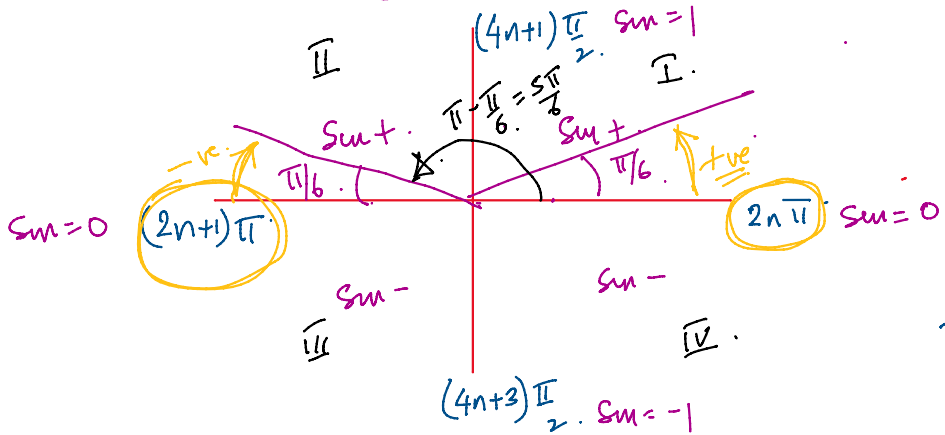


Inverse trigonometric functions

$\sin^{-1}\left(\frac{1}{2}\right) = x \rightarrow \sin x = \frac{1}{2} = \sin 30^\circ = \sin \frac{\pi}{6}$ $0 \leq x \leq 2\pi$

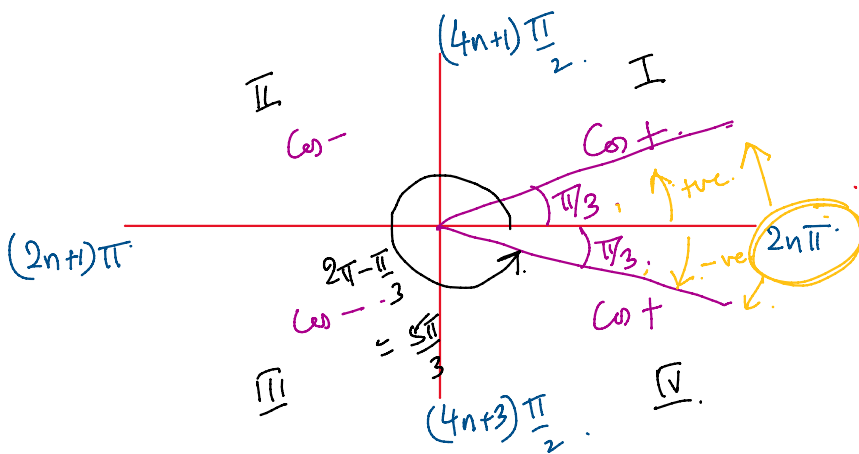


$\sin^{-1}\left(\frac{1}{2}\right) = x$
 $x = \frac{\pi}{6}, \frac{5\pi}{6}$

Generic Soln

$x = 2n\pi + \frac{\pi}{6}, (2n+1)\pi - \frac{\pi}{6}$
 $x = 2n\pi + \frac{\pi}{6}, 2n\pi + \frac{5\pi}{6}$

$\cos^{-1}\left(\frac{1}{2}\right) = x$ $0 \leq x \leq 2\pi$
 $\cos x = \frac{1}{2} = \cos \frac{\pi}{3} = \cos 60^\circ$



Principal Soln

$x = \frac{\pi}{3}, \frac{5\pi}{3}$

Generic Soln

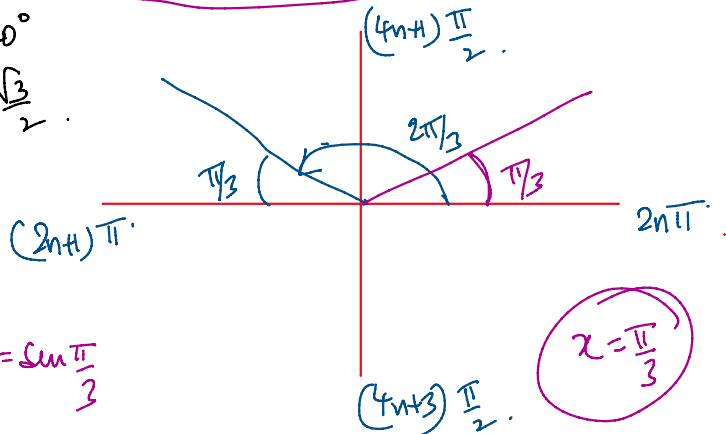
$x = 2n\pi \pm \frac{\pi}{3}$
 $n=0 \rightarrow x = 2 \times 0 \times \pi + \frac{\pi}{3} = \frac{\pi}{3}$
 $n=1 \rightarrow x = 2 \times 1 \times \pi - \frac{\pi}{3} = \frac{5\pi}{3}$

$\sin^{-1}\left(\sin \frac{2\pi}{3}\right) = x$ $\sin x = \sin \frac{2\pi}{3}$ $x = \frac{2\pi}{3}$

$\sin 120^\circ = \frac{\sqrt{3}}{2}$

$\sin^{-1}\left(\frac{\sqrt{3}}{2}\right) = x$

$\sin x = \frac{\sqrt{3}}{2} = \sin 60^\circ = \sin \frac{\pi}{3}$

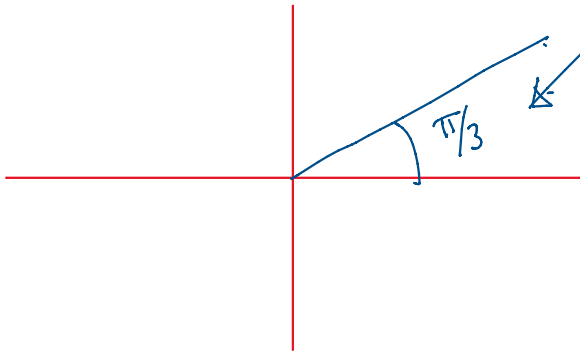


$x = \frac{\pi}{3}$

$$\sin^{-1}(\sin \frac{2\pi}{3}) = \frac{\pi}{3}$$

$$\sin(\sin^{-1} \frac{\sqrt{3}}{2}) = \frac{\sqrt{3}}{2}$$

$$\sin \frac{\pi}{3} = \frac{\sqrt{3}}{2}$$



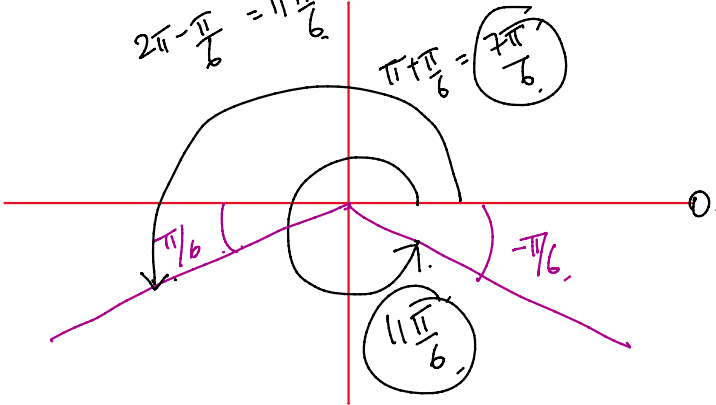
$$\sin^{-1}(\sin(-\frac{\pi}{6})) = ?$$

$$= -\frac{\pi}{6} \quad \text{?}$$

$$\frac{5\pi}{6} \quad \text{?}$$

$$2\pi - \frac{\pi}{6} = \frac{11\pi}{6}$$

$$\pi + \frac{\pi}{6} = \frac{7\pi}{6}$$



$$\cos(\sin^{-1}(-\frac{1}{2})) = ?$$

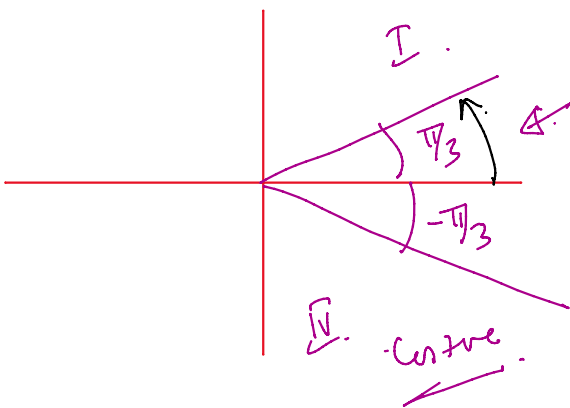
$$\sin(-\frac{\pi}{6}) = -\sin \frac{\pi}{6} = -\frac{1}{2}$$

$$\sin^{-1}(-\frac{1}{2}) = \frac{7\pi}{6}$$

$$\sin(\sin^{-1}(-\frac{1}{2})) = \sin(-\frac{\pi}{6}) = -\frac{1}{2} \quad \sin^{-1}(-\frac{1}{2}) = -\frac{\pi}{6}$$

$$\cos^{-1}(\cos(-\frac{\pi}{3})) = \cos^{-1}(\frac{1}{2}) = \frac{\pi}{3}$$

$$\cos(-\frac{\pi}{3}) = \cos \frac{\pi}{3} = \frac{1}{2}$$

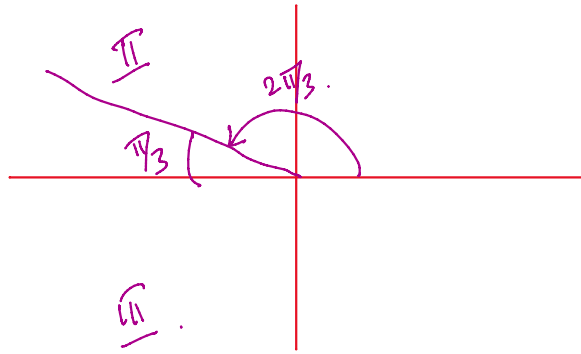


$$\cos(\cos^{-1}(-1/2)) = -1/2$$

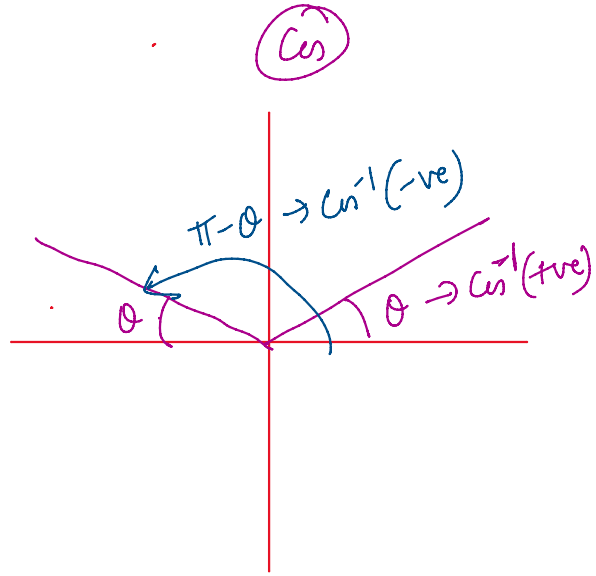
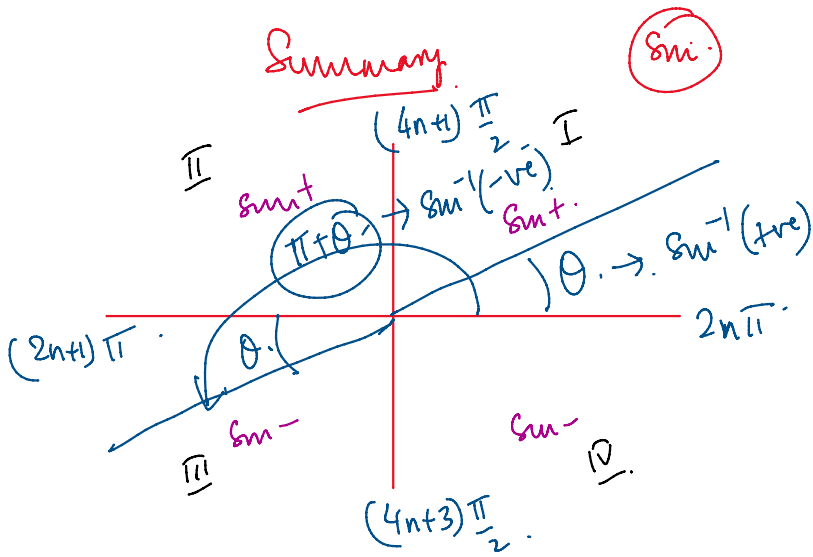
$$\cos^{-1}(1/2) = \pi/2$$

$$\cos^{-1}(-1/2) = 2\pi/3$$

$$\cos 2\pi/3 = -1/2$$



Summary

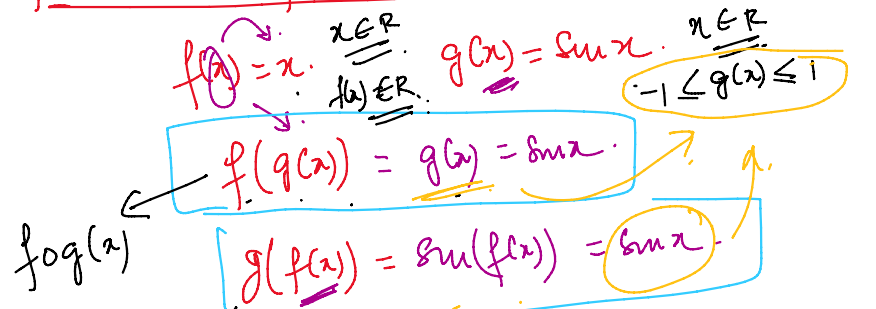


V V Imp

4 types of fns

- ① Algebraic
- ② Trig
- ③ Exp
- ④ log

function of functions (Composite functions)

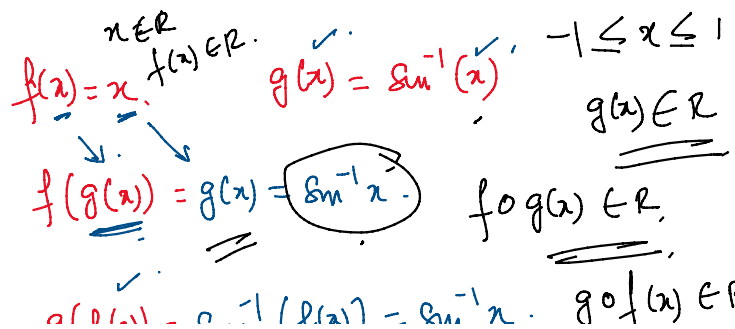


$$-1 \leq \sin \theta \leq 1$$

$$-1 \leq x \leq 1$$

$$\sin^{-1} 1 = \theta$$

$$\sin \theta = 1$$



$$-1 \leq x \leq 1$$

$$g(f(x)) = \sin^{-1}(f(x)) = \sin^{-1}x \quad \underline{\underline{g \circ f(x) \in \mathbb{R}}}$$

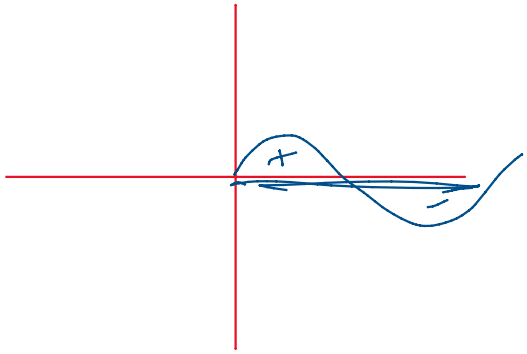
$$f(x) = x^2 \quad g(x) = \sin x$$

$$f(g(x)) = \sin^2 x$$

$$f \circ g(x) = [0, 1]$$

$$g(f(x)) = \sin(x^2)$$

$$g \circ f(x) = [-1, 1]$$



$$\downarrow \sin \theta$$

e^x any real no

$$f(x) = e^x$$

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

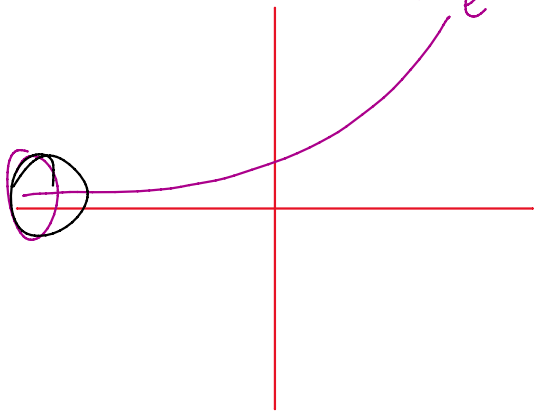
$$f(g(x)) = e^{\sin^{-1} x}$$

$$f \circ g(x) = [0, \infty)$$

$$g(f(x)) = \sin^{-1}(e^x)$$

$$0 < e^x \leq 1$$

$$g \circ f(x) = [2n\pi, (2n+1)\pi]$$



$$\sin^{-1}(x) \rightarrow \underline{\underline{-1 \leq x \leq 1}}$$

$$\underline{\underline{\sin^{-1} 0}} \rightarrow \underline{\underline{\sin^{-1} 1}}$$

