doubtnut
India's Number 1 Education App

# MATHS

## BOOKS - CENGAGE MATHS (ENGLISH)

## INVERSE TRIGONOMETRIC FUNCTIONS

### Solved Examples

**1.** Sove $2\cos^{-1}x = \sin^{-1}\left(2x\sqrt{1-x^2}\right)$

Watch Video Solution

**2.** Find the domain for $f(x) = \sin^{-1}\left(\frac{1+x^2}{2x}\right)$

Watch Video Solution

**3.** Find the range of $\cot^{-1}\left(2x - x^2\right)$

Watch Video Solution

**4.** Find the set of values of parameter $a$ so that the equation $\left(\sin^{-1}x\right)^3 + \left(\cos^{-1}x\right)^3 = a\pi^3$ has a solution.

Watch Video Solution

**5.** Solve the equation $\sqrt{\left|\sin^{-1}|\cos| \right| + \left|\cos^{1}|\sin x|\right|} = \sin^{-1}|\cos x| - \cos^{-1}|\sin x|, \frac{-\pi}{2} \leq x \leq \frac{\pi}{2}.$

Watch Video Solution

**6.** If $p > q > 0 and pr < -1 < qr,$ then find the value of $\tan^{-1}\left(\frac{p-q}{1+pq}\right) + \tan^{-1}\left(\frac{q-r}{1+qr}\right) + \tan^{-1}\left(\frac{r-p}{1+rp}\right).$

Watch Video Solution

7. If $0 < a_1 < a_2 < .... < a_n$, then prove that

$$\tan^{-1}\left(\frac{a_1x - y}{x + a_1y}\right) + \tan^{-1}\left(\frac{a_2 - a_1}{1 + a_2a_1}\right) + \tan^{-1}\left(\frac{a_3 - a_2}{1 + a_3a_2}\right) + ..... + \tan^{-1}\left(\frac{a_n - a_n}{1 + a_na}\right.$$

Watch Video Solution

8. Find the number of positive integral solution of the equation

$$\tan^{-1}x + \cos^{-1}\left(\frac{y}{\sqrt{1 - y^2}}\right) = \sin^{-1}\left(\frac{3}{\sqrt{10}}\right)$$

A. (1, 2) & (2, 7)

B. (1, - 2) & (2, 7)

C. (1, 2) & ( - 2, 7)

D. (1, 2) & (2, - 7)

**Answer: A**

Watch Video Solution

**9.** If `tan^(-1)y=4tan^(-1)x(|x|

Watch Video Solution

**10.** Find the sum

$\operatorname{cosec}^{-1}\sqrt{10} + \operatorname{cosec}^{-1}\sqrt{50} + \operatorname{cosec}^{-1}\sqrt{170} + .... + \operatorname{cosec}^{-1}\sqrt{(n^2+1)(n^2+2n+}$

Watch Video Solution

**11.** Let $f(x) = \sin x + \cos x + \tan x + \sin^{-1}x + \cos^{-1}x + \tan^{-1}x$. Then find the maximum and minimum values of $f(x)$.

Watch Video Solution

## Illustration

**1.** Find the principal value of the following:

(i) $\operatorname{cosec}^{-1}(2)$ (ii) $\tan^{-1}\left(-\sqrt{3}\right)$ (iii) $\cos^{-1}\left(-\frac{1}{\sqrt{2}}\right)$

Watch Video Solution

**2.** Solver $\sin^{-1}x > -1$

Watch Video Solution

**3.** Solve $\cos^{-1}x > \cos^{-1}x^2$

Watch Video Solution

**4.** Solve for $x$ if $\left(\cot^{-1}x\right)^2 - 3\left(\cot^{-1}x\right) + 2 > 0$

Watch Video Solution

**5.** Find the value of x for which the following expression are defined

(i) $\sin^{-1}(3x - 2)$ (ii) $\cos^{-1}\left(\log_e x\right)$ (iii) $\sec^{-1}\left(x^2 - 2\right)$

Watch Video Solution

**6.** Sove $\left[\cot^{-1}x\right] + \left[\cos^{-1}x\right] = 0$, where [. ] denotes the greatest integer function

Watch Video Solution

**7.** Find the value of $\sin^{-1}\left(2^x\right)$ (ii) $\cos^{-1}\sqrt{x^2 - x + 1}$ $\dfrac{\tan^{-1}\left(x^2\right)}{1 + x^2}$ (iv) $\sec^{-1}\left(x + \dfrac{1}{x}\right)$

Watch Video Solution

**8.** Find the range of $f(x) = \left|3\tan^{-1}x - \cos^{-1}(0)\right| - \cos^{-1}(-1)$

Watch Video Solution

**9.** Find the value of $x$ for which $\sec^{-1}x + \sin^{-1}x = \frac{\pi}{2}$

A. $x = \frac{\pi}{2}$

B. $x = -2$

C. $x = \pm 1$

D. $x = 2$

**Answer: C**

Watch Video Solution

**10.** If $\sin^{-1}\left(x^2 + 2x + 2\right) + \tan^{-1}\left(x^2 - 3x - k^2\right) > \frac{\pi}{2}$, then find the value of k

Watch Video Solution

**11.** If $\cos^{-1}\lambda\cos^{-1}\mu + \cos^{-1}\gamma = 3\pi,$ then find the value of $\lambda\mu + \mu\lambda$

Watch Video Solution

**12.** If $\sin^{-1}x_1 + \sin^{-1}x_2 + \ + \sin^{-1}x_n \leq \ = \frac{n\pi}{2}, n \in N, n = 2m + 1, m \geq 1,$ then find the value of $\frac{x11 + x33 + x55 + (m + 1)terms}{x22 + x44 + x66 + mterms}$

Watch Video Solution

**13.** Find $x$ satisfying $\left[\tan^{-1}x\right] + \left[\cos^{-1}x\right] = 2,$ where $[]$ represents the greatest integer function.

Watch Video Solution

**14.** If $\cos\left(2\sin^{-1}x\right) = \frac{1}{9},$ then find the value of x

Watch Video Solution

**15.** Find the value of $\sin\left(\frac{1}{2}\cot^{-1}\left(-\frac{3}{4}\right)\right)$

Watch Video Solution

**16.** Prove that $\cot^{-1}\left(\frac{\sqrt{1+\sin x}+\sqrt{1-\sin x}}{\sqrt{1+\sin x}-\sqrt{1-\sin x}}\right)=\frac{x}{2}, x \in \left(0, \frac{\pi}{4}\right)$

Watch Video Solution

**17.** Solve $\sin^{-1}(1-x)-2s \in^{-1} x=\frac{\pi}{2}$

Watch Video Solution

**18.** Find the solutions of the equation $\cos\left(\cos^{-1}x\right)=\operatorname{cosec}\left(\operatorname{cosec}^{-1}x\right)$.

Watch Video Solution

**19.** Find the principal values of the following

(i) $\sin^{-1}(\sin 1)$ (ii) $\sin^{-1}(\sin 2)$

(iii) $\sin^{-1}(\sin 10)$

Watch Video Solution

**20.** Solve $\sin^{-1}(\sin 6x) = x, x \in [0, \pi]$

Watch Video Solution

**21.** Solve $\sin^{-1}\left[\sin\left(\frac{2x^2 + 4}{1 + x^2}\right)\right] < \pi - 3$

Watch Video Solution

**22.** Find the area bounded by $y = \sin^{-1}(\sin x)$ and x-axis for $x \in [0, 100\pi]$

Watch Video Solution

**23.** Find the value of x for which $f(x) = 2\sin^{-1}\sqrt{1-x} + \sin^{-1}\left(2\sqrt{x-x^2}\right)$ is constant

Watch Video Solution

**24.** Find the principal value of the following

(i) $\cos^{-1}(\cos 3)$ (ii) $\cos^{-1}(\cos 4)$

(iii) $\cos^{-1}(\cos 15)$ (iv) $\cos^{-1}(\cos 30)$

(v) $\cos^{-1}(\cos 50)$ (vi) $\cos^{-1}\left(\cos.\ \frac{48\pi}{7}\right)$

Watch Video Solution

**25.** Solve $\cos^{-1}(\cos x) > \sin^{-1}(\sin x)$, $x \in [0, 2\pi]$

Watch Video Solution

**26.** Find the principal values of the following

(i) $\tan^{-1}\left(\tan.\frac{2\pi}{3}\right)$ (ii) $\tan^{-1}(\tan(-6))$

Watch Video Solution

**27.** Find the number of solution of $2\tan^{-1}(\tan x) = 6 - x$

Watch Video Solution

**28.** Write $\tan^{-1}x, x > 0$ in the form of other inverse trigonometric function

Watch Video Solution

**29.** Find $\tan^{-1}.\frac{x}{\sqrt{a^2 - x^2}}$ in terms of $\sin^{-1}$, where $x \in (0, a)$

Watch Video Solution

**30.** Prove that $\sin\left(\cot^{-1}\left(\tan\left(\cos^{-1}x\right)\right)\right) = x, x > 0$

Watch Video Solution

**31.** If $x < 0$, then prove that $\cos^{-1}x = \pi - \sin^{-1}\sqrt{1 - x^2}$

Watch Video Solution

**32.** Prove that $\cos^{-1}\left\{\sqrt{\frac{1 + x}{2}}\right\} = \frac{\cos^{-1}x}{2}, -1 < x < 1$

Watch Video Solution

**33.** Prove that $\tan^{-1}\left\{\frac{x}{a + \sqrt{a^2 - x^2}}\right\} = \frac{1}{2}\sin^{-1}.\frac{x}{a}, -a < x < a$

Watch Video Solution

**34.** Prove that $\sin^{-1}\left\{\frac{\sqrt{1+x}+\sqrt{1-x}}{2}\right\} = \frac{\pi}{4} + \frac{\cos^{-1}x}{2}, 0 < x < 1$

Watch Video Solution

**35.** Prove that $\cos^{-1}\left(\frac{1-x^{2n}}{1+x^{2n}}\right) = 2\tan^{-1}x^n, 0 < x < \infty$

Watch Video Solution

**36.** If $x \in [-1, 0]$, then find the value of $\cos^{-1}\left(2x^2 - 1\right) - 2\sin^{-1}x$

Watch Video Solution

**37.** If $\frac{1}{\sqrt{2}} < x < 1$, then prove that $\cos^{-1}x + \cos^{-1}\left(\frac{x+\sqrt{1-x^2}}{\sqrt{2}}\right) = \frac{\pi}{4}$

Watch Video Solution

**38.** Find the value of $\sin^{-1}(\sin 5) + \cos^{-1}(\cos 10) + \tan^{-1}\{\tan(-6)\} + \cot^{-1}\{\cot(-10)\}$

Watch Video Solution

**39.** Find the minimum value of the function $f(x) = \dfrac{\pi^2}{16\cot^{-1}(-x)} - \cot^{-1}x$

Watch Video Solution

**40.** Find the range of $y = \left(\cot^{-1}x\right)\left(\cot^{-1}(-x)\right)$

Watch Video Solution

**41.** The value of $2\tan^{-1}\left(\operatorname{cosec}\tan^{-1}x - \tan\cot^{-1}x\right)$ is equal to

Watch Video Solution

**42.** Prove that $\cos\left(\tan^{-1}\left(\sin\left(\cot^{-1}x\right)\right)\right) = \sqrt{\frac{x^2+1}{x^2+2}}$

Watch Video Solution

**43.** If $\sin^{-1}x = \pi/5$, for some $x \in (-1, 1)$, then find the value of $\cos^{-1}x$

Watch Video Solution

**44.** If $\sin\left(\sin^{-1}.\frac{1}{5} + \cos^{-1}x\right) = 1$, then find the value of x

Watch Video Solution

**45.** solve $\sin^{-1}x \leq \cos^{-1}x$

Watch Video Solution

**46.** Find the range of $f(x) = \sin^{-1}x + \tan^{-1}x + \cos^{-1}x$

Watch Video Solution

**47.** Find the minimum value of $\left(\sec^{-1}x\right)^2 + \left(\operatorname{cosec}^{-1}x\right)^2$

Watch Video Solution

**48.** Find the range of $f(x) = \left(\sin^{-1}x\right)^2 + 2\pi\cos^{-1}x + \pi^2$

Watch Video Solution

**49.** Solve $\sin^{-1}.\dfrac{14}{|x|} + \sin^{-1}.\dfrac{2\sqrt{15}}{|x|} = \dfrac{\pi}{2}$

Watch Video Solution

**50.** If $\alpha = \sin^{-1}\left(\cos\left(\sin^{-1}\right)x\right)\right)$ and $\beta = \cos^{-1}\left(\sin\left(\cos^{-1}x\right)\right)$, then find $\tan\alpha.\ \tan\beta$.

Watch Video Solution

**51.** If $\sec^{-1}x = \operatorname{cosec}^{-1}y$, then find the value of $\cos^{-1}.\ \frac{1}{x} + \cos^{-1}.\ \frac{1}{y}$

A. π

B. π/4

C. π/2

D. -π/2

**Answer:**

Watch Video Solution

**52.** Prove that $\tan^{-1}x + \tan^{-1}.\ \frac{1}{x} = \begin{cases} \pi/2 & \text{if} x > 0 \\ -\pi/2 & \text{if } x < 0 \end{cases}$

Watch Video Solution

**53.** For which values of x, function $f(x) = \sin^{-1}x + \sin^{-1}.\frac{1}{x} + \cos^{-1}x + \cos^{-1}.\frac{1}{x}$ is defined? Also, find the range

Watch Video Solution

**54.** Find the value of $\sum_{r=1}^{10}\sum_{s=1}^{10}\tan^{-1}\left(\frac{r}{s}\right)$

Watch Video Solution

**55.** If $\sin^{-1}x_i \in [0, 1]\,\forall\, i = 1, 2, 3, .28$ then find the maximum value of $\sqrt{\sin^{-1}x_1}\sqrt{\cos^{-1}x_2} + \sqrt{\sin^{-1}x_2}\sqrt{\cos^{-1}x_3} + \sqrt{\sin^{-1}x_3}\sqrt{\cos^{-1}x_4} + \; + \sqrt{\sin^{-1}x_{28}}\sqrt{\cos^{-1}x_1}$

Watch Video Solution

**56.** If two angles of a triangle are $\tan^{-1}(2)$ and $\tan^{-1}(3)$, then find the third angles

Watch Video Solution

**57.** Prove that $\cos^{-1}.(4).(5) + \cos^{-1}.\frac{12}{13} = \cos^{-1}.\frac{33}{65}$

Watch Video Solution

**58.** Prove that: `tan^(-1)(1/2tan2A)+tan^(-1)(cota)+tan^(-1)(cot^3A)={ when 0

Watch Video Solution

**59.** Let a, b and c be positive real numbers. Then prove that `tan^(-1) sqrt((a(a + b + c))/(bc)) + tan^(-1) sqrt((b (a + b + c))/(ca)) + tan^(-1) sqrt((c(a + b+ c))/(ab)) =' pi'

Watch Video Solution

**60.** Simplify

$$\left[\frac{3\sin 2\alpha}{5+3\cos 2\alpha}\right]+\tan^{-1}\left[\frac{\tan\alpha}{4}\right],\quad \text{where}\quad -\frac{\pi}{2}<\alpha<\frac{\pi}{2}$$

Watch Video Solution

**61.** Solve the equation $\tan^{-1}2x+\tan^{-1}3x=\pi/4$

Watch Video Solution

**62.** Solve $\tan^{-1}x+\sin^{-1}x=\tan^{-1}2x$

Watch Video Solution

**63.** Solve $\cot^{-1}\left(\frac{3x^2+1}{x}\right)=\cot^{-1}\left(\frac{1-3x^2}{x}\right)-\tan^{-1}6x$

Watch Video Solution

**64.** If $x > y > z > 0$, then find the value of $\cot^{-1}\frac{xy+1}{x-y} + \cot^{-1}.\frac{yz+1}{y-z} + \cot^{-1}.\frac{zx+1}{z-x}$

Watch Video Solution

**65.** Solve $\tan^{-1}x + \cot^{-1}(-|x|) = 2\tan^{-1}6x$

Watch Video Solution

**66.** If $a_1, a_2, a_3, \ldots, a_n$ is an A.P. with common difference d, then prove that

$$\tan\left[\tan^{-1}\left(\frac{d}{1+a_1a_2}\right) + \tan^{-1}\left(\frac{d}{1+a_2a_3}\right) + \ldots + \tan^{-1}\left(\frac{d}{1+a_{-1}a_n}\right)\right] = \frac{(n-1)d}{1+a_1a_n}$$

Watch Video Solution

**67.** Find the value of $\sum_{r=0}^{\infty} \tan^{-1}\left(\frac{1}{1+r+r^2}\right)$

Watch Video Solution

**68.** Find the sum $\sum_{r=1}^{\infty} \tan^{-1}\left(\frac{2(2r-1)}{4+r^2\left(r^2-2r+1\right)}\right)$

Watch Video Solution

**69.** Find the value of $4\tan^{-1}.\frac{1}{5} - \tan^{-1}.\frac{1}{70} + \tan^{-1}.\frac{1}{99}$

Watch Video Solution

**70.** If $(x-1)\left(x^2+1\right) > 0$, then find the value of $\sin\left(\frac{1}{2}\tan^{-1}.\frac{2x}{1-x^2} - \tan^{-1}x\right)$

Watch Video Solution

Watch Video Solution

**71.** Prove that

$$3\tan^{-1}x = \begin{cases} \tan^{-1}\left(\dfrac{3x-x^3}{1-3x^2}\right) & \text{if } -\dfrac{1}{\sqrt{3}} < x < \dfrac{1}{\sqrt{3}} \\ \pi + \tan^{-1}\left(\dfrac{3x-x^3}{1-3x^2}\right) & \text{if } x > \dfrac{1}{\sqrt{3}} \\ -\pi + \tan^{-1}\left(\dfrac{3x-x^3}{1-3x^2}\right) & \text{if } x < -\dfrac{1}{\sqrt{3}} \end{cases}$$

Watch Video Solution

**72.** Prove that $\cot^{-1}.\dfrac{3}{4} + \sin^{-1}.\dfrac{5}{13} = \sin^{-1}.\dfrac{63}{65}$

Watch Video Solution

**73.** Solve : $\sin^{-1}x + \sin^{-1}2x = \dfrac{\pi}{3}$

Watch Video Solution

**74.** Solve $\sin^{-1}x + \sin^{-1}(1 - x) = \cos^{-1}x$

Watch Video Solution

**75.** Solve : $\cos^{-1}\left(\frac{1}{2}x^2 + \sqrt{1 - x^2}.\sqrt{1 - \frac{x^2}{4}}\right) = \frac{\cos^{-1}x}{2} - \cos^{-1}x$.

Watch Video Solution

**76.** If $x \in \left(0, \frac{\pi}{2}\right)$, then show that $\cos^{-1}\left(\frac{7}{2}(1 + \cos 2x) + \sqrt{\left(\sin^2 x - 48\cos^2 x\right)}\sin x\right) = x - \cos^{-1}(7\cos x)$

Watch Video Solution

**77.** Which of the following angles is greater ?

$$\theta_1 = \sin^{-1}.\frac{4}{5} + \sin^{-1}.\frac{1}{3} \text{ and } \theta_2 = \cos^{-1}.\frac{4}{5} + \cos^{-1}.\frac{1}{3}$$

Watch Video Solution

**78.** Find the value

$$\lim n \to \infty \sum_{k=2}^{n} \cos^{-1}\left(\frac{1 + \sqrt{(k-1)k(k+1)(k+2)}}{k(k+1)}\right)$$

Watch Video Solution

**79.** If $f(x) = \sin^{-1}x$ then prove that

$$\lim x \to \frac{1}{2}^{+} f\left(3x - 4x^3\right) = \pi - 3 \lim x \to \frac{1}{2}^{+} \sin^{-1}x$$

Watch Video Solution

**80.** Solve $\sin^{-1}x - \cos^{-1}x = \sin^{-1}(3x - 2)$

Watch Video Solution

Watch Video Solution

**81.** If

$A = 2\tan^{-1}\left(2\sqrt{2} - 1\right)$ and $B = 3\sin^{-1}\left(\frac{1}{3}\right) + \sin^{-1}\left(\frac{3}{5}\right)$, then show $A > B$.

Watch Video Solution

**82.** If $\frac{\sin^{-1}(2x)}{1 + x^2} = \frac{\tan^{-1}(2x)}{1 - x^2}$, then find the value of $x$.

Watch Video Solution

**83.** If $\sin^{-1}\left(\frac{4x}{x^2 + 4}\right) + 2\tan^{-1}\left(-\frac{x}{2}\right)$ is independent of $x$, find the values of $x$.

Watch Video Solution

**84.** If $\cos^{-1}.\frac{6x}{1+9x^2} = -\frac{\pi}{2} + 2\tan^{-1}3x$, then find the values of x

Watch Video Solution

**85.** Find the value of $2\cos^{-1}.\frac{3}{\sqrt{13}} + \cot^{-1}.\frac{16}{63} + \frac{1}{2}\cos^{-1}.\frac{7}{25}$

Watch Video Solution

## Concept Application Exercise 7 1

**1.** Find the principal value of (a) $\operatorname{cosec}^{-1}(-1)$ (b) $\cot^{-1}\left(-\frac{1}{\sqrt{3}}\right)$

Watch Video Solution

**2.** Solves $\cos^{-1}x < 2$

A. $x \in (\cos 2, 2)$

B. $x \in (0, 1)$

C. $x \in (-1, 1)$

D. $x \in (\cos 2, 1)$

**Answer: D**

Watch Video Solution

**3.** Find the possible values of $\sin^{-1}(1 - x) + \cos^{-1}\sqrt{x - 2}$

A. 0

B. `{-1,1}

C. 2

D. -1/2

**Answer: A**

Watch Video Solution

**4.** Find the real values of x for which the function $f(x) = \cos^{-1}\sqrt{x^2 + 3x + 1} + \cos^{-1}\sqrt{x^2 + 3x}$ is defined

Watch Video Solution

**5.** Find the smallest and the largest values of $\tan^{-1}\left(\frac{1 - x}{1 + x}\right), 0 \leq x \leq 1$

Watch Video Solution

**6.** Find the value of x for which $\sin^{-1}\left(\cos^{-1}x\right) < 1$ and $\cos^{-1}\left(\cos^{-1}x\right) < 1$

Watch Video Solution

**7.** Solve $\sin^{-1}x > \tan^{-1}x$

Watch Video Solution

**8.** Find the range of $f(x) = \cos^{-1}x + \cot^{-1}x$

Watch Video Solution

**9.** If $\left(\sin^{-1}x\right)^2 + \left(\sin^{-1}y\right)^2 + \left(\sin^{-1}z\right)^2 = \frac{3}{4}\pi^2$, find the value of $x^2 + y^2 + z^2$

.

Watch Video Solution

**10.** Find the value of $\sin\left(\frac{1}{4}\right)\cos^{-1}\left(\frac{-1}{9}\right)$

Watch Video Solution

**11.** If $x < 0$, then prove that $\cos^{-1}x = \pi + \tan^{-1}.\ \frac{\sqrt{1 - x^2}}{x}$

Watch Video Solution

**12.** Prove that $\sin^{-1}.\left(\left(x+\frac{\sqrt{1-x^2}}{\sqrt{2}}\right)\right)=\sin^{-1}x+\frac{\pi}{4}$, where $-\frac{1}{\sqrt{2}}<x<\frac{1}{\sqrt{2}}$

Watch Video Solution

## Concept Application Exercise 7 2

**1.** Find the following values :

(a) $\tan^{1}\tan.\frac{13\pi}{5}$ (b) $\sec^{-1}\sec.\frac{13\pi}{3}$

(c) $\sin^{-1}\sin.\frac{33\pi}{5}$ (d) $\sin^{-1}(\sin 8)$

(e) $\tan^{-1}(\tan 10)$ (f) $\sec^{-1}(\sec 9)$

(g) $\cot^{-1}(\cot 6)$ (h) $\operatorname{cosec}^{-1}(\operatorname{cosec} 7)$

Watch Video Solution

**2.** If $f(x)=\sin^{-1}\left(\sin\left(\log_2 x\right)\right)$, then find the value of $f(300)$

Watch Video Solution

**3.** find the maximum value of $f(x) = \left(\sin^{-1}(\sin x)\right)^2 - \sin^{-1}(\sin x)$

Watch Video Solution

**4.** solve $\sin^{-1}(\sin 5) > x^2 - 4x$

Watch Video Solution

**5.** Consider function $f(x) = \sin^{-1}(\sin x) + \cos^{-1}(\cos x), x \in [0, 2\pi]$

(a) Draw the graph of $y = f(x)$

(b) Find the range of $f(x)$

(c) Find the area bounded by $y = f(x)$ and x-axis

Watch Video Solution

**6.** Find the values of $x \in [0, 2\pi]$ for which function $f(x) = \tan^{-1}(\tan x)$ and $g(x) = \cos^{-1}(\cos x)$ are identical

Watch Video Solution

## Concept Application Exercise 7 3

**1.** Express $\sin^{-1}.\frac{\sqrt{x}}{\sqrt{x+a}}$ as a function of $\tan^{-1}$

Watch Video Solution

**2.** If $\tan\left(\cos^{-1}x\right) = \sin\left(\cot^{-1}.\frac{1}{2}\right)$, then find the value of x

Watch Video Solution

**3.** Prove that: $\operatorname{cosec}\left(\tan^{-1}\left(\cos\left(\cot^{-1}\left(\sec\left(\sin^{-1}a\right)\right)\right)\right)\right) = \sqrt{3-a^2}$, where $a \in [0, 1]$

Watch Video Solution

**4.** Prove that

$\sin\cot^{-1}\tan\cos^{-1}x = \sin\cos ec^{-1}\cot\tan^{-1}x = x,$ where $x \in [0, 1]$

Watch Video Solution

**5.** $\tan^{-1}\left(\frac{\sqrt{1 + a^2x^2} - 1}{ax}\right)$ where $x \neq 0,$ is equal to

Watch Video Solution

**6.** Prove that $\sin\left[2\tan^{-1}\left\{\sqrt{\frac{1 - x}{1 + x}}\right\}\right] = \sqrt{1 - x^2}$

Watch Video Solution

**7.** Prove that $\tan^{-1}.\frac{1}{\sqrt{x^2 - 1}} = \frac{\pi}{2} - \sec^{-1}x, x > 1$

Watch Video Solution

**8.** Prove that: tan^(-1){(sqrt(1+x)-sqrt(1-x))/(sqrt(1+x)+sqrt(1-x))}=pi/4-1/2. cos^(-1)x , 0

Watch Video Solution

**9.** If $x < 0$, the prove that $\cos^{-1}\left(\frac{1+x}{\sqrt{2\left(1+x^2\right)}}\right) = \frac{\pi}{4} - \tan^{-1}x$

Watch Video Solution

**10.** Find the value of $\tan^{-1}\left(-\tan.\frac{13\pi}{8}\right) + \cot^{-1}\left(-\cot\left(\frac{9\pi}{8}\right)\right)$

Watch Video Solution

**11.** The value of $\tan\left\{\left(\cos^{-1}\left(-\frac{2}{7}\right) - \frac{\pi}{2}\right)\right]$ is

Watch Video Solution

Watch Video Solution

**12.** If $\tan^{-1}\left(\frac{1}{y}\right) = -\pi + \cot^{-1}y$, where $y = x^2 - 3x + 2$, then find the value of $x$

Watch Video Solution

## Concept Application Exercise 7 4

**1.** If $\sin^{-1}x + \sin^{-1} = \frac{2\pi}{3}$, then $\cos^{-1}x\cos^{-1}y$ is equal to

Watch Video Solution

**2.** solve the equation $\cot^{-1}x + \tan^{-1}3 = \frac{\pi}{2}$

Watch Video Solution

**3.** Solve $2\cos^{-1}x + \sin^{-1}x = \frac{2\pi}{3}$

Watch Video Solution

**4.** Prove that $\sin^{-1}\cos\left(\sin^{-1}x\right) + \cos^{-1}x\Big) = \frac{\pi}{2}, |x| \leq 1$

Watch Video Solution

**5.** If $\sin^{-1}x + \sin^{-1}y = \frac{2\pi}{3}$ and $\cos^{-1}x - \cos^{-1}y = -\frac{\pi}{3}$ then the number of values of $(x, y)$ is

Watch Video Solution

**6.** If $\left(\tan^{-1}x\right)^2 + \left(\cot^{-1}x\right)^2 = \frac{5\pi^2}{8}$ find x.

Watch Video Solution

**7.** Solve $\sec^{-1}x > \operatorname{cosec}^{-1}x$

Watch Video Solution

**8.** Solve $\tan^{-1}x > \cot^{-1}x$

Watch Video Solution

**9.** If $\alpha$ is the only real root of the equation $x^3 + bx^2 + cx + 1 = 0 (b < c)$, then the value of $\tan^{-1}\alpha + \tan^{-1}\left(\alpha^{-1}\right)$ is equal to :

Watch Video Solution

**10.** If $\alpha \in \left(-\frac{\pi}{2}, 0\right)$, then find the value of $\tan^{-1}(\cot\alpha) - \cot^{-1}(\tan\alpha)$

Watch Video Solution

**11.** Find the maximum value of $\left(\sec^{-1}x\right)\left(\operatorname{cosec}^{-1}x\right), x \geq 1$

Watch Video Solution

**12.** If equation $\sin^{-1}\left(4\sin^2\theta + \sin\theta\right) + \cos^{-1}(6\sin\theta - 1) = \frac{\pi}{2}$ has 10 solution for $\theta \in [0, n\pi]$, then find the minimum value of n

Watch Video Solution

## Concept Application Exercise 7 5

**1.** Find the value of $\sin^{-1}\left(\frac{3}{5}\right) + \tan^{-1}\left(\frac{1}{7}\right)$

Watch Video Solution

**2.** If $x > y > 0$, then find the value of $\tan^{-1}.\frac{x}{y} + \tan^{-1}\left[\frac{x+y}{x-y}\right]$

Watch Video Solution

**3.** Prove that $\tan^{-1}.\frac{1}{\sqrt{2}} + \sin^{-1}.\frac{1}{\sqrt{5}} - \cos^{-1}.\frac{1}{\sqrt{10}} = -\pi + \cot^{-1}\left(\frac{1+\sqrt{2}}{1-\sqrt{2}}\right)$

Watch Video Solution

**4.** Solve : $\frac{\tan^{-1}(x-1)}{x-2} + \frac{\tan^{-1}(x+1)}{x+2} = \frac{\pi}{4}$

Watch Video Solution

**5.** The number of real values of x satisfying $\tan^{-1}\left(\frac{x}{1-x^2}\right) + \tan^{-1}\left(\frac{1}{x^3}\right) =$

(3pi)/(4)`

Watch Video Solution

**6.** Prove the following: $2\frac{\sin^{-1}3}{5} = \frac{\tan^{-1}(24)}{7}$

Watch Video Solution

**7.** Write the following function in the simplest form:

$\tan^{-1}\left(\frac{3a^2x - x^3}{a^3 - 3ax^2}\right), a > 0; \frac{-a}{\sqrt{3}} \leq x \leq \frac{a}{\sqrt{3}}$

Watch Video Solution

**8.** Solve the equation $2\tan^{-1}(\cos x) = \tan^{-1}(2\cos ecx)$

Watch Video Solution

**9.** Solve the equations.$\tan^{-1}\left(\frac{1 - x}{1 + x}\right) = \frac{1}{2}\tan^{-1}x, (x > 0)$

Watch Video Solution

**10.** If $x + y + z = xyz$ and $x, y, z > 0$, then find the value of $\tan^{-1}x + \tan^{-1}y + \tan^{-1}z$

Watch Video Solution

**11.** If $\alpha$ and $\beta(\alpha > \beta)$ are the roots of $x^2 + kx - 1 = 0$, then find the value of $\tan^{-1}\alpha - \tan^{-1}\beta$

Watch Video Solution

**12.** Find the sum $\cot^{-1}2 + \cot^{-1}8 + \cot^{-1}18 + \ldots\infty$

Watch Video Solution

**13.** Prove that $\sum_{r=1}^{n} \tan^{-1}\left(\frac{2^{r-1}}{1 + 2^{2r-1}}\right) = \tan^{-1}\left(2^n\right) - \frac{\pi}{4}$

Watch Video Solution

## Concept Application Exercise 7 6

**1.** If $\cos^{-1}.\frac{x}{2} + \cos^{-1}.\frac{y}{3} = \frac{\pi}{6}$, then prove that $\frac{x^2}{4} - \frac{xy}{2\sqrt{3}} + \frac{y^2}{9} = \frac{1}{4}$

Watch Video Solution

**2.** Prove that : $\cos^{-1}x + \cos^{-1}\left(\frac{x}{2} + \frac{\sqrt{3 - 3x^2}}{2}\right) = \frac{\pi}{3}$

Watch Video Solution

**3.** solve the following equation

$\sec^{-1}.\frac{x}{a} - \sec^{-1}.\frac{x}{b} = \sec^{-1}b - \sec^{-1}a, a \geq 1, b \geq 1, a \neq b$

Watch Video Solution

**4.** If $a^2 + b^2 = c^2, c \neq 0$, then find the non-zero solution of the equation:

$$\sin^{-1}.\frac{ax}{c} + \sin^{-1}.\frac{bx}{c} = \sin^{-1}x$$

Watch Video Solution

**5.** If $\cos(\theta - \alpha) = a$ and $\sin(\theta - \beta) = b(0 < \theta - \alpha, \theta - \beta < \pi/2)$, then prove that

$$\cos^2(\alpha - \beta) + 2ab\sin(\alpha - \beta) = a^2 + b^2$$

Watch Video Solution

**6.** Find the value of x which satisfy equation $2\tan^{-1}2x = \sin^{-1}.\frac{4x}{1 + 4x^2}$

Watch Video Solution

**7.** If $x \in (0, 1)$, then find the value of $\tan^{-1}\left(\frac{1 - x^2}{2x}\right) + \cos^{-1}\left(\frac{1 - x^2}{1 + x^2}\right)$

Watch Video Solution

**8.** If $x \in [-1, 0)$ then find the value of $\cos^{-1}\left(2x^2 - 1\right) - 2\sin^{-1}x$

Watch Video Solution

**9.** $\sin\left(2\sin^{-1}0.8\right) =$

Watch Video Solution

## Single Correct

**1.** $\cos^{-1}\left(\cos\left(2\cot^{-1}\left(\sqrt{2} - 1\right)\right)\right)$ is equal to

A. $\sqrt{2} - 1$

B. $\frac{\pi}{4}$

C. $\frac{3\pi}{4}$

D. none of these

**Answer: C**

Watch Video Solution

**2.** The value of $\sin^{-1}\left\{\cot\left(\sin^{-1}\left(\sqrt{\frac{2-\sqrt{3}}{4}}+\cos^{-1}\left(\frac{\sqrt{12}}{4}\right)+\sec^{-1}\sqrt{2}\right)\right)\right\}$ is

A. 0

B. $\frac{\pi}{2}$

C. $\frac{\pi}{3}$

D. none of these

**Answer: A**

Watch Video Solution

**3.** If $\cot^{-1}\left(\frac{n}{\pi}\right) > \frac{\pi}{6}, n \in N$, then the maximum value of n is :

A. 6

B. 7

C. 5

D. none of these

**Answer: C**

Watch Video Solution

**4.** If $\operatorname{cosec}^{-1}(\operatorname{cosec} x)$ and $\operatorname{cosec}\left(\operatorname{cosec}^{-1} x\right)$ are equal functions, then the maximum range of value of x is

A. $\left[-\frac{\pi}{2}, -1\right] \cup \left[1, \frac{\pi}{2}\right]$

B. $\left[-\frac{\pi}{2}, 0\right) \cup \left[0, \frac{\pi}{2}\right]$

C. $(-\infty, -1] \cup [1, \infty)$

D. $[-1, 0) \cup [0, 1)$

**Answer: A**

Watch Video Solution

**5.** $\sec^2\left(\tan^{-1}2\right) + \operatorname{cosec}^2\left(\cot^{-1}3\right)$ is equal to

A. 5

B. 13

C. 15

D. 6

**Answer: C**

Watch Video Solution

**6.** The maximum value of $f(x) = \tan^{-1}\left(\frac{\left(\sqrt{12} - 2\right)x^2}{x^4 + 2x^2 + 3}\right)$ is (A) $18^\circ$ (B) $36^\circ$ (C) $22.5^\circ$ (D) $15^\circ$

A. $18^\circ$

B. $36^\circ$

C. $22.5^\circ$

D. $15^\circ$

**Answer: D**

Watch Video Solution

**7.** For the equation $\cos^{-1}x + \cos^{-1}2x + \pi = 0$ , the number of real solution is

A. 1

B. 2

C. 0

D. $\infty$

**Answer: C**

Watch Video Solution

**8.** The number of real solution of the equation $\tan^{-1}\sqrt{x^2 - 3x + 2} + \cos^{-1}\sqrt{4x - x^2 - 3} = \pi$ is

A. one

B. two

C. zero

D. infinite

**Answer: C**

Watch Video Solution

**9.** If $\sin^{-1}(x - 1) + \cos^{-1}(x - 3) + \tan^{-1}\left(\frac{x}{2 - x^2}\right) = \cos^{-1}k + \pi,$ then the value of $k$ is 1 (b) $-\frac{1}{\sqrt{2}}$ (c) $\frac{1}{\sqrt{2}}$ (d) non of these

A. 1

B. $-\frac{1}{\sqrt{2}}$

C. $\frac{1}{\sqrt{2}}$

D. none of these

**Answer: C**

Watch Video Solution

**10.** The number of real solution of the equation $\sqrt{1+\cos 2x} = \sqrt{2}\sin^{-1}(\sin x),\ -\pi \le x \le \pi$, is

A. 0

B. 1

C. 2

D. infinite

**Answer: C**

Watch Video Solution

**11.** The equation $3\cos^{-1}x - \pi x - \frac{\pi}{2} = 0$has

A. one negative solution

B. one positive solution

C. no solution

D. more than one solution

**Answer: B**

Watch Video Solution

**12.** Range of $f(x) = \sin^{-1}x + \tan^{-1}x + \sec^{-1}x$ is

A. $\left(\frac{\pi}{4}, \frac{3\pi}{4}\right)$

B. $\left[\frac{\pi}{4}, \frac{3\pi}{4}\right]$

C. $\left\{\frac{\pi}{4}, \frac{3\pi}{4}\right\}$

D. none of these

**Answer: C**

Watch Video Solution

**13.** The value of $\lim_{|x| \to \infty} \cos\left(\tan^{-1}\left(\sin\left(\tan^{-1}\right)\right)\right)$ is equal to

A. $-1$

B. $\sqrt{2}$

C. $-\frac{1}{\sqrt{2}}$

D. $\frac{1}{\sqrt{2}}$

**Answer: D**

Watch Video Solution

**14.** Find the range of $\tan^{-1}\left(\frac{2x}{1+x^2}\right)$

A. $\left[-\frac{\pi}{4}, \frac{\pi}{4}\right]$

B. $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

C. $\left(-\frac{\pi}{2}, \frac{\pi}{4}\right]$

D. $\left[\frac{\pi}{4}, \frac{\pi}{2}\right]$

**Answer: A**

Watch Video Solution

**15.** Equation $\left[\cot^{-1}x\right] + 2\left[\tan^{-1}x\right] = 0$, where $[.]$ denotes the greatest integer function, is satisfied by

A. $(0, \cot 1)$

B. $(0, \tan 1)$

C. $(\tan 1, \infty)$

D. $(\cot 1, \tan 1)$

**Answer: D**

Watch Video Solution

**16.** The number of integral values of $k$ for which the equation $\sin^{-1}x + \tan^{-1}x = 2k + 1$ has a solution is

A. 1

B. 2

C. 3

D. 4

**Answer: B**

Watch Video Solution

**17.** The range of the values of p for which the equation $\sin\cos^{-1}\left(\cos\left(\tan^{-1}x\right)\right) = p$ has a solution is

A. $\left(-\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$

B. $[0, 1)$

C. $\left(\frac{1}{\sqrt{2}}, 1\right)$

D. $(-1, 1)$

**Answer: B**

Watch Video Solution

**18.** The number of the solutions of the equation $2\sin^{-1}\sqrt{x^2+x+1} + \cos^{-1}\sqrt{x^2+x} = \frac{3\pi}{2}$ is

A. 0

B. -1

C. 1

D. 2

**Answer: D**

Watch Video Solution

**19.** complete solution set of $\tan^2\left(\sin^{-1}x\right) > 1$ is

A. $\left(-1, -\frac{1}{\sqrt{2}}\right) \cup \left(\frac{1}{\sqrt{2}}, 1\right)$

B. $\left(-\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right) \sim \{0\}$

C. $(-1, 1) \sim \{0\}$

D. none of these

**Answer: A**

Watch Video Solution

**20.** The trigonometric equation $\sin^{-1}x = 2\sin^{-1}a$ has a solution for all real values (b) $|a| < \frac{1}{a}$ $|a| \leq \frac{1}{\sqrt{2}}$ (d) $\frac{1}{2} < |a| < \frac{1}{\sqrt{2}}$

A. all real values

B. $|a| < \frac{1}{2}$

C. $|a| \leq \frac{1}{\sqrt{2}}$

D. $(1).\ (2) < |a| < \frac{1}{\sqrt{2}}$

**Answer: C**

Watch Video Solution

**21.** The number of solution of equation $\sin^{-1}x + n\sin^{-1}(1 - x) = \frac{m\pi}{2}, where n > 0, m \geq 0,$ is 3 (b) 1 (c) 2 (d) None of these

A. 3

B. 1

C. 2

D. none of these

**Answer: D**

Watch Video Solution

**22.** If $\left|\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)\right| < \frac{\pi}{3}$, then

A. $x \in \left[-\frac{1}{3}, \frac{1}{\sqrt{3}}\right]$

B. $x \in \left(-\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}\right)$

C. $x \in \left(0, \frac{1}{\sqrt{3}}\right)$

D. none of these

**Answer: B**

Watch Video Solution

**23.** The value of $\sin^{-1}(\sin 12) + \cos^{-1}(\cos 12)$ is equal to

A. zero

B. $24 - 2\pi$

C. $4\pi - 24$

D. none of these

**Answer: A**

Watch Video Solution

**24.** The value of the expression $\sin^{-1}\left(\frac{\sin(22\pi)}{7}\right)\cos^{-1}\left(\frac{\cos(5\pi)}{3}\right) + \tan^{-1}\left(\frac{\tan(5\pi)}{7}\right) + \sin^{-1}(\cos 2)$ is $\frac{17\pi}{42} - 2$ (b) $-2\ \frac{-\pi}{21} - 2$ (d) *noneofthese*

A. $\frac{17\pi}{42} - 2$

B. $-2$

C. $\frac{-\pi}{21} - 2$

D. none of these

**Answer: A**

Watch Video Solution

**25.** The value of $\sin^{-1}\left(\cos\left(\cos^{-1}(\cos x) + \sin^{-1}(\sin x)\right)\right)$, where $x \in \left(\frac{\pi}{2}, \pi\right)$, is equal to $\frac{\pi}{2}$ (b) $-\pi$ (c) $\pi$ (d) $-\frac{\pi}{2}$

A. $\frac{\pi}{2}$

B. $-\pi$

C. $\pi$

D. $-\frac{\pi}{2}$

**Answer: D**

Watch Video Solution

**26.** If $\alpha \in \left(-\frac{3\pi}{2}, -\pi\right)$, then the value of $\tan^{-1}(\cot\alpha) - \cot^{-1}(\tan\alpha) + \sin^{-1}(\sin\alpha) + \cos^{-1}(c0s\alpha)$ is equal to $2\pi + \alpha$ (b) $\pi + \alpha$ (c) 0 (d) $\pi - \alpha$

A. $2\pi + \alpha$

B. $\pi + \alpha$

C. 0

D. $\pi - \alpha$

**Answer: C**

Watch Video Solution

**27.** $\tan^{-1}\left[\frac{\cos x}{1 + \sin x}\right]$ is equal to

A. $\frac{\pi}{4} - \frac{x}{2}$, for $x \in \left(-\frac{\pi}{2}, \frac{3\pi}{2}\right)$

B. $\frac{\pi}{4} - \frac{x}{2}$, for $x \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

C. $\frac{\pi}{4}, \frac{x}{2}$, for $x \in \left(\frac{3\pi}{2}, \frac{5\pi}{2}\right)$

D. $\frac{\pi}{4} - \frac{x}{2}$, for $x \in \left(-\frac{3\pi}{2}, \frac{\pi}{2}\right)$

**Answer: A**

Watch Video Solution

**28.** If $f(x) = x^{11} + x^9 - x^7 + x^3 + 1$ and $f\left(\sin^{-1}(\sin 8) = \alpha, \alpha\right.$ is constant, then $f\left(\tan^{-1}(tan8)\right.$ is equal to $\alpha$ (b) $\alpha - 2$ (c) $\alpha + 2$ (d) $2 - \alpha$

A. $\alpha$

B. $\alpha - 2$

C. $\alpha + 2$

D. $2 - \alpha$

**Answer: D**

Watch Video Solution

**29.** If $\sin^{-1}:[-1,1] \to \left[\frac{\pi}{2}, \frac{3\pi}{2}\right]$ and $\cos^{-1}:[-1,1] \to [0,\pi]$ be two bijective functions, respectively inverse of bijective functions $\sin:\left[\frac{\pi}{2}, \frac{3\pi}{2}\right] \to [-1, 10$ and $\cos:[0,\pi] \to [-1,1]$ then $\sin^{-1}x + \cos^{-1}x$ is

A. $\frac{\pi}{2}$

B. $\pi$

C. $\frac{3\pi}{2}$

D. not a constant

**Answer: D**

Watch Video Solution

**30.** If the difference between the roots of the equation $x^2 + ax + 1 = 0$ is less than $\sqrt{5}$, then the set of possible values of a is (1) $(-3, 3)$ (2) $(-3, \infty)$ (3) $(3, \infty)$ (4) $(-\infty, -3)$

A. $(0, 1)$

B. $(-1, 1) - \{0\}$

C. $(-1, 0)$

D. $[-1, 1]$

**Answer: A**

Watch Video Solution

**31.** 'solve tan ( sin − 1 ( cos ( sin − 1 x ) ) ) tan ( cos − 1 ( sin ( cos − 1 x ) ) ) '

A. 0

B. 1

C. -1

D. none of these

**Answer: B**

Watch Video Solution

**32.** There exists a positive real number of $x$ satisfying $\cos\left(\tan^{-1}x\right) = x$.

Then the value of $\cos^{-1}\left(\frac{x^2}{2}\right)$ is $\frac{\pi}{10}$ (b) $\frac{\pi}{5}$ (c) $\frac{2\pi}{5}$ (d) $\frac{4\pi}{5}$

A. $\frac{\pi}{10}$

B. $\frac{\pi}{5}$

C. $\frac{2\pi}{5}$

D. $\frac{4\pi}{5}$

**Answer: C**

Watch Video Solution

**33.** If $\frac{\tan^{-1}\left(\sqrt{1+x^2}-1\right)}{x} = 4^0$ then $x = \tan 2^0$ (b) $x = \tan 4^0$ $x = \frac{\tan 1}{4^0}$ (d) $x = \tan 8^0$

A. $x = \tan 2^\circ$

B. $x = \tan 4^\circ$

C. $x = \tan(1/4)^\circ$

D. $x = \tan 8^\circ$

**Answer: D**

Watch Video Solution

**34.** The value of $\frac{\alpha^3}{2}\operatorname{cosec}^2\left(\frac{1}{2}\frac{\tan^{-1}\alpha}{\beta}\right) + \frac{\beta^3}{2}\sec^2\left(\frac{1}{2}\tan^{-1}\left(\frac{\beta}{\alpha}\right)\right) isequa < o$

$(\alpha + \beta)\left(\alpha^2 + \beta^2\right)$ (b) $(\alpha + \beta)\left(\alpha^2 - \beta^2\right)$ $(\alpha + \beta)\left(\alpha^2 + \beta^2\right)$ (d) none of these

A. $(\alpha - \beta)\left(\alpha^2 + \beta^2\right)$

B. $(\alpha + \beta)\left(\alpha^2 - \beta^2\right)$

C. $(\alpha + \beta)\left(\alpha^2 + \beta^2\right)$

D. none of these

**Answer: C**

Watch Video Solution

**35.** $\tan\left(\frac{\pi}{4}+\frac{1}{2}\cos^{-1}x\right)+\tan\left(\frac{\pi}{4}-\frac{1}{2}\cos^{-1}x\right), x \neq 0$ is equal to

A. $x$

B. $2x$

C. $\frac{2}{x}$

D. none of these

**Answer: C**

Watch Video Solution

**36.** If $\sin^{-1}x+\sin^{-1}y=\frac{\pi}{2}, then \frac{1+x^4+y^4}{x^2-x^2y^2+y^2}$ is equal to 1 (b) 2 (c) $\frac{1}{2}$ (d) none of these

A. 1

B. 2

C. $\frac{1}{2}$

D. none of these

**Answer: B**

Watch Video Solution

**37.** Prove that : $2\tan^{-1}\left(\operatorname{cosec}\tan^{-1}x - \tan\cot^{-1}x\right) = \tan^{-1}x$

A. $\cot^{-1}x$

B. $\cot^{-1}.\frac{1}{x}$

C. $\tan^{-1}x$

D. none of these

**Answer: C**

Watch Video Solution

**38.** If $\sin^{-1}a + \sin^{-1}b + \sin^{-1}c = \pi$, then the value of $a\sqrt{\left(1 - a^2\right)} + b\sqrt{\left(1 - b^2\right)} + \sqrt{\left(1 - c^2\right)}$ will be $2abc$ (b) $abc$ (c) $\frac{1}{2}abc$ (d) $\frac{1}{3}abc$

A. $2abc$

B. $abc$

C. $\frac{1}{2}abc$

D. $\frac{1}{3}abc$

**Answer: A**

Watch Video Solution

**39.** If $a\sin^{-1}x - b\cos^{-1}x = c$, then $a\sin^{-1}x + b\cos^{-1}$ equal to

A. 0

B. $\frac{\pi ab + c(b - a)}{a + b}$

C. $\frac{\pi}{2}$

D. $\frac{\pi ab + c(a - b)}{a + b}$

**Answer: D**

Watch Video Solution

**40.** The solution of the inequality $\log_2 \sin^{-1} x > \log_{1/2} \cos^{-1} x$ is

A. $x \in \left[0, \frac{\pi}{\sqrt{2}}\right]$

B. $x \in \left(\frac{1}{\sqrt{2}}, 1\right]$

C. $x \in \left(0, \frac{1}{\sqrt{2}}\right)$

D. none of these

**Answer: C**

Watch Video Solution

**41.** sin − 1 ( sin θ ) > π 2 − sin − 1 ( sin θ ) find the range of θ

A. $\left(\frac{\pi}{4}, \pi\right)$

B. $\left(\pi, \frac{3\pi}{2}\right)$

C. $\left(\frac{\pi}{4}, \frac{3\pi}{4}\right)$

D. $\left(\frac{3\pi}{4}, 2\pi\right)$

**Answer: C**

Watch Video Solution

**42.** If $\left|\sin^{-1}x\right| + \left|\cos^{-1}x\right| = \frac{\pi}{2}$, then $x \in$

A. R

B. $[-1, 1]$

C. $[0, 1]$

D. $\phi$

**Answer: C**

Watch Video Solution

**43.** If $\left(\sin^{-1}x\right)^2 - \left(\cos^{-1}x\right)^2 = a\pi^2$ then find the range of a

A. $\left[-\frac{3}{4}, \frac{1}{4}\right]$

B. $\left[-\frac{3}{4}, \frac{3}{4}\right]$

C. $[-1, 1]$

D. $\left[-1, \frac{3}{4}\right]$

**Answer: A**

Watch Video Solution

**44.** The number of integer $x$ satisfying $\sin^{-1}|x-2| + \cos^{-1}(1-|3-x|) = \frac{\pi}{2}$ is

1 (b) 2 (c) 3 (d) 4

A. 1

B. 2

C. 3

D. 4

**Answer: B**

Watch Video Solution

**45.** The number of solutions of the equation $\cos^{-1}\left(\frac{1+x^2}{2x}\right) - \cos^{-1}x = \frac{\pi}{2} + \sin^{-1}x$ is 0 (b) 1 (c) 2 (d) 3

A. 0

B. 1

C. 2

D. 3

**Answer: B**

Watch Video Solution

**46.** $f(x) = \tan^{-1}x + \tan^{-1}\left(\frac{1}{x}\right)$; $g(x) = \sin^{-1}x + \cos^{-1}x$ are identical functions if $x \in R$ (b) $x > 0$ (c) $x \in [-1, 1]$ (d) $x \in [0, 1]$

A. $x \in R$

B. $x > 0$

C. $x \in [-1, 1]$

D. $x \in (0, 1]$

**Answer: D**

Watch Video Solution

**47.** The value of $a$ for which $ax^2 + \sin^{-1}\left(x^2 - 2x + 2\right) + \cos^{-1}\left(x^2 - 2x + 2\right) = 1$ has a real solution is $\frac{\pi}{2}$ (b) $-\frac{\pi}{2}$ (c) $\frac{2}{\pi}$ (d) $-\frac{2}{\pi}$

A. $\frac{\pi}{2}$

B. $-\frac{\pi}{2}$

C. $\frac{2}{\pi}$

D. $-\frac{2}{\pi}$

**Answer: B**

Watch Video Solution

**48.** If $\sin^{-1}\left(\frac{5}{x}\right) + \sin^{-1}\left(\frac{12}{x}\right) = \frac{\pi}{2}$, then $x$ is equal to $\frac{7}{13}$ (b) $\frac{4}{3}$ (c) 13 (d) $\frac{13}{7}$

A. $\frac{7}{13}$

B. $\frac{4}{3}$

C. 13

D. $\frac{13}{7}$

**Answer: C**

Watch Video Solution

**49.** if $\cos^{-1}\sqrt{p} + \cos^{-1}\sqrt{1-p} + \cos^{-1}\sqrt{1-q} = \frac{3\pi}{4}$ ,then the value of q is (A) 1 (B) $\frac{1}{\sqrt{2}}$ (C) $\frac{1}{3}$ (D) $\frac{1}{2}$

A. 1

B. $\frac{1}{\sqrt{2}}$

C. $\frac{1}{3}$

D. $\frac{1}{2}$

**Answer: D**

Watch Video Solution

**50.** If $\tan^{-1}\left(\sin^2\theta - 2\sin\theta + 3\right) + \cot^{-1}\left(5^{\sec} \wedge (2y) + 1\right) = \frac{\pi}{2}$, then value of $\cos^2\theta - \sin\theta$ is equal to 0 (b) -1 (c) 1 (d) none of these

A. 0

B. -1

C. 1

D. none of these

**Answer: C**

Watch Video Solution

**51.** The product of all values of $x$ satisfying the equation $\sin^{-1}\cos\left(\frac{2x^2 + 10|x| + 4}{x^2 + 5|x| + 3}\right) = \cot\left(\cot^{-1}\left(\frac{2 - 18|x|}{9|x|}\right)\right) + \frac{x}{2} is$ 9 (b) -9 (c) -3 (d) -1

A. 9

B. -9

C. -3

D. -1

**Answer: A**

Watch Video Solution

**52.** The exhaustive set of values of a for which $a - \cot^{-1}3x = 2\tan^{-1}3x + \cos^{-1}x\sqrt{3} + \sin^{-1}x\sqrt{3}$ may have solution, is

A. $\left[-\frac{\pi}{4}, \frac{\pi}{4}\right]$

B. $\left(\frac{\pi}{2}, \frac{3\pi}{2}\right)$

C. $\left[\frac{2\pi}{3}, \frac{4\pi}{3}\right]$

D. $\left[-\frac{3\pi}{6}, \frac{7\pi}{6}\right]$

**Answer: C**

Watch Video Solution

Watch Video Solution

**53.** If $u = \cot^{-1}\sqrt{\tan\alpha} - \tan^{-1}\sqrt{\tan\alpha}$, then $\tan\left(\frac{\pi}{4} - \frac{u}{2}\right)$ is equal to (a) $\sqrt{\tan\alpha}$ (b) $\sqrt{\cos\alpha}$ (c) $\tan\alpha$ (d) $\cot\alpha$

A. $\sqrt{\tan\alpha}$

B. $\sqrt{\cot\alpha}$

C. $\tan\alpha$

D. $\cot\alpha$

**Answer: A**

Watch Video Solution

**54.** The solution set of the equation

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

A. $[-1, 1] - \{0\}$

B. $(0, 1] \cup \{-1\}$

C. $[-1, 0) \cup \{1\}$

D. $[-1, 1]$

**Answer: C**

Watch Video Solution

**55.** the value of $\cos^{-1}\sqrt{\frac{2}{3}} - \cos^{-1}\left(\frac{\sqrt{6}+1}{2\sqrt{3}}\right)$ is equal to:

A. $\frac{\pi}{3}$

B. $\frac{\pi}{4}$

C. $\frac{\pi}{2}$

D. $\frac{\pi}{6}$

**Answer: D**

Watch Video Solution

**56.** $\theta = \tan^{-1}\left(2\tan^2\theta\right) - \tan^{-1}\left(\frac{1}{3}\tan\theta\right)$ then $\tan\theta =$

A. $-2$

B. $-1$

C. $2/3$

D. $2$

**Answer: A**

Watch Video Solution

**57.** If $y = \tan^{-1}.\frac{1}{2} + \tan^{-1}b, (0b < 1)$ and $0 < y \leq \frac{\pi}{4}$, then the maximum value of b is

A. $1/2$

B. $1/3$

C. $1/4$

D. $2/3$

**Answer: B**

Watch Video Solution

**58.** If $x, y, z$ are natural numbers such that $\cot^{-1}x + \cot^{-1}y = \cot^{-1}z$ then the number of ordered triplets $(x, y, z)$ that satisfy the equation is 0 (b) 1 (c) 2 (d) Infinite solutions

A. 0

B. 1

C. 2

D. Infinite solution

**Answer: D**

Watch Video Solution

**59.** The value of $\alpha$ such that $\frac{\sin^{-1}2}{\sqrt{5}}, \frac{\sin^{-1}3}{\sqrt{10}}, \sin^{-1}\alpha$ are the angles of a triangle is $\frac{-1}{\sqrt{2}}$ (b) $\frac{1}{2}$ (c) $\frac{1}{\sqrt{3}}$ (d) $\frac{1}{\sqrt{2}}$

A. $\frac{-1}{\sqrt{2}}$

B. $\frac{1}{2}$

C. $\frac{1}{\sqrt{3}}$

D. $\frac{1}{\sqrt{2}}$

**Answer: D**

Watch Video Solution

**60.** The number of solution of the equation $\tan^{-1}(1+x)+\tan^{-1}(1-x)=\frac{\pi}{2}$ is

A. 2

B. 3

C. 1

D. 0

**Answer: C**

Watch Video Solution

**61.** Arithmetic mean of the non-zero solutions of the equation

$$\tan^{-1}\left(\frac{1}{2x+1}\right)+\tan^{-1}\left(\frac{1}{4x+1}\right)=\tan^{-1}\left(\frac{2}{x^2}\right)$$

A. 2

B. 3

C. 4

D. none of these

**Answer: B**

Watch Video Solution

**62.** If $\cot^{-1}x + \cot^{-1}y + \cot^{-1}z = \frac{\pi}{2}, x, y, z > 0 and xy < 1,$ then $x + y + z$ is also equal to $\frac{1}{x} + \frac{1}{y} + \frac{1}{z}$ (b) $xyz$ $xy + yz + zx$ (d) none of these

A. $\frac{1}{x} + \frac{1}{y} + \frac{1}{z}$

B. $xyz$

C. $xy + yz + zx$

D. none of these

**Answer: B**

Watch Video Solution

**63.** If $x^2 + y^2 + z^2 = r^2, then \tan^{-1}\left(\frac{xy}{zr}\right) + \tan^{-1}\left(\frac{yz}{xr}\right) + \tan^{-1}\left(\frac{xz}{yr}\right)$ is equal to

(a) $\pi$

(b) $\frac{\pi}{2}$

(c) 0

(d) none of these

A. $\pi$

B. $\frac{\pi}{2}$

C. 0

D. none of these

**Answer: B**

Watch Video Solution

**64.** The value of $\tan^{-1}\left(\frac{x\cos\theta}{1 - x\sin\theta}\right) - \cot^{-1}\left(\frac{\cos\theta}{x - \sin\theta}\right) is$

A. $2\theta$

B. $\theta$

C. $\theta/2$

D. independent of $\theta$

**Answer: B**

Watch Video Solution

**65.** if $\cot^{-1}\left[\sqrt{\cos\alpha}\right] - \tan^{-1}\left[\sqrt{\cos\alpha}\right] = x$ then $\sin x$ is equal to

A. $\tan^2.\ \frac{\alpha}{2}$

B. $\cot^2.\ \frac{\alpha}{2}$

C. $\tan\alpha$

D. $\cot.\ \frac{\alpha}{2}$

**Answer: A**

Watch Video Solution

**66.** $\sum_{r=1}^{n} \sin^{-1}\left(\frac{\sqrt{r} - \sqrt{r-1}}{\sqrt{r}(r+1)}\right)$ is equal to

A. $\tan^{-1}\left(\sqrt{n}\right) - \frac{\pi}{4}$

B. $\tan^{-1}\left(\sqrt{n+1}\right) - \frac{\pi}{4}$

C. $\tan^{-1}\left(\sqrt{n}\right)$

D. $\tan^{-1}\left(\sqrt{n+1}\right)$

**Answer: C**

Watch Video Solution

**67.** $\sum_{m=1}^{n} \tan^{-1}\left(\frac{2m}{m^4+m^2+2}\right)$ is equal to

A. $\tan^{-1}\left(\frac{n^2+n}{n^2+n+2}\right)$

B. $\tan^{-1}\left(\frac{n^2-n}{n^2-n+2}\right)$

C. $\tan^{-1}\left(\frac{n^2+n+2}{n^2+n}\right)$

D. none of these

**Answer: A**

Watch Video Solution

**68.** The value of $\tan^{-1}.\frac{4}{7}+\tan^{-1}.\frac{4}{19}+\tan^{-1}.\frac{4}{39}+\tan^{-1}.\frac{4}{67}...\infty$ equals

A. $\tan^{-1}1+\tan^{-1}.\frac{1}{2}+\tan^{-1}.\frac{1}{3}$

B. $\tan^{-1}1+\cot^{-1}3$

$\cot^{-1}+\cot^{-1}.\frac{1}{2}+\cot^{-1}.\frac{1}{3}$

C. $\cot^{-1}1+\cot^{-1}.\frac{1}{2}+\cot^{-1}.\frac{1}{3}$

D. $\cot^{-1}1+\tan^{-1}3$

**Answer: B**

Watch Video Solution

**69.** The sum of series $\sec^{-1}\sqrt{2}+\frac{\sec^{-1}\left(\sqrt{10}\right)}{3}+\frac{\sec^{-1}\left(\sqrt{50}\right)}{7}++\sec^{-1}\sqrt{\frac{\left(n^2+1\right)\left(n^2-2n+2\right)}{\left(n^2-n+1\right)^2}}$ is

$\tan^{-1}1$ (b) $n\tan^{-1}(n+1)$ (d) $\tan^{-1}(n-1)$

A. $\tan^{-1}1$

B. $\tan^{-1}n$

C. $\tan^{-1}(n+1)$

D. $\tan^{-1}(n-1)$

**Answer: B**

Watch Video Solution

**70.** If $\frac{1}{2}\sin^{-1}\left[\frac{3\sin 2\theta}{5+4\cos 2\theta}\right] = \tan^{-1}x,$ then $x =$

A. $\tan 3\theta$

B. $3\tan\theta$

C. $(1/3)\tan\theta$

D. $3\cot\theta$

**Answer: C**

Watch Video Solution

**71.** The value $2\tan^{-1}\left[\sqrt{\frac{a-b}{a+b}\frac{\tan\theta}{2}}\right]$ is equal to $\cos^{-1}\left(\frac{a\cos\theta+b}{a+b\cos\theta}\right)$ (b) $\cos^{-1}\left(\frac{a+b\cos\theta}{a\cos\theta+b}\right)$ $\cos^{-1}\left(\frac{a\cos\theta}{a+b\cos\theta}\right)$ (d) $\cos^{-1}\left(\frac{b\cos\theta}{a\cos\theta+b}\right)$

A. $\cos^{-1}\left(\frac{a\cos\theta+b}{a+b\cos\theta}\right)$

B. $\cos^{-1}\left(\frac{a+b\cos\theta}{a\cos\theta+b}\right)$

C. $\cos^{-1}\left(\frac{a\cos\theta}{a+b\cos\theta}\right)$

D. $\cos^{-1}\left(\frac{b\cos\theta}{a\cos\theta+b}\right)$

**Answer: A**

Watch Video Solution

**72.** If $\sin^{-1}\left(\frac{2a}{1+a^2}\right)+\sin^{-1}\left(\frac{2b}{1+b^2}\right)=2\tan^{-1}x$ then $x=$

A. $\frac{a-b}{1+ab}$

B. $\frac{b}{1+ab}$

C. $\frac{b}{1-ab}$

D. $\frac{a+b}{1-ab}$

**Answer: D**

Watch Video Solution

**73.** If $3\sin^{-1}\left(\frac{2x}{1+x^2}\right)-4\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)+2\tan^{-1}\left(\frac{2x}{1-x^2}\right)=\frac{\pi}{3}$, then $x$ is equal to $\frac{1}{\sqrt{3}}$ (b) $-\frac{1}{\sqrt{3}}$ (c) $\sqrt{3}$ (d) $-\frac{\sqrt{3}}{4}$

A. $\frac{1}{\sqrt{3}}$

B. $-\frac{1}{\sqrt{3}}$

C. $\sqrt{3}$

D. $-\frac{\sqrt{3}}{4}$

**Answer: A**

Watch Video Solution

**74.** If $x_1 = 2\tan^{-1}\left(\frac{1+x}{1-x}\right), x_2 = \sin^{-1}\left(\frac{1-x^2}{1+x^2}\right)$, where $x \in (0, 1)$, then $2(x_1 + x_2)$ is equal to

A. 0

B. $2\pi$

C. $\pi$

D. none of these

**Answer: C**

Watch Video Solution

**75.** If the equation `x^3+b x^2+c x+1=0,(b

A. $-\pi$

B. $-\frac{\pi}{2}$

C. $\frac{\pi}{2}$

D. $\pi$

**Answer: A**

Watch Video Solution

**76.** The value of $\sin^{-1}\left[x\sqrt{1-x}-\sqrt{x}\sqrt{1-x^2}\right]$ is equal to

A. $\sin^{-1}x+\sin^{-1}\sqrt{x}$

B. $\sin^{-1}x-\sin^{-1}\sqrt{x}$

C. $\sin^{-1}\sqrt{x}-\sin^{-1}x$

D. none of these

**Answer: B**

Watch Video Solution

**77.** If $\cos^{-1}x - \cos^{-1}\left(\frac{y}{2}\right) = \alpha$ then $4x^2 - 4xy\cos\alpha + y^2 =$

A. 4

B. $2\sin^2\alpha$

C. $-4\sin^2\alpha$

D. $4\sin^2\alpha$

**Answer: D**

Watch Video Solution

**78.** If

$\sin^{-1}x + \sin^{-1}y + \sin^{-1}z = \pi, then x^4 + y^2 + z^4 + 4x^2y^2z^2 = K\left(x^2y^2 + y^2z^2 + z^2x^2\right)$

where $K$ is equal to 1 (b) 2 (c) 4 (d) none of these

A. 1

B. 2

C. 4

D. none of these

**Answer: B**

Watch Video Solution

**79.** If $f(x) = \sin^{-1}\left(\frac{\sqrt{3}}{2}x - \frac{1}{2}\sqrt{1 - x^2}\right), -\frac{1}{2} \leq x \leq 1, then f(x)$ is equal to $\sin^{-1}\left(\frac{1}{2}\right) - \sin^{-1}(x)$ $\sin^{-1}x - \frac{\pi}{6}$ $\sin^{-1}x + \frac{\pi}{6}$ (d) none of these

A. $\sin^{-1}\left(\frac{1}{2}\right) - \sin^{-1}(x)$

B. $\sin^{-1}x - \frac{\pi}{6}$

C. $\sin^{-1}x + \frac{\pi}{6}$

D. none of these

**Answer: B**

Watch Video Solution

**80.** If $2^{2\pi/\sin^{(-1)}x} - 2(a+2)^{\pi/\sin^{(-1)}x} + 8a < 0$ for at least one real $x$, then

A. $\frac{1}{8} \leq a \leq 2$

B. $a \leq 2$

C. $a \in R - \{2\}$

D. $a \in \left[0, \frac{1}{8}\right) \cup (2, \infty)$

**Answer: D**

Watch Video Solution

## Multiple Correct Answer Type

**1.** If $\alpha, \beta(\alpha < \beta)$ are the roots of the equation $6x^2 + 11x + 3 = 0$, then which of the following are real ?

A. $\cos^{-1}\alpha$

B. $\sin^{-1}\beta$

C. $\operatorname{cosec}^{-1}\alpha$

D. Both $\cot^{-1}\alpha$ and $\cot^{-1}\beta$

**Answer: B::C::D**

Watch Video Solution

**2.** $2\tan^{-1}(-2)$ is equal to

A. $-\cos^{-1}\left(\frac{-3}{5}\right)$

B. $-\pi + \cos^{-1}.\frac{3}{5}$

C. $-\frac{\pi}{2} + \tan^{-1}\left(-\frac{3}{4}\right)$

D. $-\pi + \cot^{-1}\left(-\frac{3}{4}\right)$

**Answer: A::B::C**

Watch Video Solution

**3.** Which of the following is/are the value of $\cos\left[\frac{1}{2}\cos^{-1}\left(\cos\left(-\frac{14\pi}{5}\right)\right)\right]$?

A. $\cos\left(-\frac{7\pi}{5}\right)$

B. $\sin\left(\frac{\pi}{10}\right)$

C. $\cos\left(\frac{2\pi}{5}\right)$

D. $-\cos\left(\frac{3\pi}{5}\right)$

**Answer: B::C::D**

Watch Video Solution

**4.** Which of the following is not a rational number. a. $\sin\left(\tan^{-1}3 + \tan^{-1}.\frac{1}{3}\right)$ b.$\cos\left(\frac{\pi}{2} - \sin^{-1}.\frac{3}{4}\right)$ c.$\tan\left(\frac{1}{2}\cos^{-1}.\frac{\sqrt{5}}{3}\right)$

A. $\sin\left(\tan^{-1}3 + \tan^{-1}.\frac{1}{3}\right)$

B. $\cos\left(\frac{\pi}{2} - \sin^{-1}.\frac{3}{4}\right)$

C. $\log_2\left(\sin\left(\frac{1}{4}\sin^{-1}.\frac{\sqrt{63}}{8}\right)\right)$

D. $\tan\left(\frac{1}{2}\cos^{-1}.\frac{\sqrt{5}}{3}\right)$

**Answer: A::B::C**

Watch Video Solution

**5.** Which of the following quantities is/are positive ? a.$\cos\left(\tan^{-1}(\tan 4)\right)$ b. $\sin\left(\cot^{-1}(\cot 4)\right)$ c.$\tan\left(\cos^{-1}(\cos 5)\right)$ d.$\cot\left(\sin^{-1}(\sin 4)\right)$

A. $\cos\left(\tan^{-1}(\tan 4)\right)$

B. $\sin\left(\cot^{-1}(\cot 4)\right)$

C. $\tan\left(\cos^{-1}(\cos 5)\right)$

D. $\cot\left(\sin^{-1}(\sin 4)\right)$

**Answer: A::B::C**

Watch Video Solution

**6.** If $x < 0, then \tan^{-1}x$ is equal to $-\pi + \frac{\cot^{-1}1}{x}$ (b) $\frac{\sin^{-1}x}{\sqrt{1+x^2}}$ $-\frac{\cos^{-1}1}{\sqrt{1+x^2}}$ (d) $-\operatorname{cosec}^{-1}\frac{\sqrt{1+x^2}}{x}$

A. $-\pi + \cot^{-1}.\frac{1}{x}$

B. $\sin^{-1}.\frac{x}{\sqrt{1+x^2}}$

C. $-\cos^{-1}.\frac{1}{\sqrt{1+x^2}}$

D. $-\operatorname{cosec}^{-1}.\frac{\sqrt{1+x^2}}{x}$

**Answer: A::B::C**

Watch Video Solution

**7.** If $-1 < x < 0$, then $\cos^{-1}x$ is equal to

A. $\sec^{-1}.\frac{1}{x}$

B. $\pi - \sin^{-1}\sqrt{1-x^2}$

C. $\pi + \tan^{-1}.\frac{\sqrt{1-x^2}}{x}$

D. $\cot^{-1}.\frac{x}{\sqrt{1-x^2}}$

**Answer: A::B::C::D**

Watch Video Solution

**8.** If $\left(\sin^{-1}x + \sin^{-1}w\right)\left(\sin^{-1}y + \sin^{-1}z\right) = \pi^2$, then $D = \left|x^{N_1}y^{N_3}z^{N_3}w^{N_4}\right|\left(N_1, N_2, N_3, N_4 \in N\right)$ has a maximum value of 2 has a maximum value of 0 16 different D are possible has a minimum value of -2

A. has a maximum value of 2

B. has a minimum value of 0

C. 16 different D are possible

D. has a minimum value of -2

**Answer: A::C::D**

Watch Video Solution

**9.** Indicate the relation which can hold in their respective domain for infinite values of $x$ $\tan\left|\tan^{-1}x\right| = |x|$ (b) $\cot\left|\cot^{-1}x\right| = |x|$ $\tan^{-1}|\tan x| = |x|$ (d) $\sin\left|\sin^{-1}x\right| = |x|$

A. $\tan\left|\tan^{-1}x\right| = |x|$

B. $\cot\left|\cot^{-1}x\right| = |x|$

C. $\tan^{-1}|\tan x| = |x|$

D. $\sin\left|\sin^{-1}x\right| = |x|$

**Answer: A::B::C::D**

Watch Video Solution

**10.** If $\cot^{-1}\left(\frac{n^2 - 10n + 21 \cdot 6}{\pi}\right) > \frac{\pi}{6}, n \in N$, then find the minimum value of n.

A. 3

B. 2

C. 4

D. 8

**Answer: A::C**

Watch Video Solution

**11.** If $z = \sec^{-1}\left(x + \frac{1}{x}\right) + \sec^{-1}\left(y + \frac{1}{y}\right)$, where $xy < 0$, then the possible value of z is (are)

A. $\frac{8\pi}{10}$

B. $\frac{7\pi}{10}$

C. $\frac{9\pi}{10}$

D. $\frac{21\pi}{20}$

**Answer: C::D**

Watch Video Solution

**12.** The value of $k(k > 0)$ such that the length of the longest interval in which the function $f(x) = \sin^{-1}|\sin kx| + \cos^{-1}(\cos kx)$ is constant is $\frac{\pi}{4}$ is/ are

8 (b) 4 (c) 12 (d) 16

A. 8

B. 4

C. 12

D. 16

**Answer: B**

Watch Video Solution

**13.** Which of the following pairs of function/functions has same graph?

$y = \tan\left(\cos^{-1}x\right); y = \frac{\sqrt{1 - x^2}}{x}$ $y = tan\left(\cot^{-1}x\right); y = \frac{1}{x}$

$y = \sin\left(\tan^{-1}x\right); y = \frac{x}{\sqrt{1 + x^2}}$ $y = \cos\left(\tan^{-1}x\right); y = \sin\left(\cot^{-1}x\right)$

A. $y = \tan\left(\cos^{-1}x\right), y = \frac{\sqrt{1 - x^2}}{x}$

B. $y = \tan\left(\cot^{-1}x\right), y = \frac{1}{x}$

C. $y = \sin\left(\tan^{-1}x\right), y = \frac{x}{\sqrt{1 + x^2}}$

D. $y = \cos\left(\tan^{-1}x\right), y = \sin\left(\cot^{-1}x\right)$

**Answer: A::B::C::D**

Watch Video Solution

**14.** If sin −1 x+sin −1 y+sin −1 z=π, prove that x 1−x 2 +y 1−y 2 +z 1−z 2 =2xyz.

A. $x = \frac{\pi}{8} + \sqrt{\frac{1}{2} - \frac{\pi^2}{64}}$

B. $y = \sqrt{\frac{1}{2} - \frac{\pi^2}{64}} - \frac{\pi}{12}$

C. $x = \frac{\pi}{12} + \sqrt{\frac{1}{2} - \frac{\pi^2}{64}}$

D. $y = \sqrt{\frac{1}{2} - \frac{\pi^2}{64}} - \frac{\pi}{8}$

**Answer: A::D**

Watch Video Solution

**15.** If $\cos^{-1}x + \cos^{-1}y + \cos^{-1}z = \pi$, then $xy + yz + zx$ is equal to

A. $x^2 + y^2 + z^2 + 2xyz = 1$

B. $2\left(\sin^{-1}x + \sin^{-1}y + \sin^{-1}z\right) = \cos^{-1}x + \cos^{-1}y + \cos^{-1}z$

C. $xy + yz + zx = x + y + z - 1$

D. $\left(x + \frac{1}{x}\right) + \left(y + \frac{1}{y}\right) + \left(z + \frac{1}{z}\right) > 6$

**Answer: A::B**

Watch Video Solution

**16.** If $\sin^{-1}\left(a - \frac{a^2}{3} + \frac{a^3}{9} - \ldots\right) + \cos^{-1}\left(1 + b + b^2 + \ldots\right) = \frac{\pi}{2}$ then find $a$ and $b$

A. $b = \frac{2a - 3}{3a}$

B. $b = \frac{3a - 2}{2a}$

C. $a = \frac{3}{2 - 3b}$

D. $a = \frac{2}{3 - 2b}$

**Answer: A::C**

Watch Video Solution

**17.** If $\tan^{-1}\left(x^2 + 3|x| - 4\right) + \cot^{-1}\left(4\pi + \sin^{-1}s \in 14\right) = \frac{\pi}{2}$, *then* the value of $\sin^{-1}2x$ is 6 - $2\pi$ (b) $2\pi$ - 6 $\pi$ - 3 (d) 3 - $\pi$

A. 6 - $2\pi$

B. $2\pi$ - 6

C. $\pi$ - 3

D. 3 - $\pi$

**Answer: A::B**

Watch Video Solution

**18.** If $2\tan^{-1}x + \sin^{-1}\left(\frac{2x}{1 + x^2}\right)$ is independent of x then :

A. $x > 1$

B. $x < -1$

C. $0 < x < 1$

D. $-1 < x < 0$

**Answer: A::B**

Watch Video Solution

**19.** If $\alpha = \tan^{-1}\left(\frac{4x - 4x^3}{1 - 6x^2 + x^2}\right), \beta = 2\sin^{-1}\left(\frac{2x}{1 + x^2}\right)$ and $\frac{\tan\pi}{8} = k,$ then

$\alpha + \beta = \pi f$ or $x \in \left[\frac{1, 1}{k}\right]$ $\alpha + \beta f$ or $x \in (-k, k)$ $\alpha + \beta = \pi f$ or $x \in \left[\frac{1, 1}{k}\right]$

$\alpha + \beta = 0f$ or $x \in [-k, k]$

A. $\alpha + \beta = \pi$ for $x \in \left[1, \frac{1}{k}\right)$

B. $\alpha = \beta$ for $x \in (-k, k)$

C. $\alpha + \beta = -\pi$ for $x \in \left[1, \frac{1}{k}\right)$

D. $\alpha + \beta = 0$ for $x \in (-k, k)$

**Answer: A::B**

Watch Video Solution

**20.** $2\tan\left(\tan^{-1}(x) + \tan^{-1}\left(x^3\right)\right)$, $where x \in R - \{-1, 1\}$, is equal to $\frac{2x}{1 - x^2}$

$t\left(2\tan^{-1}x\right)$ $\tan\left(\cot^{-1}(-x) - \cot^{-1}(x)\right)$ $\tan\left(2\cot^{-1}x\right)$

A. $\frac{2x}{1 - x^2}$

B. $\tan\left(2\tan^{-1}x\right)$

C. $\tan\left(\cot^{-1}(-x) - \cot^{-1}x\right)$

D. $\tan\left(2\cot^{-1}x\right)$

**Answer: A::B::C**

Watch Video Solution

**21.** Let $\alpha = som^{-1}\left(\frac{36}{85}\right), \beta = \cos^{-1}\left(\frac{4}{5}\right) and \gamma = \tan^{-1}\left(\frac{8}{15}\right)$ then

$\cot\alpha + \cot\beta + \cot\gamma = \cot\alpha\cot\beta\cot\gamma$ $\tan\alpha\tan\beta + \tan\beta\tan\gamma + \tan\alpha\tan\gamma = 1$

$\tan\alpha + \tan\beta + \tan\gamma = \tan\alpha\tan\beta\tan\gamma$ $\cot\alpha\cot\beta + \cot\beta\cot\gamma + \cot\alpha\cot\gamma = 1$

A. $\cot\alpha + \cot\beta + \cot\gamma = \cot\alpha\cot\beta\cot\gamma$

B. $\tan\alpha\tan\beta + \tan\beta\tan\gamma + \tan\alpha\tan\gamma = 1$

C. $\tan\alpha + \tan\beta + \tan\gamma = \tan\alpha\tan\beta\tan\gamma$

D. $\cot\alpha\cot\beta + \cot\beta\cot\gamma + \cot\alpha\cot\gamma = 1$

**Answer: A::B**

Watch Video Solution

**22.** If $S_n = \cot^{-1}(3) + \cot^{-1}(7) + \cot^{-1}(13) + \cot^{-1}(21) + \ldots.., n$ terms, then

A. $S_{10} = \tan^{-1}.\frac{5}{6}$

B. $S_{\infty} = \frac{\pi}{4}$

C. $S_6 = \sin^{-1}.\frac{4}{5}$

D. $S_{20} = \cot^{-1}1.1$

**Answer: A::B::D**

Watch Video Solution

**23.** Equation $1 + x^2 + 2x\sin\left(\cos^{-1}y\right) = 0$ is satisfied by exactly one value of $x$ exactly two value of $x$ exactly one value of $y$ exactly two value of $y$

A. exactly one value of x

B. exactly two values of x

C. exactly one value of y

D. exactly two values of y

**Answer: A::C**

Watch Video Solution

**24.** To the equation $2^{2\pi/\cos^{(-1)}x} - \left(a + \frac{1}{2}\right)2^{\pi/\cos^{(-1)}x} - a^2 = 0$ has only one real root, then $1 \leq a \leq 3$ (b) $a \geq 1$ $a \leq -3$ (d) $a \geq 3$

A. $1 \leq a \leq 3$

B. $a \geq 1$

C. $a \leq -3$

D. $a \geq 3$

**Answer: B::C**

Watch Video Solution

## Linked Comprehension Type

**1.** For $x, y, z, t \in R$, $\sin^{-1}x + \cos^{-1}y + \sec^{-1}z \geq t^2 - \sqrt{2\pi t} + 3\pi$

The value of $x + y + z$ is equal to

A. 1

B. 0

C. 2

D. -1

**Answer: D**

Watch Video Solution

**2.** For $x, y, z, t \in R$, $\sin^{-1}x + \cos^{-1}y + \sec^{-1}z \geq t^2 - \sqrt{2\pi t} + 3\pi$

The principal value of $\cos^{-1}\left(\cos 5t^2\right)$ is

A. $\frac{3\pi}{2}$

B. $\frac{\pi}{2}$

C. $\frac{\pi}{3}$

D. $\frac{2\pi}{3}$

**Answer: B**

Watch Video Solution

**3.** For $x, y, z, t \in R$, $\sin^{-1}x + \cos^{-1}y + \sec^{-1}z \geq t^2 - \sqrt{2\pi t} + 3\pi$

The value of $\cos^{-1}(\min\{x, y, z\})$ is

A. 0

B. $\frac{\pi}{2}$

C. $\pi$

D. $\frac{\pi}{3}$

**Answer: C**

Watch Video Solution

**4.** If $ax + b\sec\left(\tan^{-1}x\right) = c$ and $ay + b\sec\left(\tan^{-l}y\right) = c$, then $\frac{x+y}{1-xy}$ is equal to

A. $\frac{2ab}{a^2 - b^2}$

B. $\frac{c^2 - b^2}{a^2 - b^2}$

C. $\frac{c^2 - b^2}{a^2 + b^2}$

D. none of these

**Answer: B**

Watch Video Solution

**5.** If $ax + b\sec\left(\tan^{-1}x\right) = c$ and $ay + b\sec\left(\tan^{-l}y\right) = c$, then $\frac{x + y}{1 - xy}$ is equal to

A. $\frac{2ac}{a^2 - b^2}$

B. $\frac{c^2 - b^2}{a^2 - b^2}$

C. $\frac{c^2 - b^2}{a^2 + b^2}$

D. none of these

**Answer: A**

Watch Video Solution

**6.** If $ax + b\sec\left(\tan^{-1}x\right) = c$ and $ay + b\sec\left(\tan^{-l}y\right) = c$, then $\frac{x+y}{1-xy}$ is equal to

A. $\frac{2ab}{a^2 - c^2}$

B. $\frac{2ac}{a^2 - c^2}$

C. $\frac{c^2 - b^2}{a^2 + b^2}$

D. none of these

**Answer: B**

Watch Video Solution

**7.** Consider the system of equations $\cos^{-1}x + \left(\sin^{-1}y\right)^2 = \frac{p\pi^2}{4}$ and $\left(\cos^{-1}x\right)\left(\sin^{-1}y\right)^2 = \frac{\pi^4}{16}, p \in Z$

The value of p for which system has a solution is

A. 1

B. 2

C. 0

D. -1

**Answer: B**

Watch Video Solution

**8.** If $n \in N$ and the set of equations, $\left(\sin^{-1}y\right)^2 + \left(\cos^{-1}x\right) = \frac{n\pi^2}{4}$ and $\left(\sin^{-1}y\right)^2 - \left(\cos^{-1}x\right) = \frac{\pi^2}{16}$ is consistent,then n can be equal to-

A. $\cos. \frac{\pi^2}{8}$

B. $\sin. \frac{\pi^2}{4}$

C. $\cos. \frac{\pi^2}{2}$

D. none of these

**Answer: D**

Watch Video Solution

**9.** If $n \in N$ and the set of equations, $\left(\sin^{-1}y\right)^2 + \left(\cos^{-1}x\right) = \frac{n\pi^2}{4}$ and $\left(\sin^{-1}y\right)^2 - \left(\cos^{-1}x\right) = \frac{\pi^2}{16}$ is consistent,then n can be equal to-

A. 1

B. $-1$

C. $\frac{1}{2}$

D. none of these

**Answer: C**

Watch Video Solution

**10.** Let $\cos^{-1}\left(4x^3 - 3x\right) = a + b\cos^{-1}x$

If $x \in \left[-1, -\frac{1}{2}\right)$, then the value of $a + b\pi$ is

A. $2\pi$

B. $3\pi$

C. $\pi$

D. $-2\pi$

**Answer: C**

Watch Video Solution

**11.** Let $\cos^{-1}\left(4x^3 - 3x\right) = a + b\cos^{-1}x$

If $x \in \left[-1, -\frac{1}{2}\right)$, then the value of $a + b\pi$ is

A. $-\frac{\pi}{3}$

B. $\frac{\pi}{3}$

C. $-\frac{\pi}{6}$

D. $\frac{\pi}{6}$

**Answer: A**

Watch Video Solution

**12.** Let $\cos^{-1}\left(4x^3 - 3x\right) = a + b\cos^{-1}x$

If $x \in \left(\frac{1}{2}, 1\right]$, then the value of $\lim y \to ab\cos(y)$ is

A. $-1/3$

B. $-3$

C. $\frac{1}{3}$

D. 3

**Answer: D**

Watch Video Solution

**13.** Let $a = \cos^{-1}\cos 20$, $b = \cos^{-1}\cos 30$ and $c = \sin^{-1}\sin(a + b)$ then

The largest integer x for which $\sin^{-1}(\sin x) \geq |x - (a + b + c)|$ is

A. 1

B. 2

C. 3

D. 4

**Answer: C**

Watch Video Solution

**14.** Let $a = \cos^{-1}\cos 20$, $b = \cos^{-1}\cos 30$ and $c = \sin^{-1}\sin(a + b)$ then

If $5\sec^{-1}x + 10\sin^{-1}y = 10(a + b + c)$ then the value of $\tan^{-1}x + \cos^{-1}(y - 1)$

is

A. $\frac{\pi}{2}$

B. $\frac{\pi}{4}$

C. $\pi$

D. 0

**Answer: B**

Watch Video Solution

**15.** Consider the function $f(x) = \sin^{-1}x$, having principal value branch $\left[\frac{\pi}{2}, \frac{3\pi}{2}\right]$ and $g(x) = \cos^{-1}x$, having principal value brach $[0, \pi]$

The value of $f(\sin 10)$ is

A. $10 - 3\pi$

B. $10 - 2\pi$

C. $10 - \frac{5\pi}{2}$

D. $\frac{7\pi}{2} - 10$

**Answer: B**

Watch Video Solution

**16.** Consider the function $f(x) = \sin^{-1}x$, having principal value branch $\left[\frac{\pi}{2}, \frac{3\pi}{2}\right]$ and $g(x) = \cos^{-1}x$, having principal value brach $[0, \pi]$

For $\sin^{-1}x < \frac{3\pi}{4}$, solution set of x is

A. $\left(\frac{1}{\sqrt{2}}, 1\right]$

B. $\left(-\frac{1}{\sqrt{2}}, -1\right]$

C. $\left[-\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right]$

D. $[-1, 1]$

**Answer: A**

Watch Video Solution

## Matrix Match Type

**1.** Match the following List I to List II

| List I | List II |
|---|---|
| **a.** $\sin^{-1}\frac{4}{5}+2\tan^{-1}\frac{1}{3}=$ | **p.** $\pi/6$ |
| **b.** $\sin^{-1}\frac{12}{13}+\cos^{-1}\frac{4}{5}+\tan^{-1}\frac{63}{16}=$ | **q.** $\pi/2$ |
| **c.** If $A=\tan^{-1}\frac{x\sqrt{3}}{2\lambda-x}$ and $B=\tan^{-1}\left(\frac{2x-\lambda}{\lambda\sqrt{3}}\right)$ then the value of $A-B$ is, | **r.** $\pi/4$ |
| **d.** $\tan^{-1}\frac{1}{7}+2\tan^{-1}\frac{1}{3}=$ | **s.** $\pi$ |

Watch Video Solution

**2.** Match the following lists :

| List I | List II |
|---|---|
| **a.** Number of roots of the equation $\sin^{-1}(\sin x) = \frac{x}{4}$ is | **p.** 2 |
| **b.** Number of roots of the equation $\cos^{-1}(\cos x) = \frac{x}{4}$ is | **q.** 3 |
| **c.** Number of roots of the equation $\tan^{-1}(\tan x) = \frac{x}{4}$ is | **r.** 4 |
| **d.** Number of roots of the equation $\cot^{-1}(\cot x) = \frac{x}{4}$ is | **s.** 5 |

A. $\begin{matrix} a & b & c & d \\ s & r & q & p \end{matrix}$

B. $\begin{matrix} a & b & c & d \\ q & s & r & p \end{matrix}$

C. $\begin{matrix} a & b & c & d \\ s & r & p & q \end{matrix}$

D. $\begin{matrix} a & b & c & d \\ q & r & q & p \end{matrix}$

**Answer: D**

Watch Video Solution

**3.** Match the following lists :

| List I | List II |
|---|---|
| a. If $3\sin^{-1}x = \pi - \sin^{-1}(3x - 4x^3)$, then | p. $x \in \left[\frac{1}{\sqrt{2}}, 1\right]$ |
| b. If $2\tan^{-1}x = \pi - \sin^{-1}\frac{2x}{1+x^2}$, then | q. $x \in \left[\frac{1}{2}, 1\right]$ |
| c. If $2\tan^{-1}x = \pi + \tan^{-1}\frac{2x}{1-x^2}$, then | r. $x \in (1, \infty)$ |
| d. If $2\sin^{-1}x = \pi - \sin^{-1}\left(2x\sqrt{1-x^2}\right)$, then | s. $x \in [1, \infty)$ |

A. $\begin{matrix} a & b & c & d \\ s & r & q & p \end{matrix}$

B. $\begin{matrix} a & b & c & d \\ q & s & r & p \end{matrix}$

C. $\begin{matrix} a & b & c & d \\ s & r & p & q \end{matrix}$

D. $\begin{matrix} a & b & c & d \\ r & p & s & q \end{matrix}$

**Answer: B**

View Text Solution

**4.** Match the following List I to List II

| List I | List |
|---|---|
| a. If $(\sin^{-1}x)^2+(\sin^{-1}y)^2=\frac{\pi^2}{2}$, then $x^3+y^3$ can be | p. 0 |
| b. $(\cos^{-1}x)^2+(\cos^{-1}y)^2=2\pi^2$, then $x^5+y^5$ can be | q. -2 |
| c $(\sin^{-1}x)^2(\cos^{-1}y)^2=\frac{\pi^4}{4}$, then $x-y$ can be | r. 2 |
| d. $\lvert\sin^{-1}x-\sin^{-1}y\rvert=\pi$, then $x-y$ can be | s. -1 |

A. $\begin{matrix} a & b & c & d \\ r & q & p & s \end{matrix}$

B. $\begin{matrix} a & b & c & d \\ s & r & q & p \end{matrix}$

C. $\begin{matrix} a & b & c & d \\ q & s & p & r \end{matrix}$

D. $\begin{matrix} a & b & c & d \\ s & r & q & p \end{matrix}$

**Answer: C**

Watch Video Solution

**5.** Match the following List I to List II

| List I | LIst II |
|---|---|
| **a.** Range of $f(x) = \sin^{-1} x + \cos^{-1} x + \cot^{-1} x$ is | **p.** $\left[0, \frac{\pi}{2}\right) \cup \left(\frac{\pi}{2}, \pi\right]$ |
| **b.** Range of $f(x) = \cot^{-1} x + \tan^{-1} x + \operatorname{cosec}^{-1} x$ is | **q.** $\left[\frac{\pi}{2}, \frac{3\pi}{2}\right]$ |
| **c.** Range of $f(x) = \cot^{-1} x + \tan^{-1} x + \cos^{-1} x$ is | **r.** $\{0, \pi\}$ |
| **d.** Range of $f(x) = \sec^{-1} x + \operatorname{cosec}^{-1} x + \sin^{-1} x$ is | **s.** $\left[\frac{3\pi}{4}, \frac{5\pi}{4}\right]$ |

Watch Video Solution

**6.** Match the column I with Column II.

| | Column I | | Column II |
|---|---|---|---|
| (A) | The shape of rubber heel changes under stress | (p) | Young's modulus of elasticity is involved |
| (B) | In a suspended bridge, there is a strain in the ropes by the load of the bridge | (q) | Bulk modulus of elasticity is involved |
| (C) | In an automobile tyre, when air is compressed, the shape of tyre changes | (r) | Modulus of rigidity is involved |
| (D) | A solid body is subjected to a deforming force | (s) | All the moduli of elasticity are involved |

Watch Video Solution

**7.** Match List I with List II and select the correct answer using the codes given below the lists:

| List I | List II |
|---|---|
| **a.** $\left(\frac{1}{y^2}\left(\frac{\cos(\tan^{-1}y)+y\sin(\tan^{-1}y)}{\cot(\sin^{-1}y)+\tan(\sin^{-1}y)}\right)^2+y^4\right)^{1/2}$ takes value | **p.** $\frac{1}{2}\sqrt{\frac{5}{3}}$ |
| **b.** If $\cos x+\cos y+\cos z=0=\sin x+\sin y+\sin z$ then possible value of $\cos\frac{x-y}{2}$ is | **q.** $\sqrt{2}$ |
| **c.** If $\cos\left(\frac{\pi}{4}-x\right)\cos 2x+\sin x\sin 2x\sec x$ $=\cos x\sin 2x\sec x+\cos\left(\frac{\pi}{4}+x\right)\cos 2x$ then possible value of $\sec x$ is | **r.** $1/2$ |
| **d.** If $\cot\left(\sin^{-1}\sqrt{1-x^2}\right)=\sin(\tan^{-1}(x\sqrt{6}))$, $x\neq 0$, then possible value of $x$ is | **s.** $1$ |

A. $\begin{matrix} a & b & c & d \\ s & r & p & q \end{matrix}$

B. $\begin{matrix} a & b & c & d \\ s & r & q & p \end{matrix}$

C. $\begin{matrix} a & b & c & d \\ r & s & q & p \end{matrix}$

D. $\begin{matrix} a & b & c & d \\ r & s & p & q \end{matrix}$

**Answer: B**

Watch Video Solution

**8.** Match List I with List II and select the correct answer using the codes given below the lists :

| List I | List |
|---|---|
| **a.** Let $y(x) = \cos(3\cos^{-1}x)$, $x \in [-1, 1]$, $x \neq \pm\frac{\sqrt{3}}{2}$. Then $\frac{1}{y(x)}\left\{(x^2-1)\frac{d^2y(x)}{dx^2} + x\frac{dy(x)}{dx}\right\}$ equals | **p.** 1 |
| **b.** Let $A_1, A_2, \ldots, A_n$ $(n > 2)$ be the vertices of a regular polygon of $n$ sides with its centre at the origin. Let $\vec{a}_k$ be the position vector of the point $A_k$, $k = 1, 2, \ldots n$. If $\left\lvert\sum_{k=1}^{n-1}(\vec{a}_k \times \vec{a}_{k+1})\right\rvert = \left\lvert\sum_{k=1}^{n-1}(\vec{a}_k \cdot \vec{a}_{k+1})\right\rvert$, then the minimum value of $n$ is | **q.** 2 |
| **c.** If the normal from the point $P(h, 1)$ on the ellipse $\frac{x^2}{6} + \frac{y^2}{3} = 1$ is perpendicular to the line $x + y = 8$, then the value of $h$ is | **r.** 8 |
| **d.** Number of positive solutions satisfying the equation $\tan^{-1}\left(\frac{1}{2x+1}\right) + \tan^{-1}\left(\frac{1}{4x+1}\right) = \tan^{-1}\left(\frac{2}{x^2}\right)$ is | **s.** 9 |

A.
| a | b | c | d |
|---|---|---|---|
| s | r | p | q |

B.
| a | b | c | d |
|---|---|---|---|
| q | s | r | p |

C.
| a | b | c | d |
|---|---|---|---|
| s | r | p | q |

D. $\begin{matrix} a & b & c & d \\ q & s & p & r \end{matrix}$

**Answer: A**

View Text Solution

## Numerical Value Type

**1.** The solution set of inequality $\left(\cot^{-1}x\right)\left(\tan^{-1}x\right) + \left(2 - \frac{\pi}{2}\right), \cot^{-1}x - 3\tan^{-1}x - 3\left(2 - \frac{\pi}{2}\right) > 0$ is $(a, b)$, then the value of $\cot^{-1}a + \cot^{-1}b$ is____

Watch Video Solution

**2.** If $x = \sin^{-1}\left(a^6 + 1\right) + \cos^{-1}\left(a^4 + 1\right) - \tan^{-1}\left(a^2 + 1\right), a \in R,$ then the value of $\sec^2 x$ is_____

Watch Video Solution

**3.** If the roots of the equation $x^3 - 10x + 11 = 0$ are u, v, and w, then the value of $3\operatorname{cosec}^2\left(\tan^{-1}u + \tan^{-1}v + \tan^{-1}w\right.$ is ____

Watch Video Solution

**4.** The number of values of $x$ for which $\sin^{-1}\left(x^2 - \frac{x^4}{3} + \frac{x^6}{9}\right) + \cos^{-1}\left(x^4 - \frac{x^8}{3} + \frac{x^{12}}{9}..\right) = \frac{\pi}{2}$, where 0<|x|

Watch Video Solution

**5.** If the domain of the function $f(x) = \sqrt{3\cos^{-1}(4x) - \pi}$ is $[a, b]$, then the value of $(4a + 64b)$ is ___

Watch Video Solution

**6.** If `0

Watch Video Solution

**7.** If $\tan^{-1}\left(x+\frac{3}{x}\right)-\tan^{-1}\left(x-\frac{3}{x}\right)=\frac{\tan^{-1}6}{x}$, then the value of $x^4$ is____.

Watch Video Solution

**8.** If range of function $f(x)=\sin^{-1}x+2\tan^{-1}x+x^2+4x+1$ is $[p,q]$, then the value of $(p+q)$ is_____>

Watch Video Solution

**9.** If $\cos^{-1}(x)+\cos^{-1}(y)+\cos^{-1}(z)=\pi\left(\sec^2(u)+\sec^4(v)+\sec^6(w)\right)$, $whereu, v, w$ are least non-negative angles such that `u

Watch Video Solution

**10.** If the area enclosed by the curves $f(x) = \cos^{-1}(\cos x)$ and $g(x) = \sin^{-1}(\cos x)$ in $x \in [9\pi/4, 15\pi/4]$ is $9\pi^2/b$ (where a and b are coprime), then the value of b is ____

Watch Video Solution

**11.** Absolute value of sum of all integers in the domain of $f(x) = \cot^{-1}\sqrt{(x+3)x} + \cos^{-1}\sqrt{x^2 + 3x + 1}$ is_____

Watch Video Solution

**12.** The least value of $\left(1 + \sec^{-1}x\right)\left(1 + cos^{-1}x\right)$ is _____

Watch Video Solution

**13.** Let $\cos^{-1}(x) + \cos^{-1}(2x) + \cos^{-1}(3x) be \pi$ If $x$ satisfies the equation $ax^3 + bx^2 + cx - c_1 = 0$, then the value of $(b - a - c)$ is_____

Watch Video Solution

**14.** The number of integral values of x satisfying the equation $\tan^{-1}(3x) + \tan^{-1}(5x) = \tan^{-1}(7x) + \tan^{-1}(2x)$ is ____

Watch Video Solution

**15.** Number of solutions of equation $\sin\left(\cos^{-1}\left(\tan\left(\sec^{-1}x\right)\right)\right) = \sqrt{1+x} is/are$ __

Watch Video Solution

**16.** If the equation $\sin^{-1}\left(x^2 + x + 1\right) + \cos^{-1}(\lambda x + 1) = \frac{\pi}{2}$ has exactly two solutions for $\lambda \in [a, b]$, then the value of $a + b$ is

Watch Video Solution

**17.** $\sin\left\{2\left(\frac{\sin^{-1}\left(\sqrt{5}\right)}{3} - \frac{\cos^{-1}\left(\sqrt{5}\right)}{3}\right)\right\}$ is equal to $\frac{k\sqrt{5}}{81}$ then $k =$

Watch Video Solution

**18.** The number of solutions of $\cos\left(2\sin^{-1}\left(\cot\left(\tan^{-1}\left(\sec\left(6\operatorname{cosec}^{-1}x\right)\right)\right)\right)\right) + 1 = 0$ where $x > 0$ is

Watch Video Solution

## Archives Jee Main

**1.** If x, y, z are in A.P. and $\tan^{-1}x, \tan^{-1}y$ and $\tan^{-1}z$ are also in A.P. then show that x=y=z and y≠0

A. $x = y = z$

B. $2x = 3y = 6z$

C. $6x = 3y = 2z$

D. $6x = 4y = 3z$

**Answer: A**

Watch Video Solution

**2.** Let $\tan^{-1}y = \tan^{-1}x + \tan^{-1}\left(\frac{2x}{1 - x^2}\right)$, where $|x| < \frac{1}{\sqrt{3}}$. Then a value of y is : (1) $\frac{3x - x^3}{1 - 3x^2}$ (2) $\frac{3x + x^3}{1 - 3x^2}$ (3) $\frac{3x - x^3}{1 + 3x^2}$ (4) $\frac{3x + x^3}{1 + 3x^2}$

A. $\frac{3x - x^3}{1 - 3x^2}$

B. $\frac{3x + x^3}{1 - 3x^2}$

C. $\frac{3x - x^3}{1 + 3x^2}$

D. $\frac{3x + x^3}{1 + 3x^2}$

**Answer: B**

Watch Video Solution

## Archives Jee Advanced

**1.** The value of $\cot\left(\sum_{n=1}^{23}\cot^{-1}\left(1+\sum_{k=1}^{n}2k\right)\right)$ is (a) $\frac{23}{25}$ (b) $\frac{25}{23}$ (c) $\frac{23}{24}$ (d) $\frac{25}{26}$

A. $\frac{23}{25}$

B. $\frac{25}{23}$

C. $\frac{23}{24}$

D. $\frac{24}{23}$

**Answer: B**

Watch Video Solution

## Archives Multiple Correct Answer Type

**1.** If $\alpha = 3\sin^{-1}\left(\frac{6}{11}\right)$ and $\beta = 3\cos^{-1}\left(\frac{4}{9}\right)$, where the inverse trigonometric functions take only the principal values, then the correct option(s) is (are)

A. $\cos\beta > 0$

B. $\sin\beta < 0$

C. $\cos(\alpha + \beta) > 0$

D. $\cos\alpha < 0$

**Answer: B::C::D**

Watch Video Solution

**2.** For any positive integer $n$, define $f_n : (0, \infty) \to R$ as $f_n(x) = \sum_{j=1}^{n} \tan^{-1}\left(\frac{1}{1 + (x+j)(x+j-1)}\right)$ for all $x \in (0, \infty)$. Here, the inverse trigonometric function $\tan^{-1}x$ assumes values in $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$. Then, which of the following statement(s) is (are) TRUE? $\sum_{j=1}^{5} \tan^2\left(f_j(0)\right) = 55$ (b)

$\sum_{j=1}^{10}(1+fj'(0))\sec^2\left(f_j(0)\right)=10$ (c) For any fixed positive integer $n$, $(\lim)_{x\to\infty}\tan\left(f_n(x)\right)=\frac{1}{n}$ (d) For any fixed positive integer $n$, $(\lim)_{x\to\infty}\sec^2\left(f_n(x)\right)=1$

A. $\sum_{j=1}^{5}\tan^2\left(f_j(0)\right)=55$

B. $\sum_{j=1}^{10}\left(1+f'_j(0)\right)\sec^2\left(f_j(0)\right)=10$

C. For any fixed positive inetger $n$, $\lim_{x\to\infty}\tan\left(f_n(x)\right)=\frac{1}{n}$

D. For any fixed positive integer $n$, $\lim_{x\to\infty}\sec^2\left(f_n(x)\right)=1$

**Answer: A::B::D**

Watch Video Solution

## Archives Numerical Value Type

**1.** Let $f:[0,4\pi]\to[0,\pi]$ be defined by $f(x)=\cos^{-1}(\cos x)$. The number of points $x\in[0,4\pi]$ 4satisfying the equation $f(x)=\frac{10-x}{10}$ is

Watch Video Solution

Watch Video Solution

**2.** The number of real solution of the equation

$$\sin^{-1}\left(\sum_{i=1}^{\infty} x^{i+1} - x\sum_{i=1}^{\infty}\left(\frac{x}{2}\right)^{i}\right)$$

$$= \frac{\pi}{2} - \cos^{-1}\left(\sum_{i=1}^{\infty}\left(-\frac{x}{2}\right)^{i} - \sum_{i=1}^{\infty}(-x)^{i}\right)$$ lying in the interval $\left(-\frac{1}{2}, \frac{1}{2}\right)$ is

_____.

(Here, the inverse trigonometric function $\sin^{-1}x$ and $\cos^{-1}x$ assume values in $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ and $[0, \pi]$ respectively)

Watch Video Solution

## Single Correct Answer Type

**1.** The values of x which satisfy $18\left(\sin^{-1}x\right)^2 - 9\pi\sin^{-1}x + \pi^2 < 0$ and $18\left(\tan^{-1}x\right)^2 - 9\pi\tan^{-1}x + \pi^2 < 0$ simultaneously are

A. $\left(\frac{\sqrt{3}}{3}, \frac{\sqrt{3}}{2}\right)$

B. $\left(\frac{\sqrt{3}}{2}, 1\right)$

C. $\left(\frac{1}{3}, \frac{\sqrt{3}}{2}\right)$

D. $\left(\frac{1}{\sqrt{3}}, \sqrt{3}\right)$

**Answer: A**

Watch Video Solution

**2.** If $f(x) = \sin^{-1}\left(\operatorname{cosec}\left(\sin^{-1}x\right)\right) + \cos^{-1}\left(\sec\left(\cos^{-1}x\right)\right)$, then f(x) takes

A. exactly two values

B. one value

C. undefined

D. infinite values

**Answer: B**

Watch Video Solution

**3.** The set of all real values of x satisfying $\sin^{-1}\sqrt{x} < \frac{\pi}{4}$, is

A. $\left(0, \frac{1}{2}\right)$

B. $\left[0, \frac{1}{2}\right)$

C. $\left(0, \frac{1}{2}\right]$

D. $\left[0, \frac{1}{2}\right]$

**Answer: B**

Watch Video Solution

**4.** The number of ordered triplets $(x, y, z)$ satisfy the equation $\left(\sin^{-1}x\right)^2 = \frac{\pi^2}{4} + \left(\sec^{-1}y\right)^2 + \left(\tan^{-1}z\right)^2$

A. 2

B. 4

C. 6

D. 8

**Answer: A**

Watch Video Solution

**5.** The range of function $f(x) = \sin^{-1}\left(x - \sqrt{x}\right)$ is equal to

A. $\left[\sin^{-1}\frac{1}{4}, \frac{\pi}{2}\right]$

B. $\left[\sin^{-1}, \frac{\pi}{2}\right]$

C. $\left[-\sin^{-1}\frac{1}{4}, \frac{\pi}{2}\right]$

D. $\left[-\sin^{-1}\frac{1}{2}, \frac{\pi}{2}\right]$

**Answer: C**

Watch Video Solution

**6.** The number of solution of the equation $\left|\tan^{-1}|x|\right| = \sqrt{\left(x^2+1\right)^2 - 4x^2}$ is

A. 2

B. 3

C. 4

D. none of these

**Answer: C**

Watch Video Solution

**7.** The number of solutions of the equation $\sin^{-1}|x| = \left|\cos^{-1}x\right|$ are

A. 0

B. 1

C. 2

D. 3

**Answer: B**

Watch Video Solution

**8.** For $x \in (0, 1)$, let $\alpha = \sin^{-1}x, \beta = x, \gamma = \tan^{-1}x, \delta = \cot^{-1}x - \frac{\pi}{2}$. Which of the following is true ?

A. $\alpha > \beta > \gamma$

B. $\beta > \alpha > \gamma > \delta$

C. $\alpha > \beta > \gamma > \delta$

D. $\beta > \alpha > \delta > \gamma$

**Answer: C**

Watch Video Solution

**9.** If $x, y, z \in$ R are such that they satisfy $x + y + z = 1$ and $\tan^{-1}x + \tan^{-1}y + \tan^{-1}z = \frac{\pi}{4}$, then the value of $\left|x^3 + y^3 + z^3 - 3\right|$ is

A. 1.5

B. 2

C. 2.5

D. 3

**Answer: B**

Watch Video Solution

**10.** The complete set of values of a for which the function $f(x) = \tan^{-1}\left(x^2 - 18x + a\right) > 0 \forall x \in R$ is

A. $(81, \infty)$

B. $[81, \infty)$

C. $(-\infty, 81)$

D. $(-\infty, 81]$

**Answer: A**

Watch Video Solution

**11.** The principal values of $\cos^{-1}\left(-\frac{\sin(7\pi)}{6}\right)$ is

A. $\frac{5\pi}{3}$

B. $\frac{7\pi}{6}$

C. $\frac{\pi}{3}$

D. none of these

**Answer: C**

Watch Video Solution

**12.** The value of $\sec\left(\sin^{-1}\left(\sin\left(\frac{-50\pi}{9}\right)\right)+\cos^{-1}\left(\frac{\cos(31\pi)}{9}\right)\right)$

A. sec. $\frac{10\pi}{9}$

B. sec. $\frac{\pi}{9}$

C. 1

D. - 1

**Answer: D**

Watch Video Solution

**13.** Maximum value of function $f(x) = \left(\sin^{-1}(\sin x)^2 - \sin^{-1}(\sin x)\right.$ is:

A. $\frac{\pi}{4}[\pi + 2]$

B. $\frac{\pi}{4}[\pi - 2]$

C. $\frac{\pi}{2}[\pi + 2]$

D. $\frac{\pi}{2}[\pi - 2]$

**Answer: A**

Watch Video Solution

**14.** The solution of $\sin^{-1}|\sin x| = \sqrt{\sin^{-1}|\sin x|}$ is

A. $n\pi \pm 1, n\pi, n \in Z$

B. $n\pi + 1, n\pi, n \in Z$

C. $n\pi - 1, n\pi, n \in Z$

D. $2n\pi + 1, n\pi, n \in Z$

**Answer: A**

Watch Video Solution

**15.** Evaluate: $\sin\left(\frac{1}{4}\sin^{-1}\left(\frac{\sqrt{63}}{8}\right)\right) is$

A. $\frac{1}{2}$

B. $\frac{1}{3}$

C. $\frac{1}{2\sqrt{2}}$

D. $\frac{1}{5}$

**Answer: C**

Watch Video Solution

**16.** Which of the following is not true ?

A. $\sin\cos^{-1}\tan\cot^{-1}x = \sqrt{1 - \frac{1}{x^2}}$

B. $\cos\tan^{-1}\cot\sin^{-1}x = x$

C. $\tan\cot^{-1}\sin\cos^{-1}x = \frac{1}{\sqrt{1 - x^2}}$

D. $\cot\sin^{-1}\cos\tan^{-1}x = \sqrt{1 - x^2}$

**Answer: D**

Watch Video Solution

**17.** The algebraic expression for $f(x) = \tan\left(\sin^{-1}\left(\cos\left(\tan^{-1}\frac{x}{2}\right)\right)\right)$ is

A. $\frac{2}{x}$

B. $\frac{x}{2}$

C. $\frac{1}{x}$

D. $\frac{2}{|x|}$

**Answer: D**

Watch Video Solution

**18.** The value of x satisfying the equation $\cos^{-1}3x + \sin^{-1}2x = \pi$ is

A. $x = \frac{1}{\sqrt{3}}$

B. $x = \frac{-1}{\sqrt{3}}$

C. $x = \frac{-1}{\sqrt{3}}$

D. none of these

**Answer: D**

Watch Video Solution

**19.** The minimum integral value of $\alpha$ for which the quadratic equation $\left(\cot^{-1}\alpha\right)x^2 - \left(\tan^{-1}\alpha\right)^{3/2}x + 2\left(\cot^{-1}\alpha\right)^2 = 0$ has both positive roots

A. 1

B. 2

C. 3

D. 4

**Answer: B**

Watch Video Solution

**20.** The number of roots of the equation $\sin^{-1}x - \frac{1}{\sin^{-1}x} = \cos^{-1}x - \frac{1}{\cos^{-1}x}$ is (a) 0 (b) 1 (c) 2 (d) 3

A. 0

B. 1

C. 2

D. 3

**Answer: C**

Watch Video Solution

**21.** The solution set of the inequality $\tan^{-1}x + \sin^{-1}x \geq \frac{\pi}{2}$ is

A. $[-1, 1]$

B. $\left[\sqrt{\frac{\sqrt{5}-1}{4}}, 1\right]$

C. $\left[\sqrt{\frac{\sqrt{5}-1}{2}}, 1\right]$

D. $\left[\frac{\sqrt{5}-1}{2}, 1\right]$

**Answer: C**

Watch Video Solution

**22.** The sum of all possible values of x satisfying the equation $\sin^{-1}\left(3x - 4x^3\right) + \cos^{-1}\left(4x^3 - 3x\right) = \frac{\pi}{2}$ is

A. $-2$

B. $-1$

C. 1

D. 0

**Answer: D**

Watch Video Solution

**23.** If maximum and minimum values of $\left|\sin^{-1}x\right| + \left|\cos^{-1}x\right|$ are Mand m, then M+m is

A. $\pi/2$

B. $\pi$

C. $2\pi$

D. $3\pi$

**Answer: C**

Watch Video Solution

**24.** If the function $f(x) = \sin^{-1}x + \cos^{-1}x$ and g(x) are identical, then g(x) can be equal to

A. $\sin^{-1}|x| + \left|\cos^{-1}x\right|$

B. $\tan^{-1}x + \cot^{-1}x$

C. $\left|\sin^{-1}x\right| + \cos^{-1}|x|$

D. $\left(\sqrt{\sin^{-1}x}\right)^2 + \left(\sqrt{\cos^{-1}x}\right)^2$

**Answer: C**

Watch Video Solution

**25.** The value of x satisfying $\sin^{-1}\left(\sqrt{\frac{3x-1}{25}}\right)+\sin^{-1}\left(\sqrt{\frac{3x+1}{25}}\right)=\frac{\pi}{2}$ lies in the interval

A. (1,2)

B. (2,3)

C. (3,4)

D. (4,5)

**Answer: D**

Watch Video Solution

**26.** The set of values of k for which the equation $\sin^{-1}x+\cos^{-1}x+\pi(|x|-2)=k\pi$ possesses real solution is [a,b] then the value of a + b is

A. 0

B. -2

C. -1

D. 2

**Answer: B**

Watch Video Solution

**27.** The soluation set of inequality $\left(\sin x + \cos^{-1}x\right) - \left(\cos x - \sin^{-1}x\right) \geq \frac{\pi}{2}$, is equal to

A. $\left[\frac{\pi}{4}, \frac{5\pi}{4}\right]$

B. $\bigcup_{n \in I}\left[2n\pi + \frac{\pi}{4}, 2n\pi + \frac{5\pi}{4}\right]$

C. $\left[\frac{\pi}{4}, 1\right]$

D. $\left[-1, \frac{-\pi}{4}\right] \cup \left[\frac{\pi}{4}, 1\right]$

**Answer: C**

Watch Video Solution

**28.** The number of integral values in the range of the function $f(x) = \sin^{-1}x - \cot^{-1}x + x^2 + 2x + 6$ is

A. 10

B. 11

C. 12

D. 8

**Answer: D**

Watch Video Solution

**29.** $\cos^{-1}\sqrt{\frac{a-x}{a-b}} = \sin^{-1}\sqrt{\frac{x-b}{a-b}}$ is possible ,if

A. $a > x > b$

B. $a < x < b$

C. $a = x = b$

D. $a > b$ and x takes any value

**Answer: A::B**

Watch Video Solution

**30.** The value(s) of $x$ satisfying $\tan^{-1}(x+3) - \tan^{-1}(x-3) = \sin^{-1}\left(\frac{3}{5}\right)$ may be

A. -2

B. -1

C. 0

D. 2

**Answer: C**

Watch Video Solution

**31.** If x and y are positive integer satisfying $\tan^{-1}\left(\frac{1}{x}\right) + \tan^{-1}\left(\frac{1}{y}\right) = \frac{1}{7}$, then the number of ordered pairs of (x,y) is

A. 3

B. 4

C. 5

D. 6

**Answer: D**

Watch Video Solution

**32.** The number of solution $(s)$ of the equation $\sin^{-1}(1 - x) - 2\sin^{-1}x = \frac{\pi}{2}$ is/are

A. 0

B. 1

C. 2

D. 3

**Answer: C**

Watch Video Solution

**33.** If $\cos^{-1}\left(\frac{x^2 - 1}{x^2 + 1}\right) + \tan^{-1}\left(\frac{2x}{x^2 - 1}\right) = \frac{2\pi}{3}$, then x equal to (A) $\sqrt{3}$ (B) $2 + \sqrt{3}$ (C) $2 - \sqrt{3}$ (D) $-\sqrt{3}$

A. 2

B. $\sqrt{3}$

C. 4

D. 3

**Answer: B**

Watch Video Solution

Watch Video Solution

**34.** The solution of $\sin^{-1}x - \sin^{-1}2x = \pm\frac{\pi}{3}$ is

A. $\pm\frac{1}{3}$

B. $\pm\frac{1}{4}$

C. $\pm\frac{\sqrt{3}}{2}$

D. $\pm\frac{1}{2}$

**Answer: D**

Watch Video Solution

**35.** If $\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right) + \sin^{-1}\left(\frac{2x}{1+x^2}\right) = p$ for all $x \in [-1, 0]$, then p is equal to

A. $\frac{-\pi}{2}$

B. 0

C. $\frac{\pi}{2}$

D. $\frac{2\pi}{3}$

**Answer: B**

Watch Video Solution

**36.** Let $f(x) = \sin^{-1}\left(\frac{2x}{1+x^2}\right)$ and $g(x) = \cos^{-1}\left(\frac{x^2-1}{x^2+1}\right)$. Then tha value of f(10)-g(100) is equal to

A. $\pi - 2\left(\tan^{-1}(10) + \tan^{-1}(100)\right)$

B. 0

C. $2\left(\tan^{-1}(100) - \tan^{-1}(10)\right)$

D. $2\left(\tan^{-1}(10) - \tan^{-1}(100)\right)$

**Answer: C**

Watch Video Solution

Watch Video Solution

**37.** Solve $\tan^{-1}x + \cot^{-1}(-|x|) = 2\tan^{-1}6x$

A. 4

B. 3

C. 2

D. 1

**Answer: C**

Watch Video Solution

**38.** Solve: $\frac{\sin^{-1}(3x)}{5} + \frac{\sin^{-1}(4x)}{5} = \sin^{-1}x$

A. 0

B. 1

C. 2

D. 3

**Answer: D**

Watch Video Solution

**39.** If $x \in \left[-1, \frac{-1}{\sqrt{2}}\right]$, then the inverse of the function $f(x) = \sin^{-1}\left(2x\sqrt{1-x^2}\right)$ is given by

A. $-\cos. \frac{y}{2}$

B. $\cos. \frac{y}{2}$

C. $-2\cos y$

D. $-2\cos y$

**Answer: A**

Watch Video Solution

**40.** The expression $\sum_{n=1}^{\infty} \cot^{-1}\left(n^2 - 3n + 3\right)$ simplifies to

A. $\frac{\pi}{4}$

B. $\frac{\pi}{2}$

C. $\frac{3\pi}{4}$

D. $\pi$

**Answer: C**

Watch Video Solution

**41.** The value of sum $\sum_{n=1}^{\infty} \cot^{-1}\left(\frac{\left(n^2 + 2n\right)\left(n^2 + 2n + 1\right) + 1}{2n + 2}\right)$ is equal to

A. $\cos^{-1}\left(\frac{1}{\sqrt{5}}\right)$

B. $\sec^{-1}\left(\frac{\sqrt{5}}{2}\right)$

C. $\sin^{-1}\left(\frac{1}{\sqrt{5}}\right)$

D. $\cot^{-1}(1)$

**Answer: C**

Watch Video Solution

**42.** The number of solution of the equation $2\sin^{-1}\left(\frac{2x}{1+x^2}\right) - \pi x^3 = 0$ is equal to

A. 0

B. 1

C. 2

D. 3

**Answer: D**

Watch Video Solution

## Multiple Correct Answers Type

**1.** Let $f(x) = \cos^{-1}\left(\frac{1 - \frac{\tan^2(x)}{2}}{1 + \frac{\tan^2(x)}{2}}\right)$. Then which of the following statement is/are true ?

A. Ranges of f(x) is $[0, \pi)$

B. $f(x) = \pi$ has infinite roots

C. y = f(x) is identical with $y = \cos^{-1}(\cos x)$

D. y = f(x) has period $2\pi$

**Answer: A::D**

Watch Video Solution

**2.** If $f(x) = \sin^{-1}(\sin x)$, $g(x) = \cos^{-1}(\cos x)$ and $h(x) = \cot^{-1}(\cot x)$, then which of the following is/are correct ?

A. (a) $f(x) = g(x) = h(x) \forall x \in \left(\frac{\pi}{4}, \frac{\pi}{3}\right)$

B. (b) $f(x) < g(x) < h(x) \forall x \in \left(\frac{\pi}{2}, \pi\right)$

C. (c) $h(x) > g(x) > f(x) \forall x \in \left(\frac{3\pi}{2}, 2\pi\right)$

D. (d) $f(x) > g(x)$ has no real solution

**Answer: A::C::D**

Watch Video Solution

**3.** If $\sin^{-1}\left(\frac{\sqrt{x}}{2}\right) + \sin^{-1}\left(\sqrt{1 - \frac{x}{4}}\right) + \tan^{-1}y = \frac{2\pi}{3}$, then

A. maximum value of $x^2 + y^2$ is $\frac{49}{3}$

B. maximum value of $x^2 + y^2$ is 4

C. minimum value of $x^2 + y^2$ is $\frac{1}{3}$

D. minimum value of $x^2 + y^2$ is 3

**Answer: A::C::D**

Watch Video Solution

**4.** Solve the following equations: $\sin\left[2\cos^{-1}\{\cot(2\tan^{-1}x\}\right] = 0$

A. $\pm 1$

B. $1 \pm \sqrt{2}$

C. $-1 \pm \sqrt{2}$

D. $\pm\sqrt{2}$

**Answer: A::B::C**

Watch Video Solution

**5.** Let $x_1, x_2, x_3, x_4$ be four non zero numbers satisfying the equation $\tan^{-1}\left(\frac{a}{x}\right) + \tan^{-1}\left(\frac{b}{x}\right) + \tan^{-1}\left(\frac{c}{x}\right) + \tan^{-1}\left(\frac{d}{x}\right) = \frac{\pi}{2}$ then which ofthe following relation(s) hold good?

A. $x_1 + x_2 + x_3 + x_4 = a + b + c + d$

B. $\frac{1}{x_1} + \frac{1}{x_2} + \frac{1}{x_3} + \frac{1}{x_4} = 0$

C. $x_1 x_2 x_3 x_4 = abcd$

D. $(x_2 + x_3 + x_4)(x_3 + x_4 + x_1)(x_1 + x_2 + x_3) = abcd$

**Answer: B::C::D**

Watch Video Solution

**6.** Which of the following is/are true ?

A. $\tan^{-1}\frac{1}{3} = \frac{1}{2}\sin^{-1}\frac{3}{5}$

B. $\tan^{-1}\frac{1}{3} = \frac{\pi}{4} - \cot^{-1}2$

C. $\tan^{-1}\frac{1}{3} = \frac{\pi}{4} - \frac{1}{2}\cos^{-1}\frac{4}{5}$

D. $\tan^{-1}\frac{1}{3} = \frac{\pi}{2} - \cot^{-1}3$

**Answer: A::B::C**

Watch Video Solution

## Comprehension Type

**1.** $f(x) = \sin^{-1}x + \left|\sin^{-1}x\right| + \sin^{-1}|x|$ no. of solution of equation f(x)=x is (a) 1 (b) 0 (c) 2 (d) 3

A. 1

B. 0

C. 2

D. 3

**Answer: A**

Watch Video Solution

**2.** Let $f(x) = \sin^{-1}x + \left|\sin^{-1}x\right| + \sin^{-1}|x|$ The range of f(x) is (a) $\left[0, \frac{\pi}{2}\right]$ (b) $\left[0, \frac{3\pi}{2}\right]$ (c) $\left[0, \frac{\pi}{4}\right]$ (d) $[0, \pi]$

A. $\left[0, \frac{\pi}{2}\right]$

B. $\left[0, \frac{3\pi}{2}\right]$

C. $\left[0, \frac{\pi}{4}\right]$

D. $[0, \pi]$

**Answer: B**

Watch Video Solution

**3.** Let $f(x) = \sin^{-1}x + \left|\sin^{-1}x\right| + \sin^{-1}|x|$ If the equation f(x) = k has two solutions, then true set of values of k is

A. $k \in \left(0, \frac{\pi}{2}\right)$

B. $k \in \left[0, \frac{\pi}{2}\right]$

C. $k \in \left(0, \frac{\pi}{2}\right]$

D. $k \in \left[0, \frac{\pi}{2}\right)$

**Answer: C**

Watch Video Solution