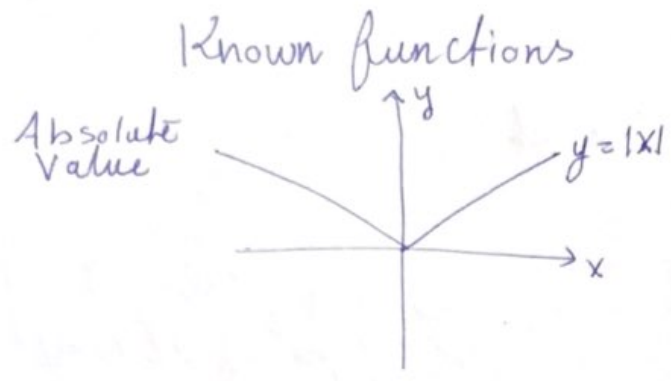


Chap 1: Review of functions

Domain } A function f is a Rule That assigns to
Range } each point x in The Domain a unique point
 $f(x)$ } "image" $y = f(x)$ in the Range R

Vk test : To know whether The diagram is a function or not

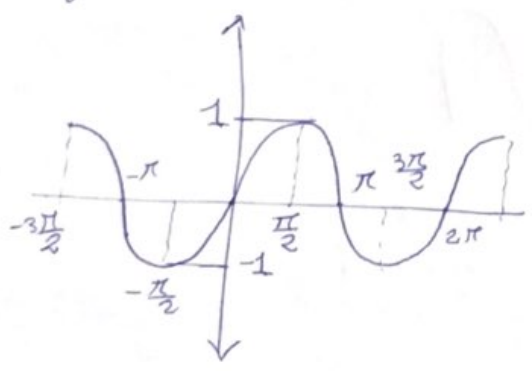
How to know even or odd?



$D = (-\infty, \infty)$
 $R = [0, \infty)$
even

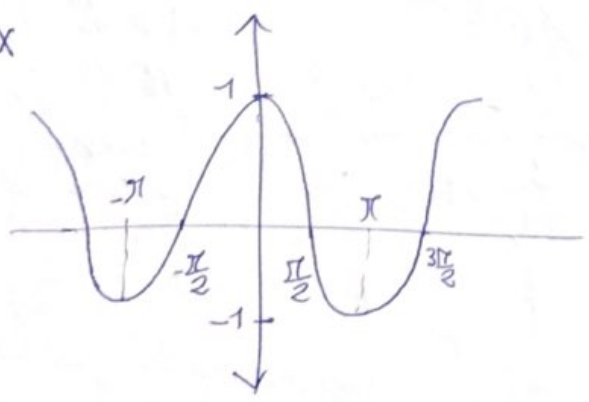
Trigonometric functions

$y = \sin x$



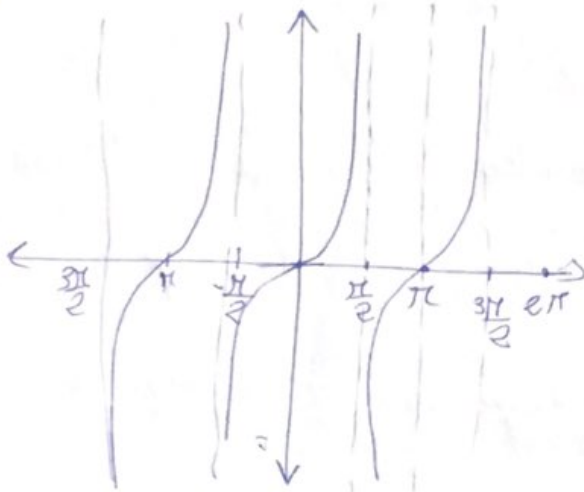
$D = (-\infty, \infty) = \mathbb{R}$
 $R = [-1, 1]$
odd $\sin(-x) = -\sin(x)$
Period 2π

$y = \cos x$



$D = \mathbb{R}$
Range: $[-1, 1]$
even $\cos(-x) = \cos(x)$
Period 2π

$$y = \tan X = \frac{\sin X}{\cos X}$$



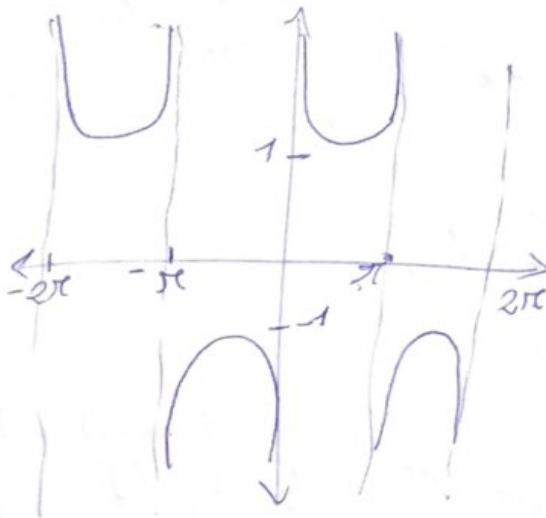
$n = 0, 1, 2, \dots$

$$D = (-\infty, \infty) \setminus \left\{ \frac{\pi}{2} + n\pi \right\}$$

$$\text{Range} = (-\infty, \infty)$$

odd
period π

$$y = \csc X = \frac{1}{\sin X} \quad \text{Co-secant}$$

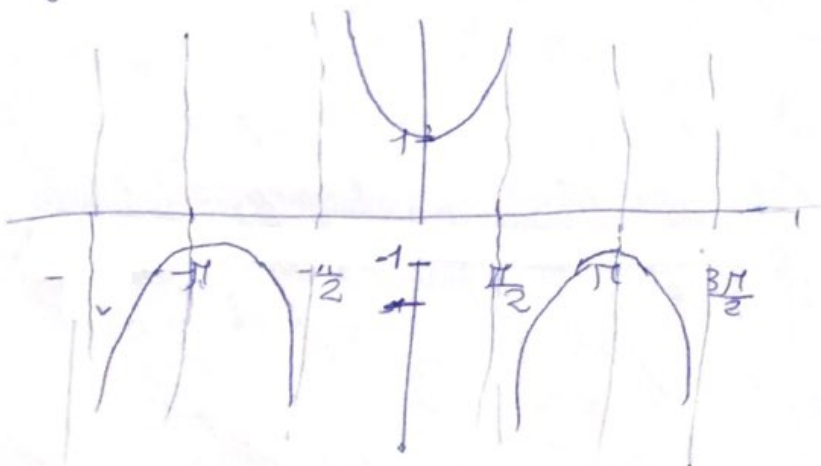


$$D = \mathbb{R} \setminus \left\{ \pm\pi, \pm 2\pi, \dots \right\}$$

$$R = (-\infty, -1] \cup [1, \infty)$$

odd
period 2π

$$y = \sec X = \frac{1}{\cos X} \quad \text{secant}$$

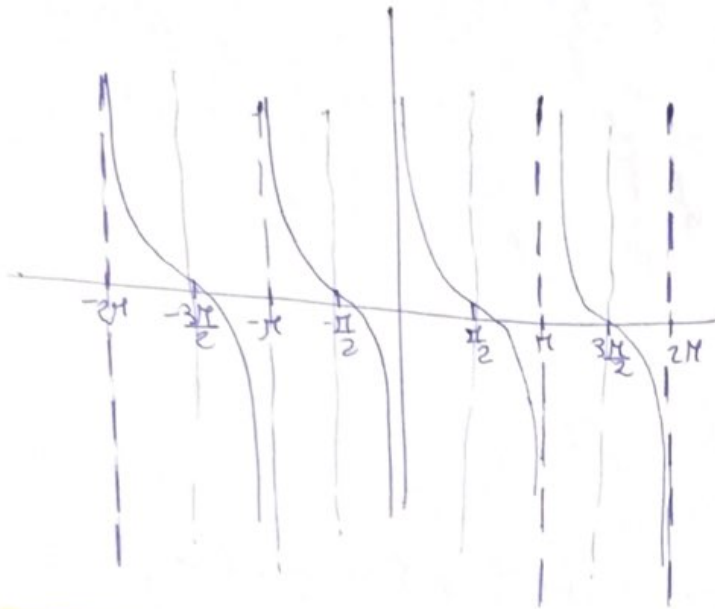


$$D = \mathbb{R} \setminus \left\{ \pm\frac{\pi}{2}, \pm\frac{3\pi}{2}, \dots \right\}$$

$$R = (-\infty, -1] \cup [1, \infty)$$

even
period 2π

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



$$D = \mathbb{R} \setminus \left\{ \pi + n2\pi \mid n \in \mathbb{Z} \right\}$$

$$R = \mathbb{R}$$

Trigonometric Identities

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

$$2. \sin 2x = 2 \sin x \cos x$$

$$3. \cos 2x = \cos^2 x - \sin^2 x$$

$$= 1 - \sin^2 x$$

$$= 2\cos^2 x - 1$$

$$4. 1 + \cot^2 x = \csc^2 x = \frac{1}{\sin^2 x}$$

$$5. \tan^2 x + 1 = \sec^2 x = \frac{1}{\cos^2 x}$$

$$6. \sin(A+B) = \sin A \cos B + \sin B \cos A$$

$$7. \cos(A+B) = \cos A \cos B - \sin A \sin B$$

* $\sin x, \csc x, \tan x, \cot x \rightarrow$ odd

* $\cos x, \sec x \rightarrow$ even

$$\tan, \cot x \rightarrow \text{period } \pi \rightarrow \tan(x+\pi) = \tan x$$

$$\cot(x+\pi) = \cot x$$

$$\sin x, \cos x, \csc x, \sec x \rightarrow \text{period } 2\pi \rightarrow \sin(x+2\pi) = \sin x$$

$$\csc(x+2\pi) = \csc x$$

$$\cos(x+2\pi) = \cos x$$

$$\sec(x+2\pi) = \sec x$$

$$* \sin\left(x + \frac{\pi}{2}\right) = \cos x$$

$$* \cos\left(x + \frac{\pi}{2}\right) = -\sin x$$

Composite "o"

$$(f \circ g) = f(g(x))$$

$$(f \circ g)(x) \neq (g \circ f)(x)$$