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Class :-12(Maths)

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Property III

- (i) $\sin^{-1}(-x) = -\sin^{-1}x$; if $x \in [-1, 1]$
- (ii) $\cos^{-1}(-x) = \pi - \cos^{-1}x$; if $x \in [-1, 1]$
- (iii) $\tan^{-1}(-x) = -\tan^{-1}x$; if $x \in R$
- (iv) $\operatorname{cosec}^{-1}(-x) = \pi - \operatorname{cosec}^{-1}x$; if $x \in (-\infty, -1] \cup [1, \infty)$
- (v) $\sec^{-1}(-x) = \pi - \sec^{-1}x$; if $x \in (-\infty, -1] \cup [1, \infty)$
- (vi) $\cot^{-1}(-x) = \pi - \cot^{-1}x$; if $x \in R$

Property IV

- (i) $\sin^{-1}\left(\frac{1}{x}\right) = \operatorname{cosec}^{-1}x$; if $x \in (-\infty, -1] \cup [1, \infty)$
- (ii) $\cos^{-1}\left(\frac{1}{x}\right) = \sec^{-1}x$; if $x \in (-\infty, -1] \cup [1, \infty)$
- (iii) $\tan^{-1}\left(\frac{1}{x}\right) = \begin{cases} \cot^{-1}x; & \text{if } x > 0 \\ -\pi + \cot^{-1}x; & \text{if } x < 0 \end{cases}$

Property VI

$$(i) \sin^{-1}x + \sin^{-1}y = \begin{cases} \sin^{-1}\{x\sqrt{1-y^2} + y\sqrt{1-x^2}\}; \\ \pi - \sin^{-1}\{x\sqrt{1-y^2} + y\sqrt{1-x^2}\}; \\ -\pi - \sin^{-1}\{x\sqrt{1-y^2} + y\sqrt{1-x^2}\}; \end{cases}$$

if $-1 \leq x, y \leq 1$ and $x^2 + y^2 \leq 1$ or if $xy < 0$ and $x^2 + y^2 > 1$
if $0 < x, y \leq 1$ and $x^2 + y^2 > 1$
if $-1 \leq x, y < 0$ and $x^2 + y^2 > 1$

$$(ii) \sin^{-1}x - \sin^{-1}y = \begin{cases} \sin^{-1}\{x\sqrt{1-y^2} - y\sqrt{1-x^2}\}; \\ \pi - \sin^{-1}\{x\sqrt{1-y^2} - y\sqrt{1-x^2}\}; \\ -\pi - \sin^{-1}\{x\sqrt{1-y^2} - y\sqrt{1-x^2}\}; \end{cases}$$

if $-1 \leq x, y \leq 1$ and $x^2 + y^2 \leq 1$ or if $xy > 0$ and $x^2 + y^2 > 1$
if $0 < x \leq 1, -1 \leq y < 0$ and $x^2 + y^2 > 1$
if $-1 \leq x < 0, 0 < y \leq 1$ and $x^2 + y^2 > 1$