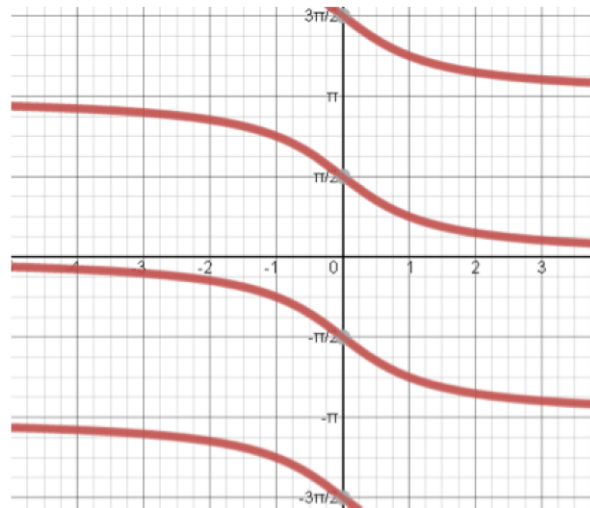
$$x = \tan(y)$$

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

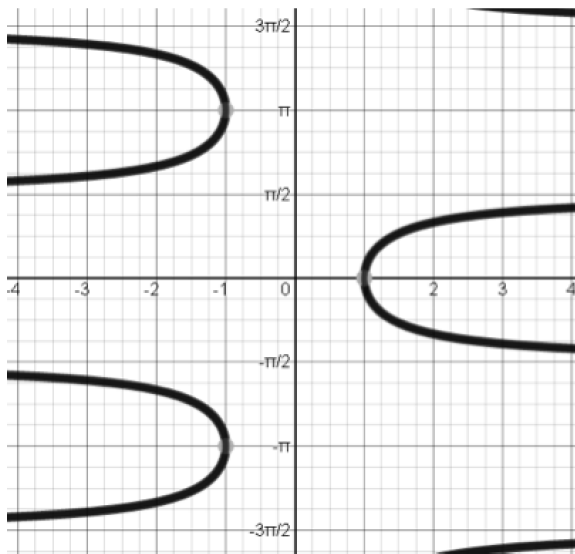


$$x = \cot(y)$$

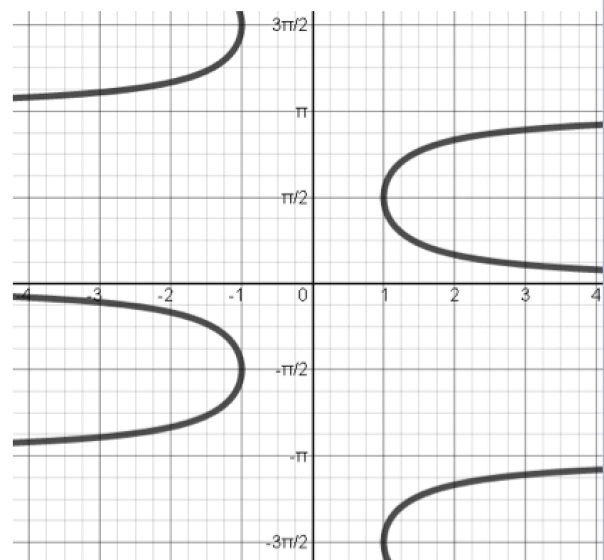
$$y = \cot^{-1}(x)$$



$$y = \sec^{-1}(x)$$



$$y = \csc^{-1}(x)$$



$y = \sec^{-1} x$ means $x = \sec y$
 where $|x| \geq 1$ and $0 \leq y \leq \pi$, $y \neq \frac{\pi}{2}$

$y = \csc^{-1} x$ means $x = \csc y$
 where $|x| \geq 1$ and $-\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$, $y \neq 0$

$y = \cot^{-1} x$ means $x = \cot y$
 where $-\infty < x < \infty$ and $0 \leq y \leq \pi$

