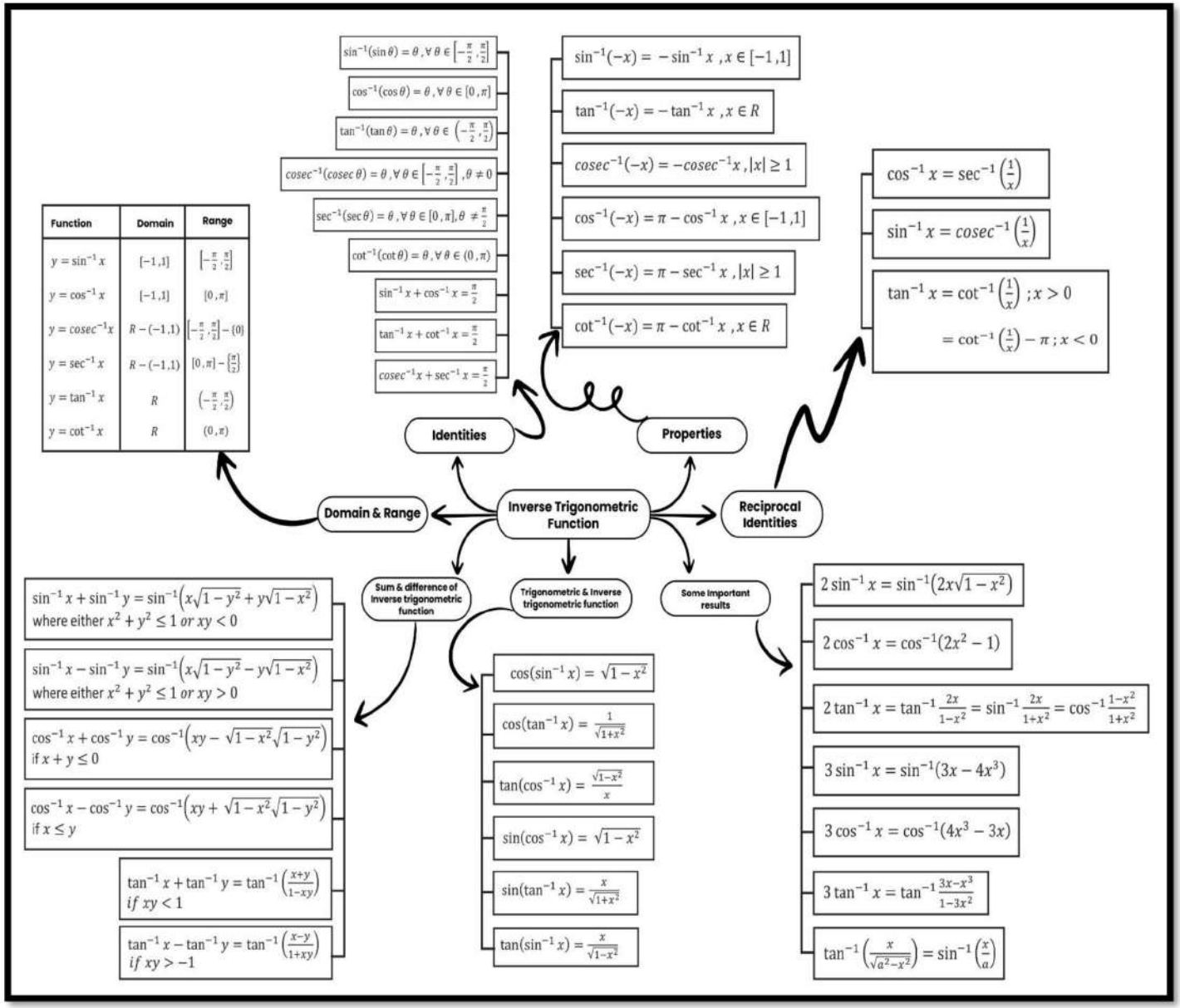
Inverse Trigonometric Function
Identities
Properties
Domain & Range
Reciprocal Identities
Sum & difference of Inverse trigonometric function
Trigonometric & Inverse trigonometric function
Some Important results
$\sin^{-1}(\sin\theta)=\theta, \forall\theta\in\left[-\frac{\pi}{2},\frac{\pi}{2}\right]$
$\cos^{-1}(\cos\theta)=\theta, \forall\theta\in[0,\pi]$
$\tan^{-1}(\tan\theta)=\theta, \forall\theta\in\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$
$cosec^{-1}(cosec\,\theta)=\theta, \forall\theta\in\left[-\frac{\pi}{2},\frac{\pi}{2}\right], \theta\neq 0$
$\sec^{-1}(\sec\theta)=\theta, \forall\theta\in[0,\pi], \theta\neq\frac{\pi}{2}$
$\cot^{-1}(\cot\theta)=\theta, \forall\theta\in(0,\pi)$
$\sin^{-1}x+\cos^{-1}x=\frac{\pi}{2}$
$\tan^{-1}x+\cot^{-1}x=\frac{\pi}{2}$
$cosec^{-1}x+\sec^{-1}x=\frac{\pi}{2}$
$\sin^{-1}(-x)=-\sin^{-1}x, x\in[-1,1]$
$\tan^{-1}(-x)=-\tan^{-1}x, x\in R$
$cosec^{-1}(-x)=-cosec^{-1}x, |x|\geq 1$
$\cos^{-1}(-x)=\pi-\cos^{-1}x, x\in[-1,1]$
$\sec^{-1}(-x)=\pi-\sec^{-1}x, |x|\geq 1$
$\cot^{-1}(-x)=\pi-\cot^{-1}x, x\in R$
$\cos^{-1}x=\sec^{-1}\left(\frac{1}{x}\right)$
$\sin^{-1}x=cosec^{-1}\left(\frac{1}{x}\right)$
$\tan^{-1}x=\cot^{-1}\left(\frac{1}{x}\right); x>0$
$=\cot^{-1}\left(\frac{1}{x}\right)-\pi; x<0$
Function | Domain | Range
$y=\sin^{-1}x$ | $[-1,1]$ | $\left[-\frac{\pi}{2},\frac{\pi}{2}\right]$
$y=\cos^{-1}x$ | $[-1,1]$ | $[0,\pi]$
$y=cosec^{-1}x$ | $R-(-1,1)$ | $\left[-\frac{\pi}{2},\frac{\pi}{2}\right]-\{0\}$
$y=\sec^{-1}x$ | $R-(-1,1)$ | $[0,\pi]-\left\{\frac{\pi}{2}\right\}$
$y=\tan^{-1}x$ | R | $\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$
$y=\cot^{-1}x$ | R | $(0,\pi)$
$\sin^{-1}x+\sin^{-1}y=\sin^{-1}\left(x\sqrt{1-y^2}+y\sqrt{1-x^2}\right)$ where either $x^2+y^2\leq 1$ or $xy<0$
$\sin^{-1}x-\sin^{-1}y=\sin^{-1}\left(x\sqrt{1-y^2}-y\sqrt{1-x^2}\right)$ where either $x^2+y^2\leq 1$ or $xy>0$
$\cos^{-1}x+\cos^{-1}y=\cos^{-1}\left(xy-\sqrt{1-x^2}\sqrt{1-y^2}\right)$ if $x+y\leq 0$
$\cos^{-1}x-\cos^{-1}y=\cos^{-1}\left(xy+\sqrt{1-x^2}\sqrt{1-y^2}\right)$ if $x\leq y$
$\tan^{-1}x+\tan^{-1}y=\tan^{-1}\left(\frac{x+y}{1-xy}\right)$ if $xy<1$
$\tan^{-1}x-\tan^{-1}y=\tan^{-1}\left(\frac{x-y}{1+xy}\right)$ if $xy>-1$
$\cos(\sin^{-1}x)=\sqrt{1-x^2}$
$\cos(\tan^{-1}x)=\frac{1}{\sqrt{1+x^2}}$
$\tan(\cos^{-1}x)=\frac{\sqrt{1-x^2}}{x}$
$\sin(\cos^{-1}x)=\sqrt{1-x^2}$
$\sin(\tan^{-1}x)=\frac{x}{\sqrt{1+x^2}}$
$\tan(\sin^{-1}x)=\frac{x}{\sqrt{1-x^2}}$
$2\sin^{-1}x=\sin^{-1}\left(2x\sqrt{1-x^2}\right)$
$2\cos^{-1}x=\cos^{-1}(2x^2-1)$
$2\tan^{-1}x=\tan^{-1}\frac{2x}{1-x^2}=\sin^{-1}\frac{2x}{1+x^2}=\cos^{-1}\frac{1-x^2}{1+x^2}$
$3\sin^{-1}x=\sin^{-1}(3x-4x^3)$
$3\cos^{-1}x=\cos^{-1}(4x^3-3x)$
$3\tan^{-1}x=\tan^{-1}\frac{3x-x^3}{1-3x^2}$
$\tan^{-1}\left(\frac{x}{\sqrt{a^2-x^2}}\right)=\sin^{-1}\left(\frac{x}{a}\right)$