

UNIT

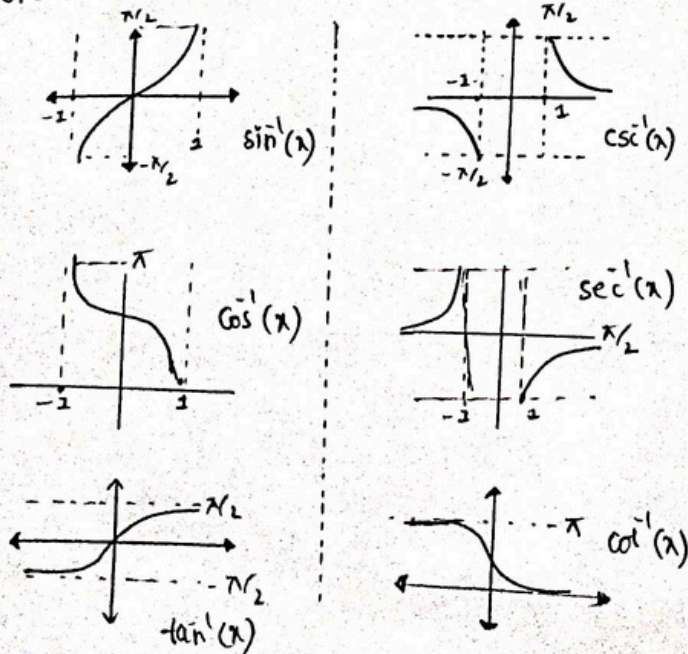
$f(x)$	Domain	Range
$\sin^{-1} x$	$[-1, 1]$	$[-\pi/2, \pi/2]$
$\cos^{-1} x$	$[-1, 1]$	$[0, \pi]$
$\tan^{-1} x$	$\mathbb{R}$	$(-\pi/2, \pi/2)$
$\sec^{-1} x$	$(-\infty, -1] \cup [1, \infty)$	$[0, \pi] - \{\pi/2\}$
$\csc^{-1} x$	$(-\infty, -1] \cup [1, \infty)$	$[-\pi/2, \pi/2] - \{0\}$
$\cot^{-1} x$	$\mathbb{R}$	$(0, \pi)$

$\sin^{-1} x = \csc^{-1}(1/x)$
 $\cos^{-1} x = \sec^{-1}(1/x)$
 $\tan^{-1} x = \begin{cases} \cot^{-1}(1/x) & x > 0 \\ -\pi + \cot^{-1}(1/x) & x < 0 \end{cases}$

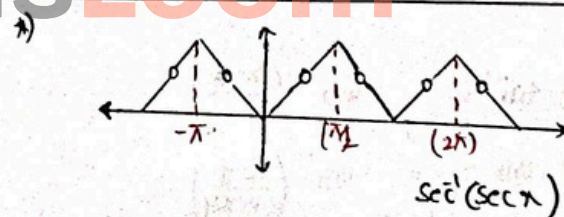
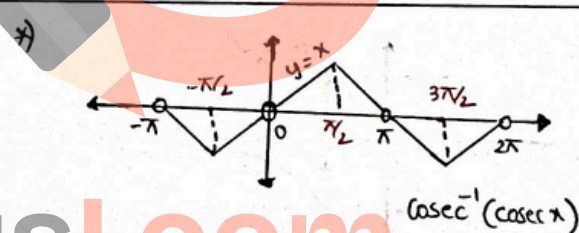
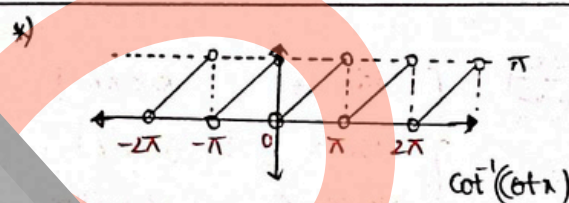
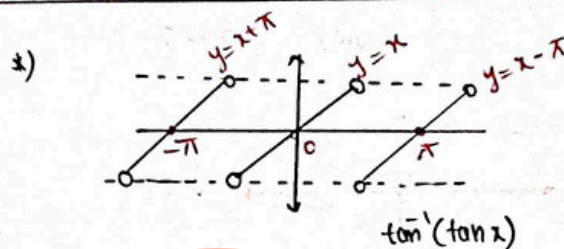
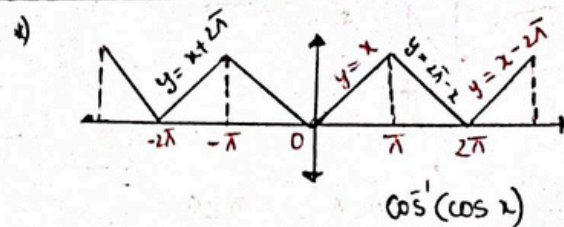
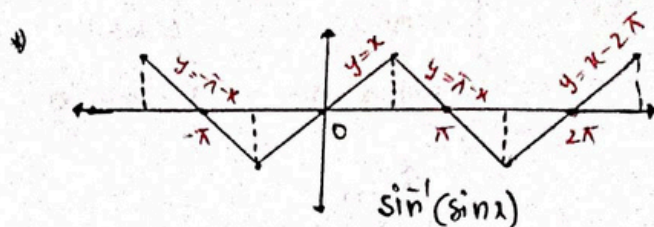
$\sin^{-1} x + \cos^{-1} x = \pi/2$
 $\sec^{-1} x + \csc^{-1} x = \pi/2$
 $\tan^{-1} x + \cot^{-1} x = \pi/2$

$\sin^{-1}(-x) = -\sin^{-1} x$
 $\tan^{-1}(-x) = -\tan^{-1} x$
 $\csc^{-1}(-x) = -\csc^{-1} x$
 $\cos^{-1}(-x) = \pi - \cos^{-1} x$
 $\cot^{-1}(-x) = \pi - \cot^{-1} x$
 $\sec^{-1}(-x) = \pi - \sec^{-1} x$

Graphs:-

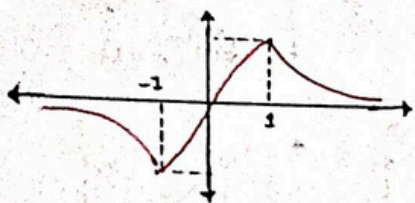


Graphs-II

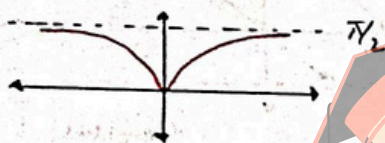


$\sin^{-1} x = \begin{cases} \cos^{-1} \sqrt{1-x^2} & 0 \leq x \leq 1 \\ -\cos^{-1} \sqrt{1-x^2} & -1 \leq x < 0 \end{cases}$
 $\cos^{-1} x = \begin{cases} \tan^{-1} \sqrt{1-x^2}/x & x \in (0, 1] \\ \pi + \tan^{-1} \sqrt{1-x^2}/x & x \in [-1, 0) \end{cases}$
 $\tan^{-1} x = \begin{cases} \cos^{-1} 1/\sqrt{1+x^2} & x \geq 0 \\ -\cos^{-1} 1/\sqrt{1+x^2} & x < 0 \end{cases}$

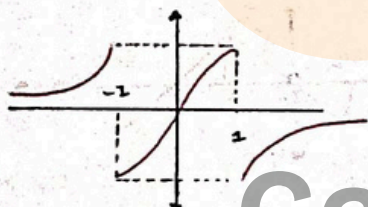
$$*) \sin^{-1}\left(\frac{2x}{1+x^2}\right) = \begin{cases} -2\tan^{-1}x - \pi & -\infty < x < -1 \\ 2\tan^{-1}x & -1 \leq x \leq 1 \\ -2\tan^{-1}x + \pi & 1 < x < \infty \end{cases}$$



$$*) \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right) = \begin{cases} 2\tan^{-1}x & x \geq 0 \\ -2\tan^{-1}x & x < 0 \end{cases}$$



$$*) \tan^{-1}\left(\frac{2x}{1-x^2}\right) = \begin{cases} 2\tan^{-1}x + \pi & -\infty < x < -1 \\ 2\tan^{-1}x & -1 < x < 1 \\ 2\tan^{-1}x - \pi & 1 < x < \infty \end{cases}$$



$$*) \tan^{-1}x + \tan^{-1}y = \tan^{-1}\left(\frac{x+y}{1-xy}\right)$$

$$*) \tan^{-1}x - \tan^{-1}y = \tan^{-1}\left(\frac{x-y}{1+xy}\right)$$

$$*) \sin^{-1}x - \sin^{-1}y = \sin^{-1}(x\sqrt{1-y^2} - y\sqrt{1-x^2})$$

$$*) \cos^{-1}x - \cos^{-1}y = \cos^{-1}(xy + \sqrt{1-x^2}\sqrt{1-y^2})$$

$$*) \cos^{-1}x + \cos^{-1}y = \cos^{-1}(xy - \sqrt{1-x^2}\sqrt{1-y^2})$$

CampusLoom