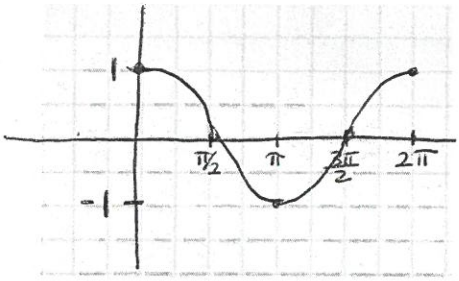
Section 4-6 Inverse Trigonometric Graph

Remember the graph of y = cos x



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

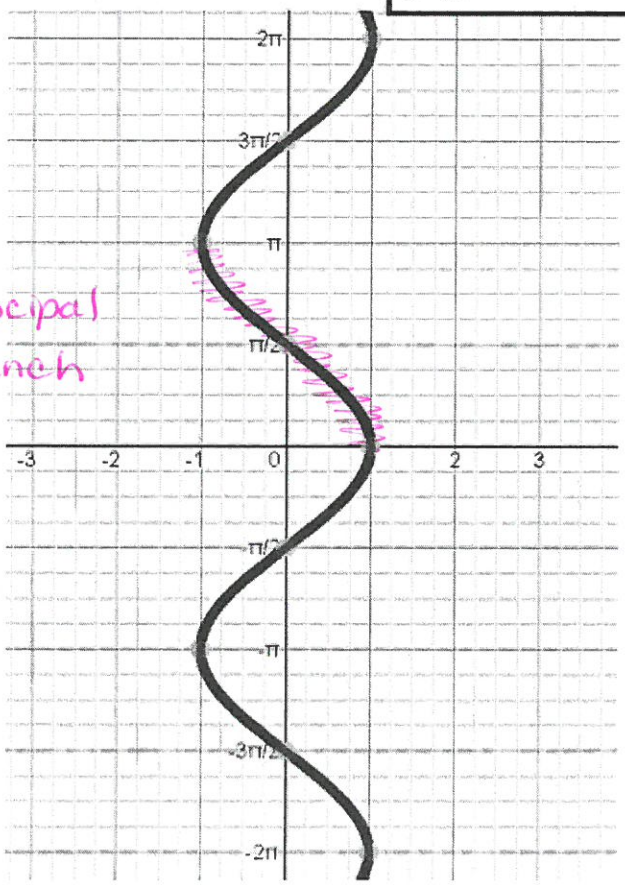
$y = \cos^{-1} x$ meaning x = cos y
where $-1 \le x \le 1$ and $0 \le y \le \pi$

$x = \cos(y)$

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

$x_1 = \cos T$

$y_1 = T$



* principal branch

In function mode:

* when you try to graph $y = \cos^{-1}(x)$ in your calculator, the graph only appears between 0 and π because that's the piece of the graph that is invertible or one-to-one.

In parametric mode:

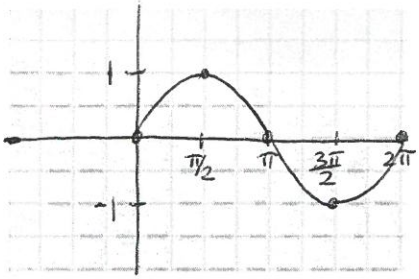
$y = \cos x \Rightarrow \begin{cases} x_1 = T \\ y_1 = \cos T \end{cases}$

$y = \cos^{-1}(x) \Rightarrow \begin{cases} x_1 = \cos T \\ y_1 = T \end{cases}$

for inverse, just switch x and y

* Parametric allows us to see the entire graph (relation)
* Choose appropriate Tstep for your mode

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.

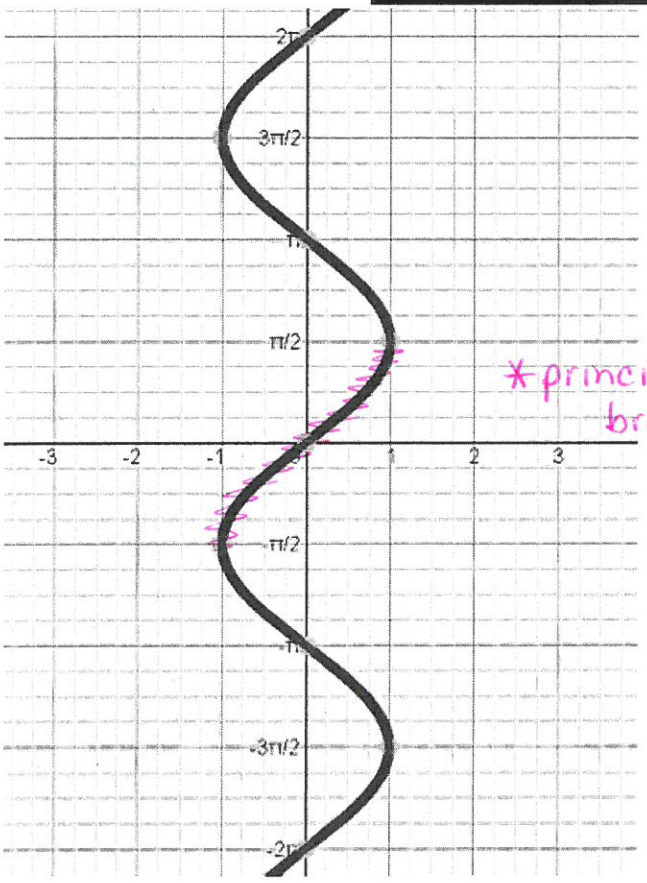
$y = \sin^{-1} x$ meaning x = sin y
where $-1 \leq x \leq 1$ and $-\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$

$x = \sin(y)$

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

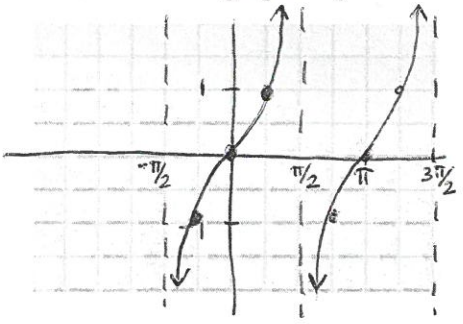
$x_1 = sinT$

$y_1 = T$



*principal branch

Remember the graph of y = tan x

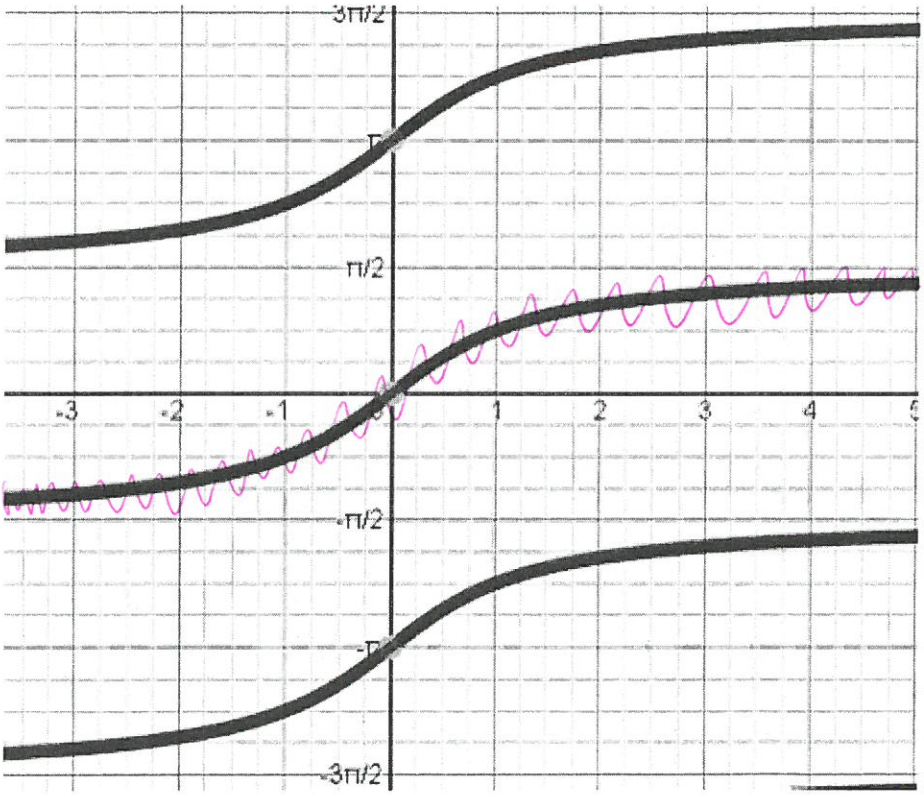


It is not one-to-one but we could restrict the domain to $-\frac{\pi}{2}$ to $\frac{\pi}{2}$ so that it is one-to-one. The inverse is

$y = \tan^{-1} x$ meaning x = tan y
where $-\infty < x < \infty$ and $-\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$

$x = \tan(y)$

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



Parametric

$x_1 = \tan T$

$y_1 = T$

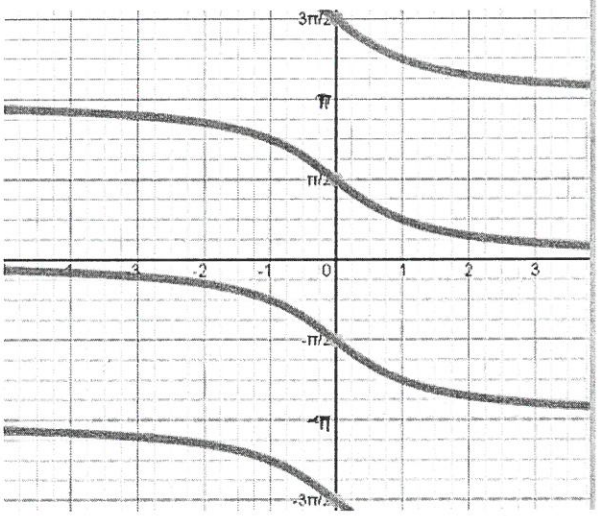
tstep = 0.1

* principal branch

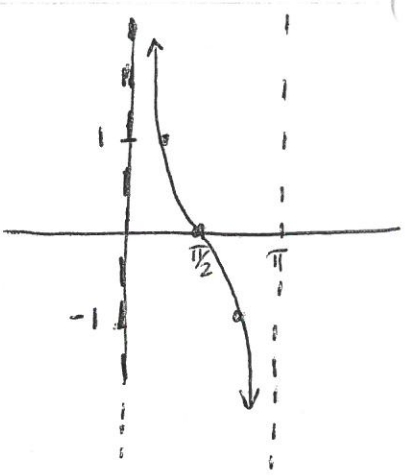
* Nice to Know

$x = \cot(y)$

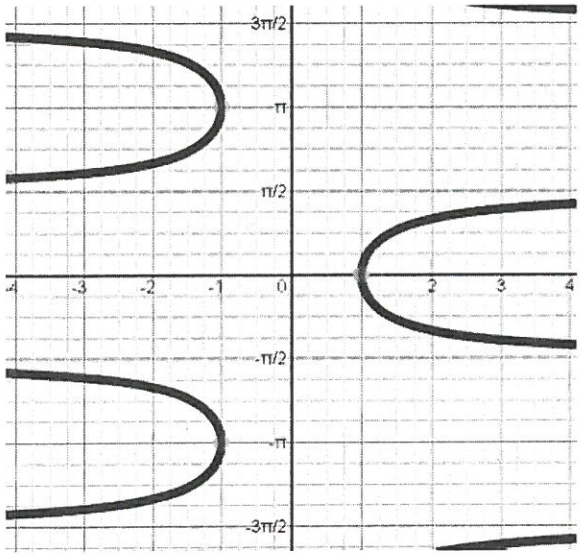
$y = \cot^{-1}(x)$



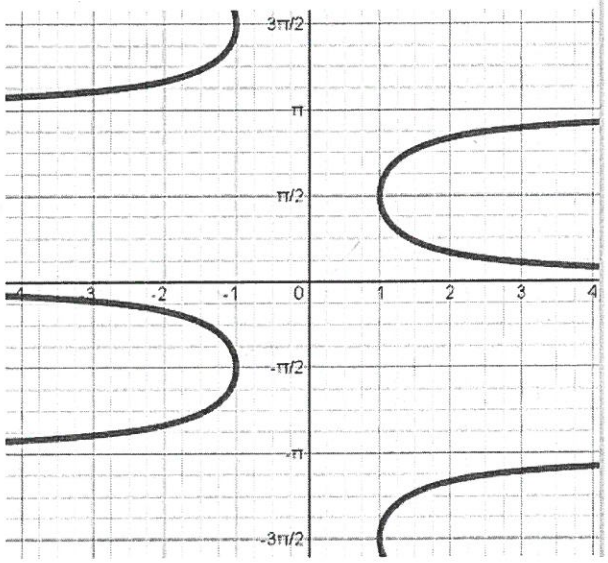
$y = \cot x$



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



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



$y = \sec^{-1} x$ 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 $0 \leq y \leq \pi$