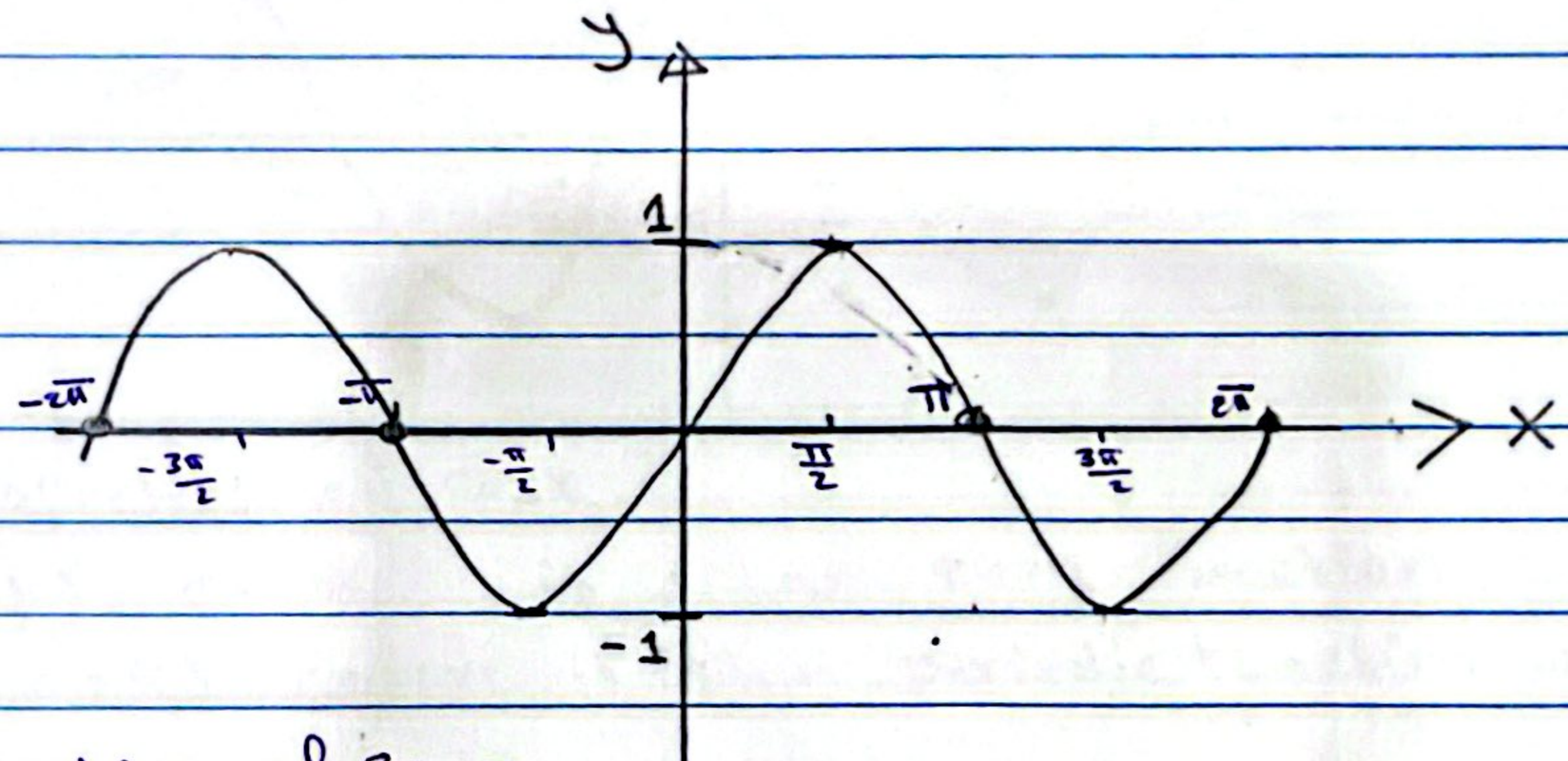
The Trigonometric Functions :-

1. $f(x) = y = \sin x$

$D_y = \{ x : x \in R \} = (-\infty, \infty)$

$R_x = \{ y : y \in R \} = [-1, 1]$



The properties of $\sin x$

- $\sin(-x) = -\sin x$ it is an odd function
- $\sin(x + 2\pi) = \sin(x)$ it is a periodic function with 2π

$\sin(\pi) = 0 \Rightarrow \sin(-\pi) = 0$

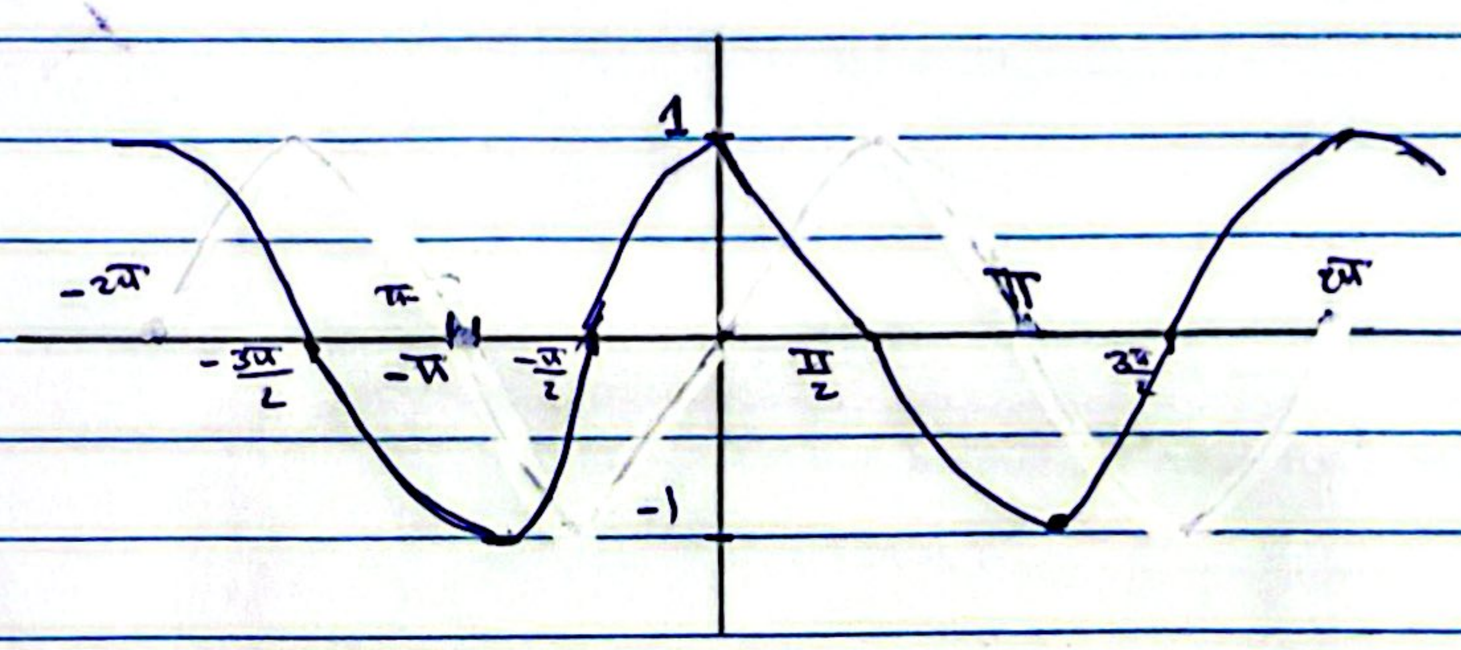
$\sin(\frac{\pi}{2}) = 1 \Rightarrow \sin(\frac{-\pi}{2}) = -1$

$$\frac{\partial \sin x}{\partial x} = \cos x$$

2. $f(x) = y = \cos x$

$Dy = \{ x : x \in R \} = (-\infty, \infty)$

$Rx = \{ y : y \in R \} = [-1, 1]$



The properties of $\cos x$

- $\cos(-x) = \cos x$ it is an even function
- $\cos(x + 2\pi) = \cos(x)$ it is a periodic function with 2π

$\cos(-\pi) = -1 \Rightarrow \cos(\pi) = 1$; $\frac{\partial \cos x}{\partial x} = -\sin x$

$\cos(\frac{-\pi}{2}) = 0 \Rightarrow \cos(\frac{\pi}{2}) = 0$

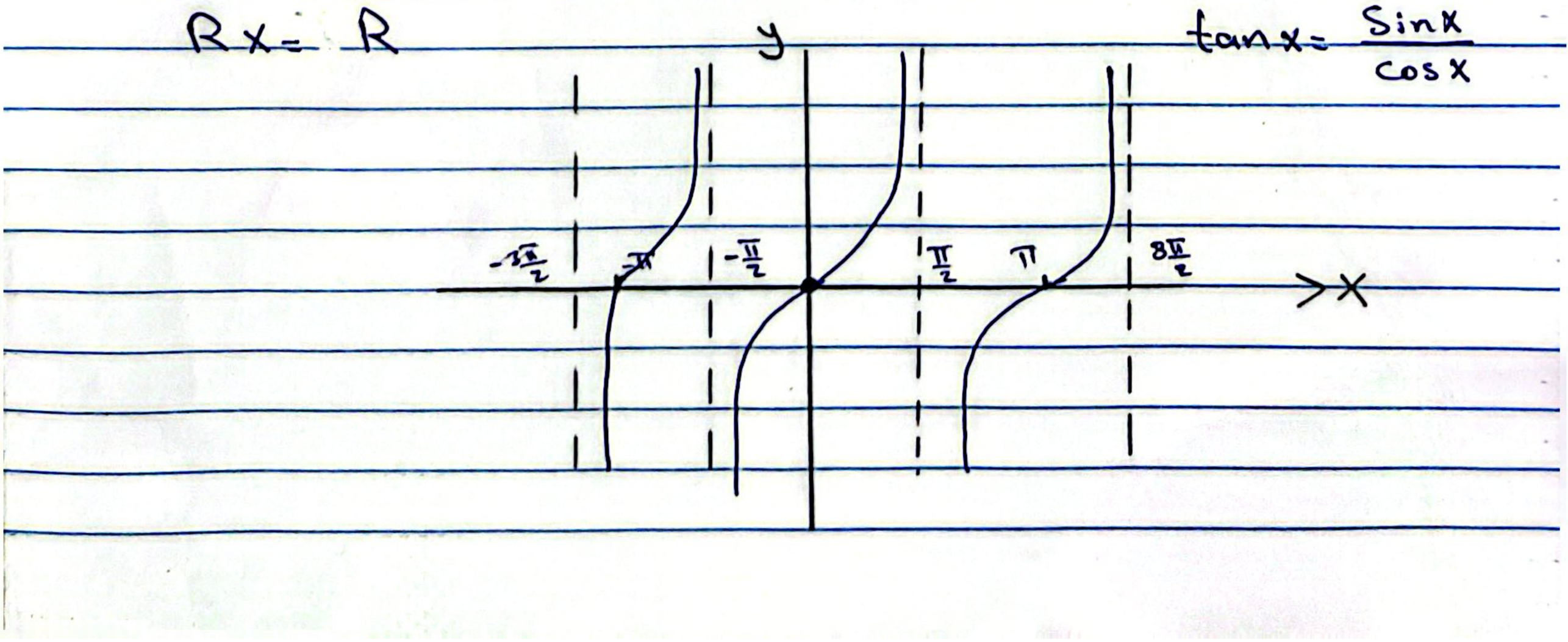
3. $f(x) = y = \tan x$

The domain of the function is all the real number, Except $\cos x = 0$

$Dy = \{ x : x \in R, x \neq \frac{\pi}{2} + n\pi ; n = 0, \pm 1, \pm 2, \dots \}$

$Rx = R$

$\tan x = \frac{\sin x}{\cos x}$



The properties of $\tan x$

- $\tan(-x) = -\tan x$ it is odd function
- $\tan(x+\pi) = \tan x$ it is periodic function with π

$\tan(-\pi) = 0 \Rightarrow \tan(\pi) = 0$; $\frac{\partial \tan x}{\partial x} = \sec^2 x$

$\tan(\frac{\pi}{4}) = 1 \Rightarrow \tan(-\frac{\pi}{4}) = -1$

$\tan(2\pi) = 0 \Rightarrow \tan(-2\pi) = 0$

4. $f(x) = y = \cot x$

The domain of the function is all the real numbers, Expect $\sin x = 0$; such that

$$Dy = \{ x : x \in R, x \neq n\pi, n = 0, \pm 1, \pm 2, \dots \}$$

$Rx = R$ the real numbers

$$\cot x = \frac{\cos x}{\sin x}$$

$$\frac{\partial \cot x}{\partial x} = -\csc^2 x$$

The properties of $\cot x$

- $\cot(-x) = -\cot(x)$ it is odd function
- $\cot(x+\pi) = \cot(x)$ it is apriodic function with π

5. $f(x) = y = \sec x = \frac{1}{\cos x}$; $\cos x \neq 0$

$$Dy = \{ x : x \in R ; x \neq \frac{\pi}{2} + n\pi ; n = 0, \pm 1, \pm 2, \dots \}$$

$Rx = R$

$$\frac{\partial \sec x}{\partial x} = \sec x \tan x$$

The properties of $\sec x$

- $\sec(-x) = \sec(x)$ it is even function
- $\sec(2\pi + x) = \sec(x)$ it is a periodic function with 2π