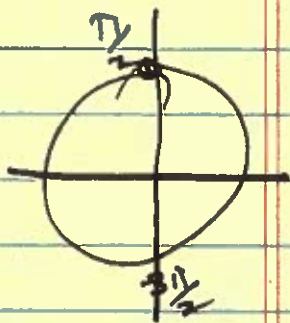


## 5.5 Graph of other trig functions

$$y = \tan(x) = \frac{\sin(x)}{\cos(x)}$$

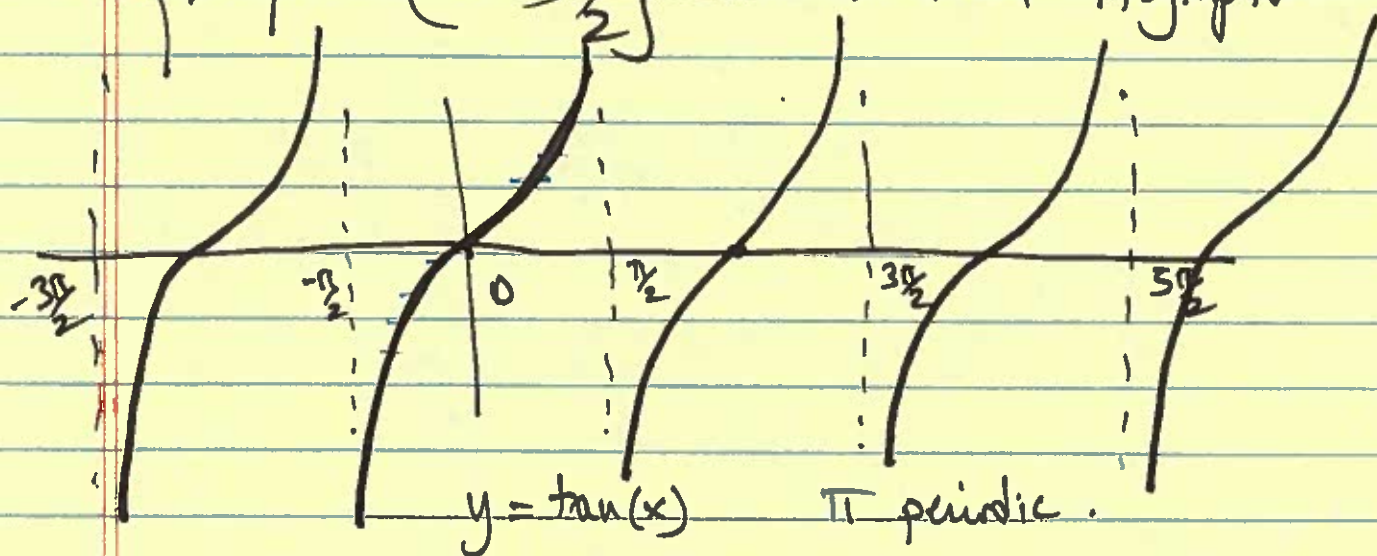


$$\cos(x) \neq 0$$

$$x \neq (2n+1)\frac{\pi}{2}$$

odd  
n integer.

$\{x \neq x = (2n+1)\frac{\pi}{2}\}$  are Vertical Asymptotes.



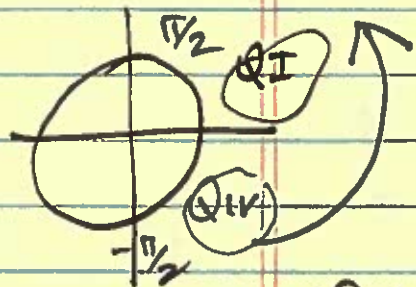
$$\tan(x+\pi) = \frac{\sin(x+\pi)}{\cos(x+\pi)} = \frac{-\sin x}{-\cos x} = \tan x$$

$y = \tan(x)$  is  $\pi$  periodic.

$$\tan(-x) = \frac{\sin(-x)}{\cos(-x)} = \frac{-\sin(x)}{\cos(x)} = -\tan(x)$$

$(-\frac{\pi}{2}, \frac{\pi}{2})$  —  $(0,0)$   $y = \tan(x)$  is odd function  
Symmetry with respect to the origin

$$\left(-\frac{\pi}{2}, \frac{\pi}{2}\right) \xrightarrow[\text{one-to-one.}]{\tan x} (-\infty, \infty)$$



$$y = \arctan(x).$$

Q IV, Q I

$$\arctan(\tan x) = x ; -\frac{\pi}{2} < x < \frac{\pi}{2}$$

$$-\frac{\pi}{2} + 2\pi = \frac{3\pi}{2} \quad \tan(\arctan y) = y ; -\infty < y < \infty$$

$$\frac{3\pi}{2} - 2\pi = -\frac{\pi}{2}$$

$$\arctan\left(\tan \frac{\pi}{3}\right) = \frac{\pi}{3}.$$

$$\tan(\arctan \sqrt{3}) = \sqrt{3}.$$