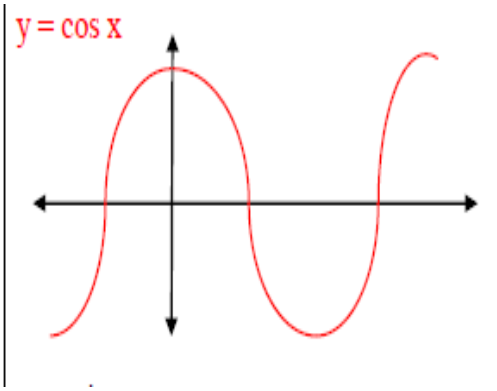
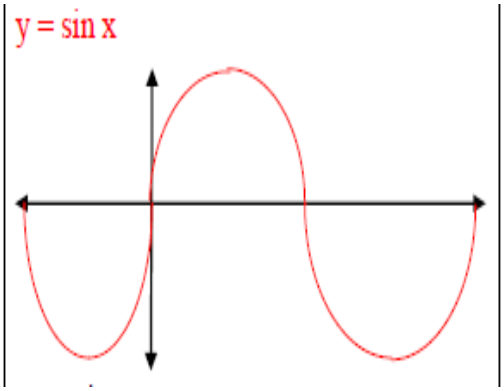
Domain and Range of trigonometric



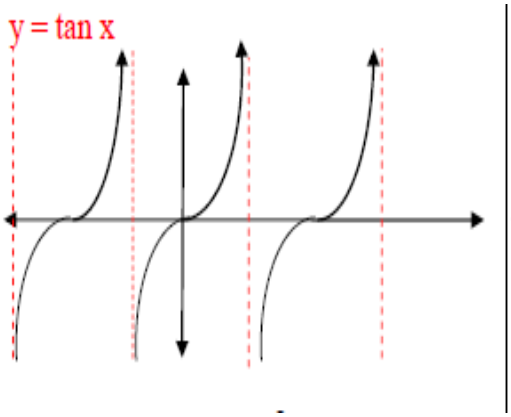
Domain function =R

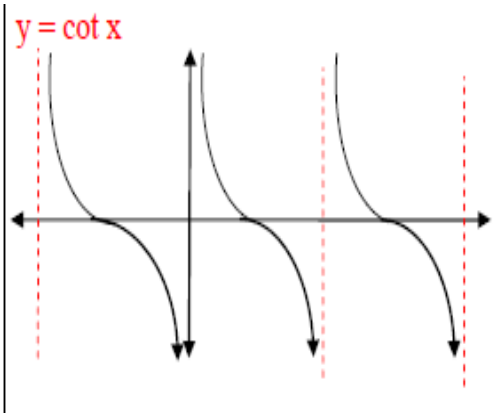
Range function= [-1,1]



Domain function=R

Range function=[-1,1]





Y=tan x

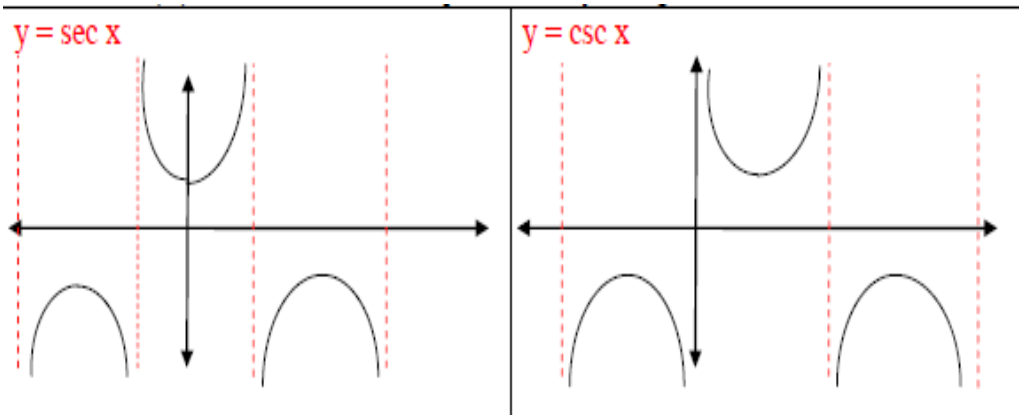
Domain function =Real except[x=$\frac{n\pi}{2}$],n=$\pm 1. \pm 3$..

Range function=R

Y=cot x

Domain function=Real except[x=$n\pi$],n=0 $\pm$ 1. $\pm$2..

Range function=R



Y=sec x

Domain function =R except[x=$\frac{n\pi}{2}$],n=$\pm$1. $\pm$3 ....

Range function=R except [-1,1]

Y=csc x

Domain function=R except[x=$n\pi$],n=0 $\pm$ 1. $\pm$2..

Range function=R except [-1,1]

1.6 Inverse of function

Function (x) have inverse is signed as f^{-1} (x)

Example 1: Find the inverse of the function y=8x^3

Solution/

$$x^3=\frac{y}{8} \quad \rightarrow X=\frac{\sqrt[3]{y}}{2}$$

$$is\ \frac{\sqrt[3]{x}}{2}\ Inverse\ of\ y = 8\ x3$$

-Inverse of trigonometric function

$$\mathbf{Y=sin^{-1}}\ x \rightarrow x = \sin y$$

$$\mathbf{Y=cos^{-1}}\ x \rightarrow x = \cos y$$

$$\mathbf{Y=tan^{-1}}\ x \rightarrow x = \tan y$$

$$\mathbf{Y=cot^{-1}}\ x \rightarrow x = \cot y$$

$$\mathbf{Y=sec^{-1}}\ x \rightarrow x = \sec y$$

$$\mathbf{Y=csc^{-1}}\ x \rightarrow x = \csc y$$

Example 2: Find the value of x.

$$\mathbf{x} = \sin^{-1}\frac{1}{\sqrt{5}} + cos^{-1}\frac{-2}{3}$$

Solution//

$$\mathbf{X}=\emptyset + \alpha$$

$$\sin^{-1}\frac{1}{\sqrt{5}} = \emptyset \rightarrow \sin\emptyset = \frac{1}{\sqrt{5}}\ \&\ \cos\emptyset = \frac{2}{\sqrt{5}}$$

$$\cos^{-1}\frac{-2}{3} = \alpha \rightarrow \cos\alpha = \frac{-2}{3} \quad \& \quad \sin\alpha = \frac{\sqrt{5}}{3}$$

$$\sin x = sin\ (\alpha + \emptyset) = \sin\alpha\cos\emptyset + \cos\alpha\sin\emptyset$$

$$\sin x = \frac{\sqrt{5}}{3} * \frac{2}{\sqrt{5}} + \frac{1}{\sqrt{5}} * \frac{-2}{3}$$

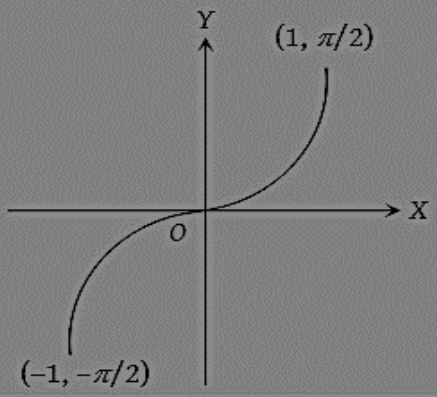
$$\sin x = \frac{2}{3} + \frac{-2}{3\sqrt{5}} \rightarrow x = \sin^{-1}(\frac{2}{3} + \frac{-2}{3\sqrt{5}})$$

OR

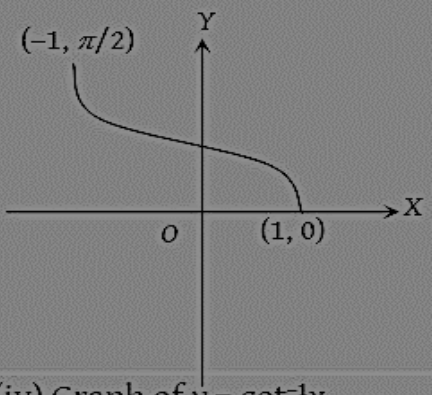
$$\cos X = \cos(\alpha + \emptyset) = \cos\alpha \cos\emptyset - \sin\alpha \sin\emptyset$$

$$\cos X = \frac{-2}{3} * \frac{2}{\sqrt{5}} - \frac{\sqrt{5}}{3} * \frac{1}{\sqrt{5}} \rightarrow X = \cos^{-1}(\frac{-4}{3\sqrt{5}} - \frac{1}{3})$$

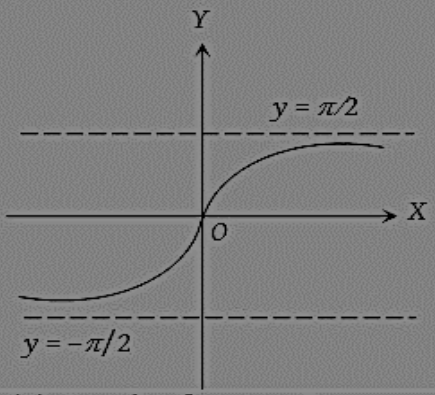
(i) Graph of $y = \sin^{-1}x$



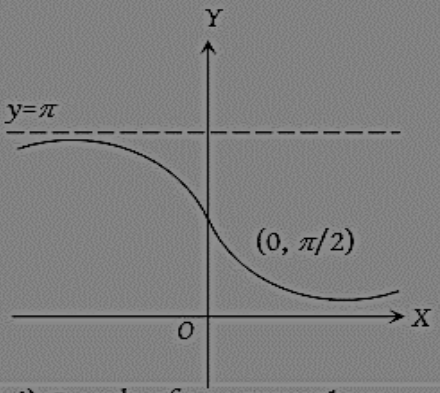
(ii) Graph of $y = \cos^{-1}x$



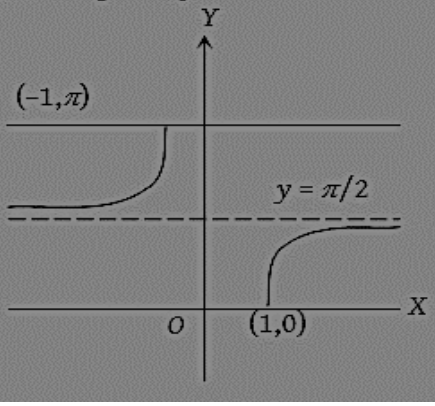
(iii) Graph of $y = \tan^{-1}x$



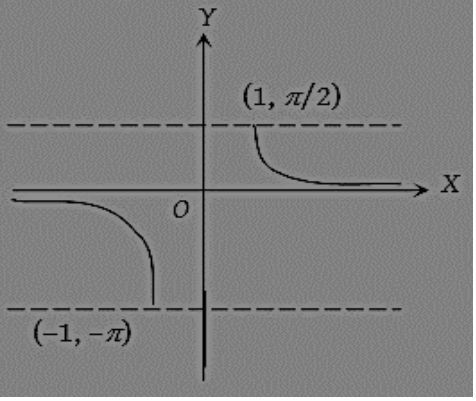
(iv) Graph of $y = \cot^{-1}x$



(v) Graph of $y = \sec^{-1}x$



(vi) Graph of $y = \text{cosec}^{-1}x$



Function	Domain (D)	Range (R)
$\sin^{-1} x$	$-1 \le x \le 1$ or $[-1,1]$	$-\frac{\pi}{2} \le \theta \le \frac{\pi}{2}$ or $\left[-\frac{\pi}{2},\frac{\pi}{2}\right]$
$\cos^{-1} x$	$-1 \le x \le 1$ or $[-1,1]$	$0 \le \theta \le \pi$ or $[0,\pi]$
$\tan^{-1} x$	$-\infty < x < \infty$ *i.e.,* $x \in R$ or $(-\infty,\infty)$	$-\frac{\pi}{2} < \theta < \frac{\pi}{2}$ or $\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$
$\cot^{-1} x$	$-\infty < x < \infty$ *i.e.,* $x \in R$ or $(-\infty,\infty)$	$0 < \theta < \pi$ or $(0,\pi)$
$\sec^{-1} x$	$x \le -1, x \ge 1$ or $(-\infty,-1]\cup[1,\infty)$	$\theta \ne \frac{\pi}{2}, 0 \le \theta \le \pi$ or $\left[0,\frac{\pi}{2}\right)\cup\left(\frac{\pi}{2},\pi\right]$
$\operatorname{cosec}^{-1} x$	$x \le -1, x \ge 1$ or $(-\infty,-1]\cup[1,\infty)$	$\theta \ne 0, -\frac{\pi}{2} \le \theta \le \frac{\pi}{2}$ or $\left[-\frac{\pi}{2},0\right)\cup\left(0,\frac{\pi}{2}\right]$