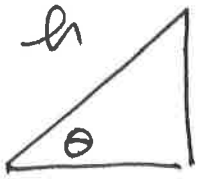
Math 1496 - Calc 1

Review - Trig Functions

h - hypotenuse



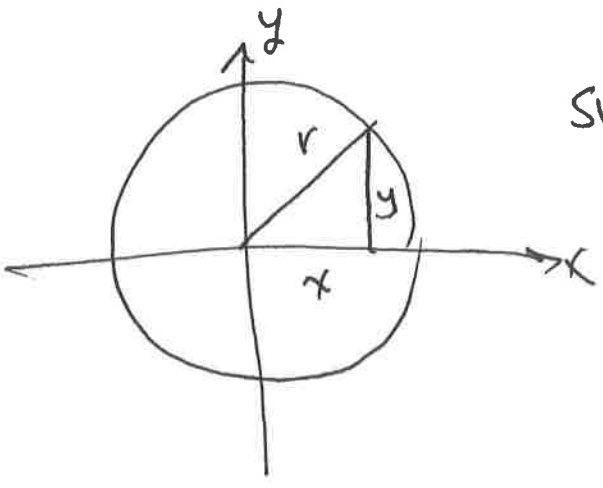
opposite (o)

adjacent (a)

$\sin\theta = \frac{o}{h}$ $\quad \cos\theta = \frac{a}{h}$ $\quad \tan\theta = \frac{o}{a}$

$\csc\theta = \frac{1}{\sin\theta} = \frac{h}{o}$ $\quad \sec\theta = \frac{1}{\cos\theta} = \frac{h}{a}$ $\quad \cot\theta = \frac{1}{\tan\theta} = \frac{a}{o}$

You can go around the unit circle to determine these 6 quantities for θ from $0 \to 2\pi$



$\sin\theta = \frac{y}{r}$ $\quad \cos\theta = \frac{x}{r}$ etc

Trig values of $\sin\theta$, $\cos\theta$, $\tan\theta$ in Q 1

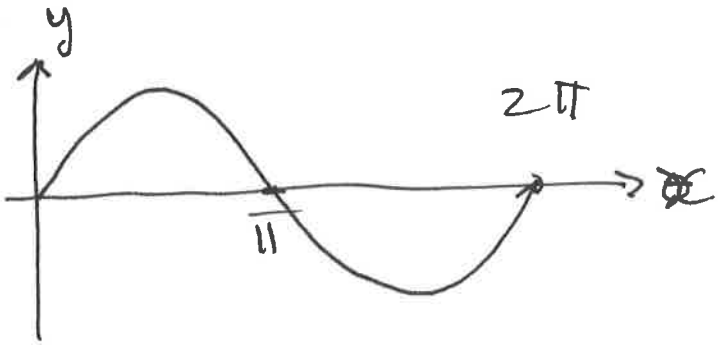
θ	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\pi/3$	$\pi/2$
	$\sqrt{\frac{0}{4}}$	$\sqrt{\frac{1}{4}}$	$\sqrt{\frac{2}{4}}$	$\sqrt{\frac{3}{4}}$	$\sqrt{\frac{4}{4}}$
$\sin\theta$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
$\cos\theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
$\tan\theta$	$\frac{0}{1}$	$\frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}}$	1	$\frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}}$	∞
	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	∞

$$\csc\theta = \frac{1}{\sin\theta}$$

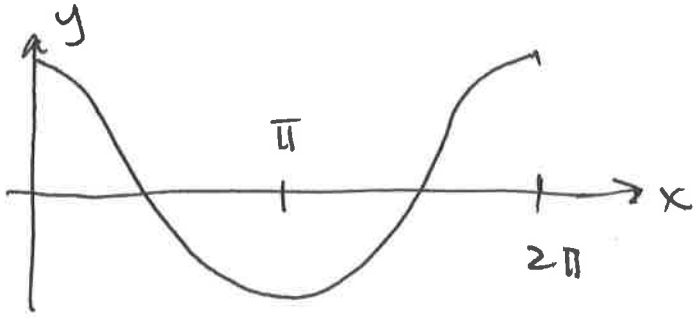
$$\sec\theta = \frac{1}{\csc\theta}$$

$$\cot\theta = \frac{1}{\tan\theta}$$

what about angles other then $[0, \pi/2]$



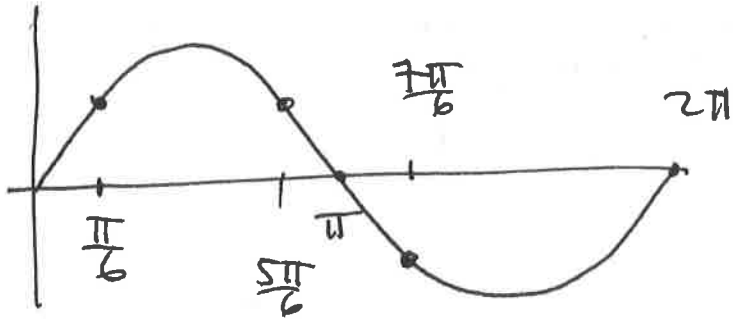
$y = \sin x$



$y = \cos x$

Let's find $\sin \frac{7\pi}{6}$ or $\cos \frac{5\pi}{4}$

$\sin \frac{7\pi}{6}$

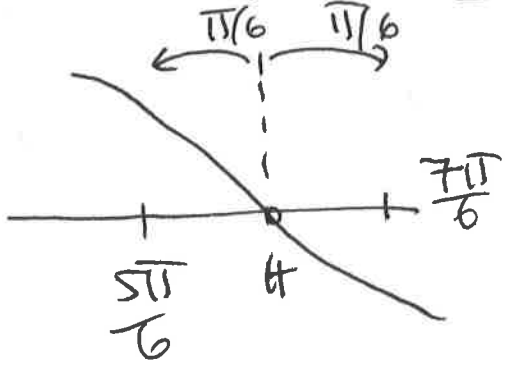


$\sin \frac{\pi}{6} = \frac{1}{2}$

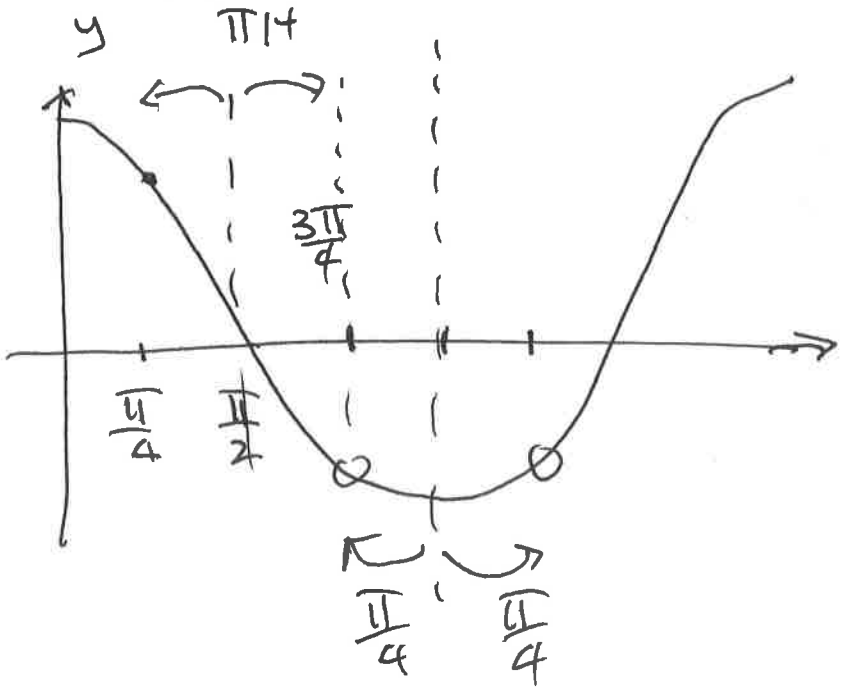
$\sin \frac{5\pi}{6} = \frac{1}{2}$

$\sin \frac{7\pi}{6} = ?$

there is symmetry here



$\sin \frac{7\pi}{6} = -1/2$

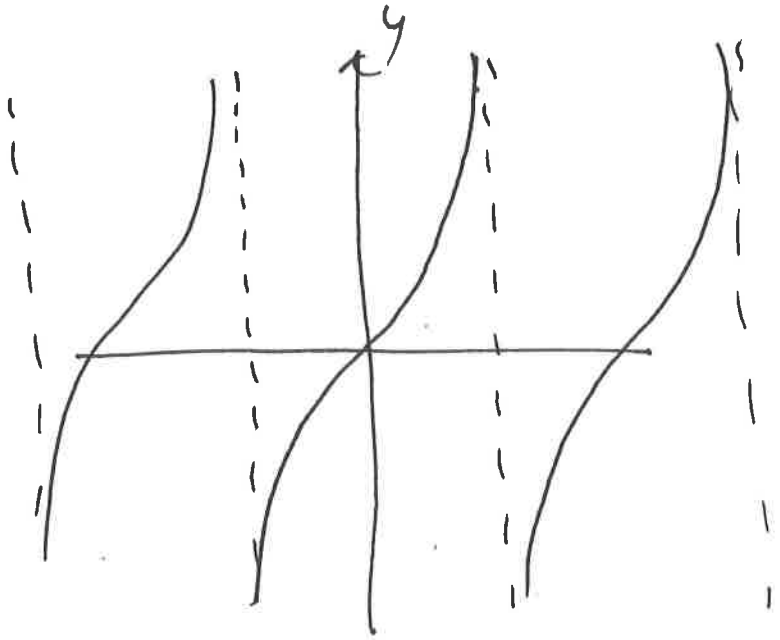


$\cos \frac{\pi}{4} = \frac{\sqrt{2}}{2}$

$\cos \frac{3\pi}{4} = -\frac{\sqrt{2}}{2}$

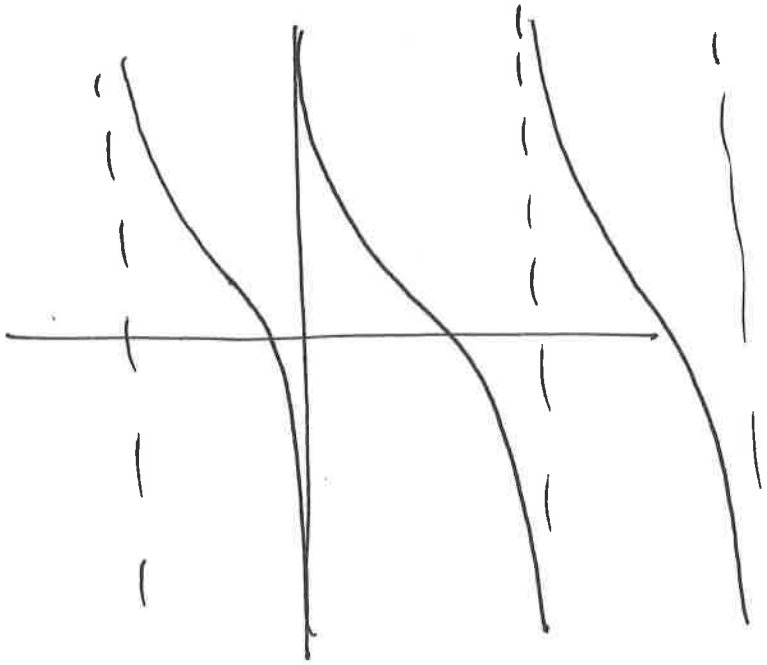
$\cos \frac{5\pi}{4} = -\frac{\sqrt{2}}{2}$

$y = \tan x$

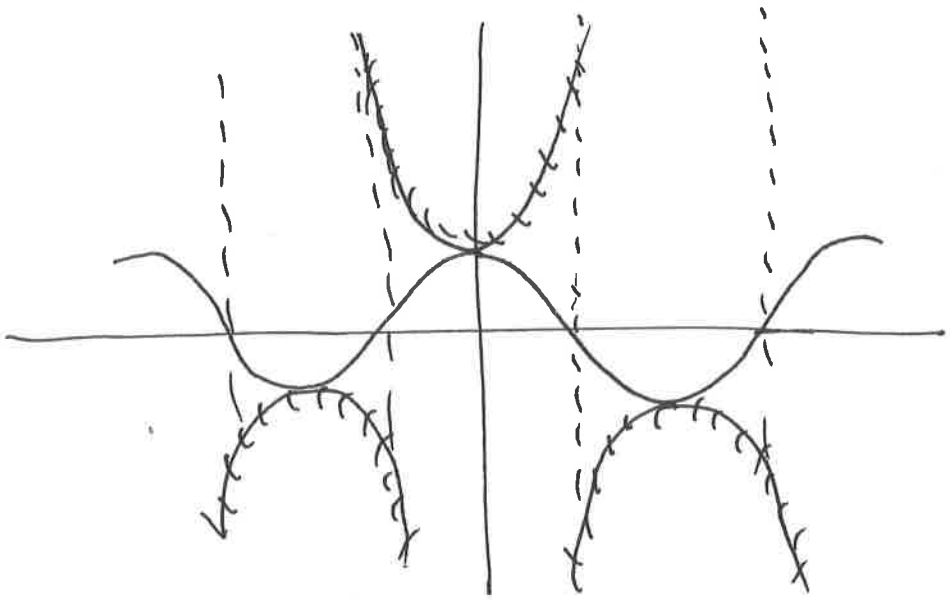


dotted lines are vertical asymptotes

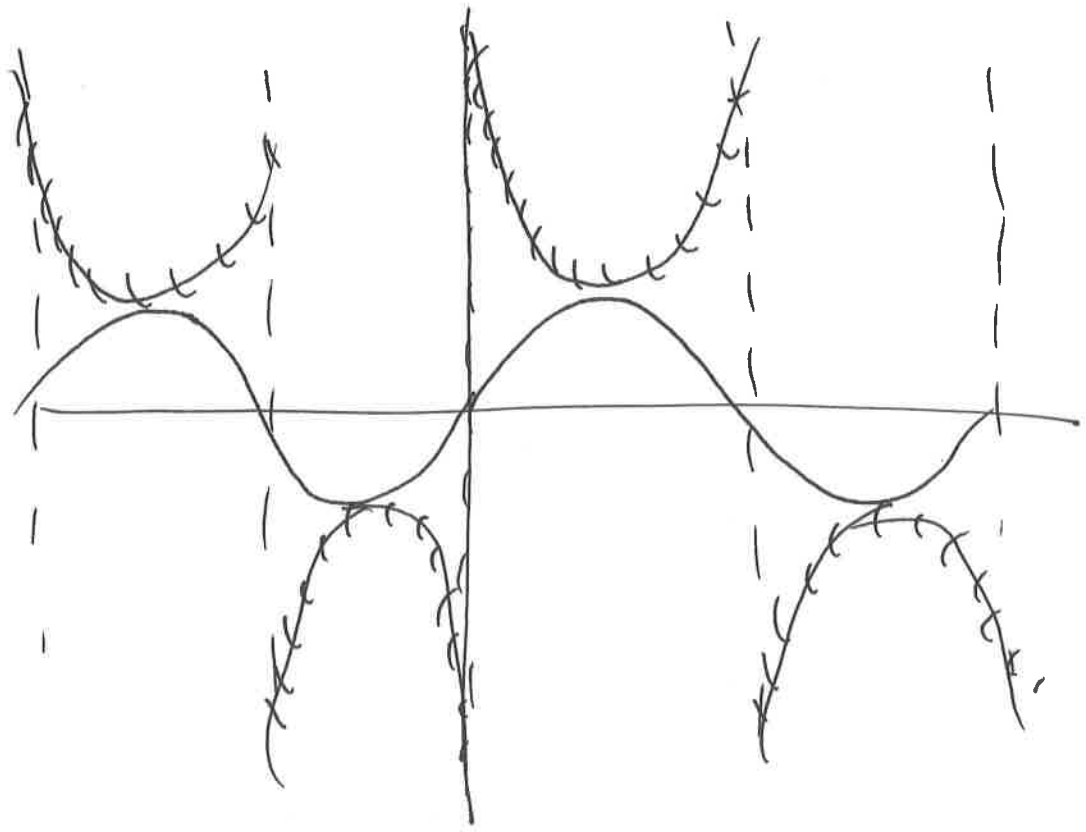
$y = \cot x$



$y = \sec x = \dfrac{1}{\cos x}$



$y = \csc x = \dfrac{1}{\sin x}$



Some Identities

(1) $\sin^2 x + \cos^2 x = 1$

(2) $\sin 2x = 2\sin x \cos x$

(3) $\cos 2x = \cos^2 x - \sin^2 x$

$= 2\cos^2 x - 1$

$= 1 - 2\sin^2 x$

(4) $\sin(x+y) = \sin x \cos y + \sin y \cos x$

$\sin(x-y) = \sin x \cos y - \sin y \cos x$

(5) $\cos(x+y) = \cos x \cos y - \sin x \sin y$

$\cos(x-y) = \cos x \cos y + \sin x \sin y$

Also

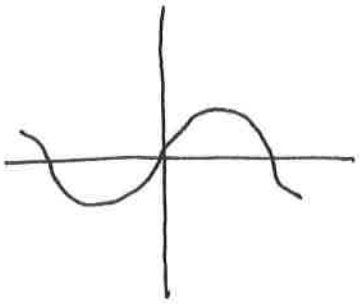
$y = A \sin(\omega x + K)$

A - amplitude

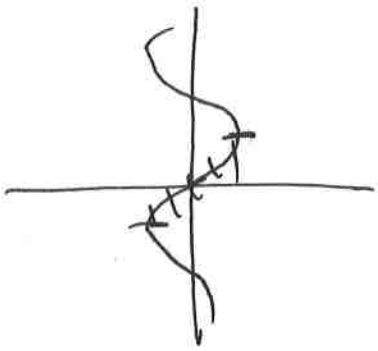
ω - frequency

K - phase shift

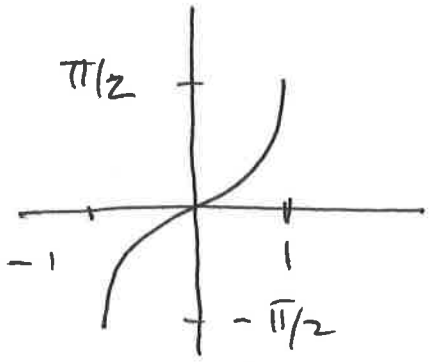
Inverse Trig Function



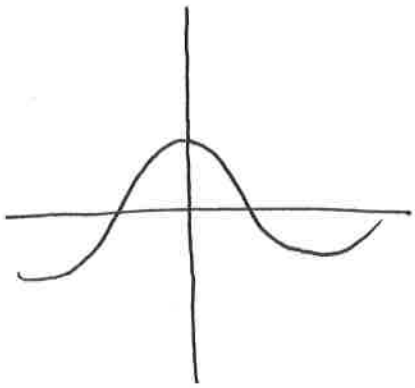
$y = \sin x$



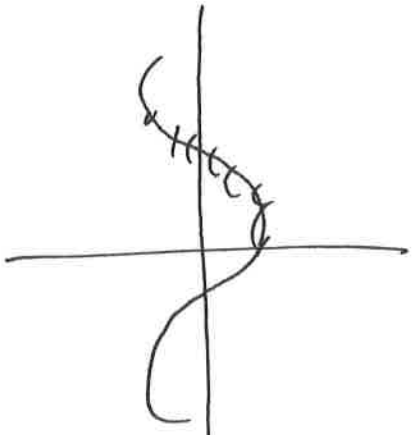
$x = \sin y$



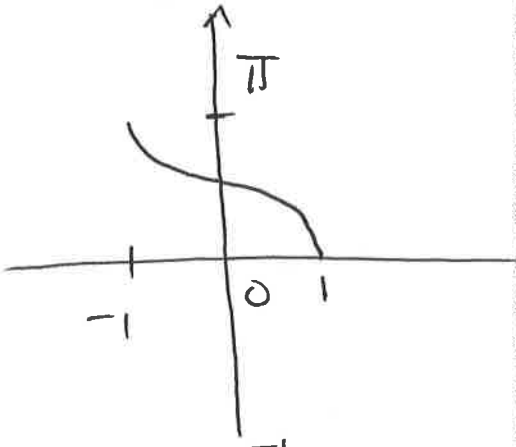
$y = \sin^{-1} x$



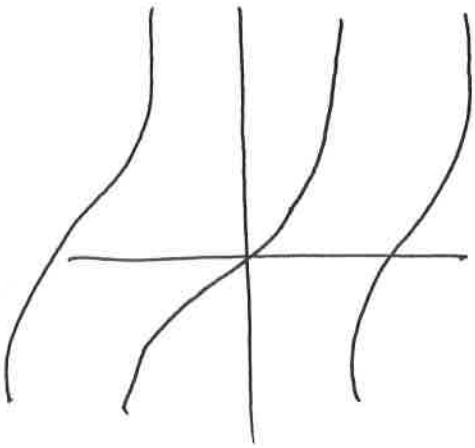
$y = \cos x$



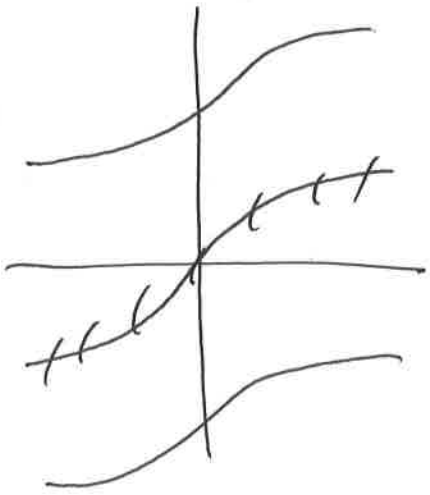
$x = \cos y$



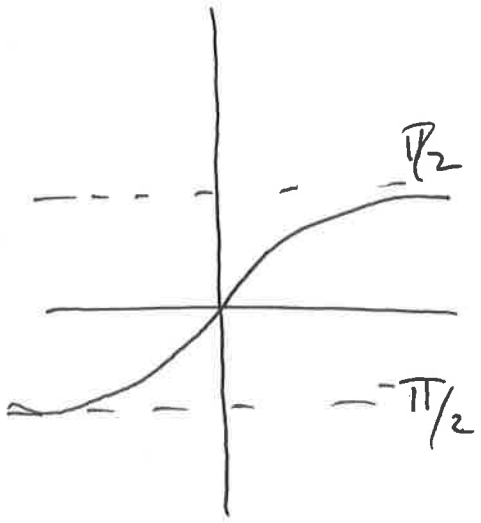
$y = \cos^{-1} x$



$y = \tan x$

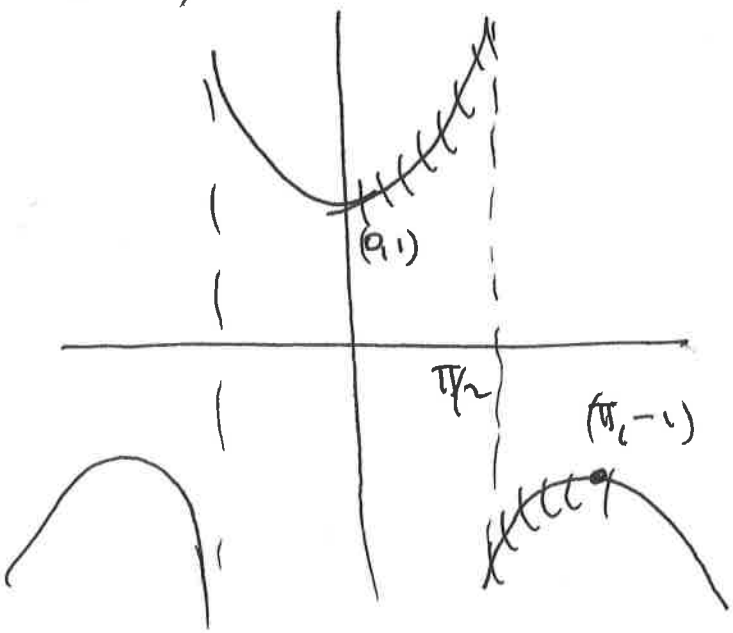


$x = \tan y$

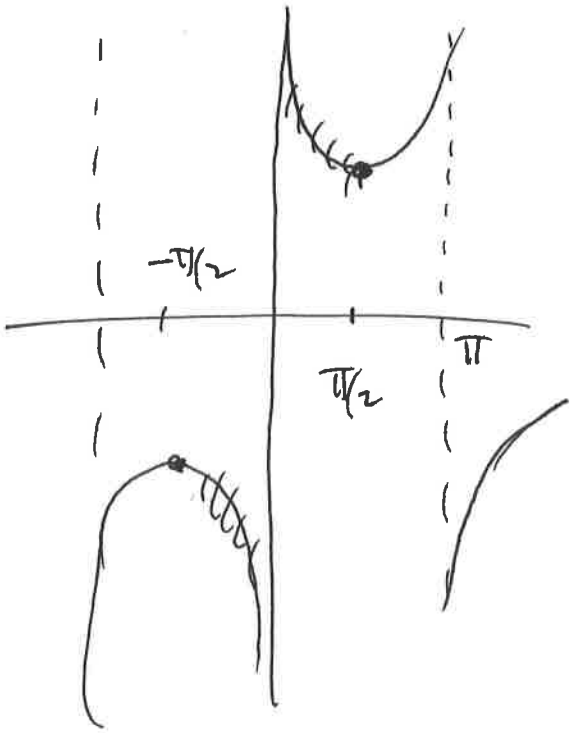


$y = \tan^{-1} x$

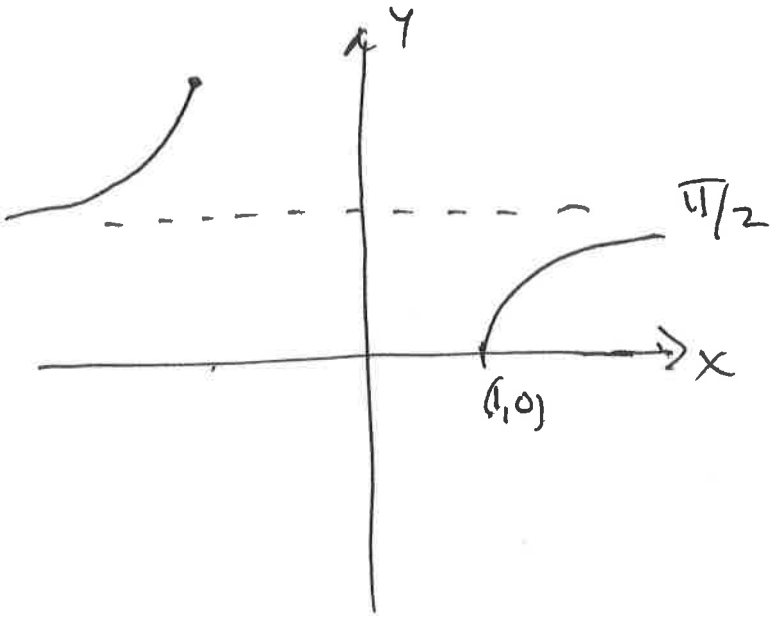
$y = \sec x$

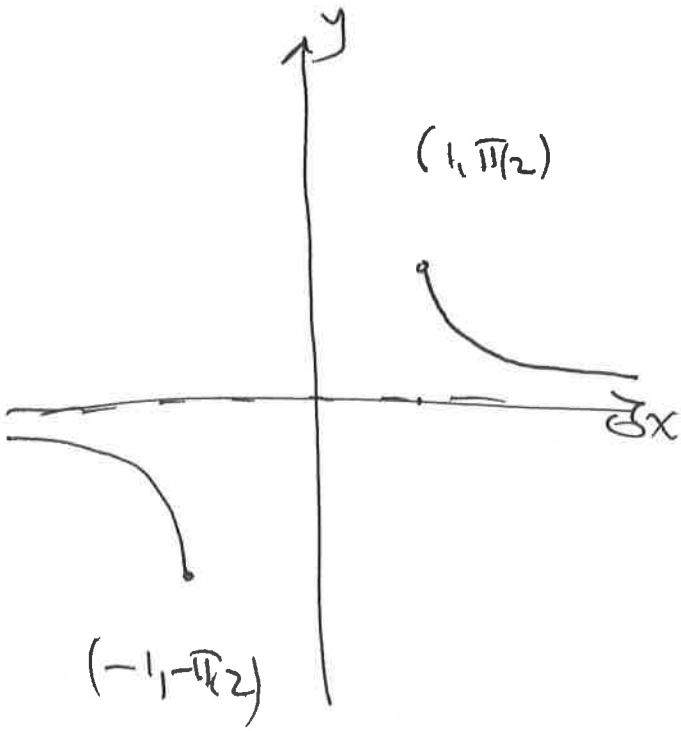


$y = \csc x$



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





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