

Inverse Trigonometric Functions

Question 1.

Solve for x : $\{x\cos(\cot^{-1} x) + \sin(\cot^{-1} x)\}^2 = \frac{51}{50}$

(a) $\frac{1}{\sqrt{2}}$

(b) $\frac{1}{5\sqrt{2}}$

(c) $2\sqrt{2}$

(d) $5\sqrt{2}$

Answer:

(b) $\frac{1}{5\sqrt{2}}$

Question 2.

The value of $\tan^{-1}\left(\frac{1}{2}\right) + \tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{7}{8}\right)$ is

(a) $\tan^{-1}\left(\frac{7}{8}\right)$

(b) $\cot^{-1}(15)$

(c) $\tan^{-1}(15)$

(d) $\tan^{-1}\left(\frac{25}{24}\right)$

Answer:

(c) $\tan^{-1}(15)$

Question 3.

Solve for x : $\sin^{-1} 2x + \sin^{-1} 3x = \frac{\pi}{3}$

(a) $\sqrt{\frac{76}{3}}$

(b) $\sqrt{\frac{3}{76}}$

(c) $\frac{3}{\sqrt{76}}$

(d) $\frac{\sqrt{3}}{76}$

- (c) $-\frac{1}{2}$
- (d) $-\frac{\sqrt{3}}{2}$

Answer:

- (b) $\frac{\sqrt{3}}{2}$

Question 8.

If $\tan^{-1}(\cot \theta) = 2\theta$, then θ is equal to

- (a) $\frac{\pi}{3}$
- (b) $\frac{\pi}{4}$
- (c) $\frac{\pi}{6}$
- (d) None of these

Answer:

- (c) $\frac{\pi}{6}$

Question 9.

$\cot\left(\frac{\pi}{4} - 2\cot^{-1} 3\right) =$

- (a) 7
- (b) 6
- (c) 5
- (d) None of these

Answer:

- (a) 7

Question 10.

If $\tan^{-1} 3 + \tan^{-1} x = \tan^{-1} 8$, then $x =$

- (a) 5
- (b) $\frac{1}{5}$
- (c) $\frac{5}{14}$
- (d) $\frac{14}{5}$

Answer:

- (b) $\frac{1}{5}$

Question 11.

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

(a) $\frac{\pi}{3}$

(b) $-\frac{\pi}{3}$

(c) $\frac{\pi}{6}$

(d) $-\frac{\pi}{6}$

Answer:

(d) $-\frac{\pi}{6}$

Question 12.

$$\cos^{-1}\left(\frac{1}{2}\right)$$

(a) $-\frac{\pi}{3}$

(b) $\frac{\pi}{3}$

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

(d) $\frac{2\pi}{3}$

Answer:

(b) $\frac{\pi}{3}$

Question 13.

$$\tan^{-1}(\sqrt{3})$$

(a) $\frac{\pi}{6}$

(b) $\frac{\pi}{3}$

(c) $\frac{2\pi}{3}$

(d) $\frac{5\pi}{6}$

Answer:

(b) $\frac{\pi}{3}$

Question 14.

$$\sin^{-1}\left(\frac{1}{\sqrt{2}}\right)$$

(a) $\frac{\pi}{4}$

(b) $\frac{\pi}{3}$

(c) $\frac{\pi}{6}$

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

Answer:

(a) $\frac{\pi}{4}$

Question 15.

$$\tan^{-1} 1 + \cos^{-1}\left(\frac{-1}{2}\right) + \sin^{-1}\left(\frac{-1}{2}\right)$$

(a) $\frac{2\pi}{3}$

(b) $\frac{3\pi}{4}$

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

(d) 6π

Answer:

(b) $\frac{3\pi}{4}$

Question 16.

$$\cos^{-1}\frac{1}{2} + 2\sin^{-1}\frac{1}{2} \text{ is equal to}$$

(a) $\frac{\pi}{4}$

(b) $\frac{\pi}{6}$

(c) $\frac{\pi}{3}$

(d) $\frac{2\pi}{3}$

Answer:

(d) $\frac{2\pi}{3}$

Question 17.

If $\cot^{-1}(\sqrt{\cos \alpha}) - \tan^{-1}(\sqrt{\cos \alpha}) = x$, then $\sin x$ is equal to

- (a) $\tan^2\left(\frac{\alpha}{2}\right)$ (b) $\cot^2\left(\frac{\alpha}{2}\right)$
(c) $\tan \alpha$ (d) $\cot\left(\frac{\alpha}{2}\right)$

Answer:

- (a) $\tan^2\left(\frac{\alpha}{2}\right)$

Question 18.

The value of $\cot\left(\operatorname{cosec}^{-1} \frac{5}{3} + \tan^{-1} \frac{2}{3}\right)$ is

- (a) $\frac{5}{17}$ (b) $\frac{6}{17}$
(c) $\frac{3}{17}$ (d) $\frac{4}{17}$

Answer:

- (b) $\frac{6}{17}$

Question 19.

If $\tan^{-1}(x-1) + \tan^{-1} x + \tan^{-1}(x+1) = \tan^{-1} 3x$, then the values of x are

- (a) $\pm \frac{1}{2}$
(b) $0, \frac{1}{2}$
(c) $0, -\frac{1}{2}$
(d) $0, \pm \frac{1}{2}$

Answer:

- (d) $0, \pm \frac{1}{2}$

Question 20.

If $6\sin^{-1}(x^2 - 6x + 8.5) = \pi$, then x is equal to

- (a) 1
(b) 2
(c) 3
(d) 8

Answer:

(b) 2

Question 21.

$\sin \left\{ 2 \cos^{-1} \left(\frac{-3}{5} \right) \right\}$ is equal to

(a) $\frac{6}{25}$

(b) $\frac{24}{25}$

(c) $\frac{4}{5}$

(d) $-\frac{24}{25}$

Answer:

(d) $-\frac{24}{25}$

Question 22.

$$\sin^{-1}(1-x) - 2\sin^{-1}x = \frac{\pi}{2}$$

(a) 0

(b) 1/2

(c) 0, 1/2

(d) -1/2

Answer:

(a) 0

Question 23.

$$2 \tan^{-1}(\cos x) = \tan^{-1}(2 \operatorname{cosec} x)$$

(a) 0

(b) $\pi/3$

(c) $\pi/4$

(d) $\pi/2$

Answer:

(c) $\pi/4$

Question 24.

$$\sin[\cot^{-1}\{\cos(\tan^{-1} x)\}] =$$

- (a) $\sqrt{\frac{x^2+1}{x^2+2}}$ (b) $\sqrt{\frac{x^2-1}{x^2-2}}$
(c) $\sqrt{\frac{x-1}{x-2}}$ (d) $\sqrt{\frac{x+1}{x+2}}$

Answer:

(a) $\sqrt{\frac{x^2+1}{x^2+2}}$

Question 25.

$$\text{The value of } \cos^{-1}\left(\cos\left(\frac{33\pi}{5}\right)\right) \text{ is}$$

- (a) $\frac{3\pi}{5}$ (b) $\frac{-3\pi}{5}$
(c) $\frac{\pi}{10}$ (d) $\frac{-\pi}{10}$

Answer:

(a) $\frac{3\pi}{5}$

Question 26.

The domain of the function defined by $f(x) = \sin^{-1} \sqrt{x-1}$ is

- (a) [1, 2]
(b) [-1, 1]
(c) [0, 1]
(d) none of these

Answer:

(a) [1, 2]

Question 27.

The value of $\sin(2\tan^{-1}(0.75))$ is equal to

- (a) 0.75
(b) 1.5
(c) 0.96
(d) $\sin 1.5$

Answer:

(c) 0.96

Question 28.

The value of expression $2 \sec^{-1} 2 + \sin^{-1}(\frac{1}{2})$

(a) $\frac{\pi}{6}$

(b) $\frac{5\pi}{6}$

(c) $\frac{7\pi}{6}$

(d) 1

Answer:

(b) $\frac{5\pi}{6}$

Question 29.

The value of $\sin\left[\cos^{-1}\left(\frac{7}{25}\right)\right]$ is

(a) $\frac{25}{24}$

(b) $\frac{25}{7}$

(c) $\frac{24}{25}$

(d) $\frac{7}{24}$

Answer:

(c) $\frac{24}{25}$

Question 30.

The value of the expression $\tan\left(\frac{1}{2} \cos^{-1} \frac{2}{\sqrt{3}}\right)$

(a) $2 + \sqrt{5}$

(b) $\sqrt{5} - 2$

(c) $\frac{\sqrt{5}+2}{2}$

(d) $5 + \sqrt{2}$

Answer:

(b) $\sqrt{5} - 2$

Question 31.

$$\cot\left(\operatorname{cosec}^{-1}\frac{5}{3} + \tan^{-1}\frac{2}{3}\right) =$$

(a) $\frac{6}{17}$

(b) $\frac{3}{17}$

(c) $\frac{4}{17}$

(d) $\frac{5}{17}$

Answer:

(a) $\frac{6}{17}$

Question 32.

$$\text{The value of } \tan\left(\cos^{-1}\frac{4}{5} + \tan^{-1}\frac{2}{3}\right) =$$

(a) $\frac{6}{17}$

(b) $\frac{7}{16}$

(c) $\frac{16}{7}$

(d) none of these

Answer:

(d) none of these

Question 33.

$$\cos\left(2\tan^{-1}\frac{1}{7}\right) - \sin\left(4\sin^{-1}\frac{1}{3}\right) =$$

(a) 1

(b) 0

(c) $\frac{1}{2}$

(d) $-\frac{1}{2}$

Answer:

(b) 0

Question 34.

$$2\cos^{-1}x = \sin^{-1}(2x\sqrt{1-x^2}) \text{ is true for}$$

(a) all x

(b) $x > 0$

(c) $x \in [-1, 1]$

(d) $\frac{1}{\sqrt{2}} \leq x \leq 1$

Answer:

(d) $\frac{1}{\sqrt{2}} \leq x \leq 1$

Question 35.

$\cos^{-1}[\cos(2\cot^{-1}(\sqrt{2}-1))] = \underline{\hspace{2cm}}$

- (a) $\sqrt{2}-1$
- (b) $1+\sqrt{2}$
- (c) $\frac{\pi}{4}$
- (d) $\frac{3\pi}{4}$

Answer:

(d) $\frac{3\pi}{4}$

Question 36.

The range of $\sin^{-1} x + \cos^{-1} x + \tan^{-1} x$ is

- (a) $[0, \pi]$
- (b) $\left[\frac{\pi}{4}, \frac{3\pi}{4}\right]$
- (c) $(0, \pi)$
- (d) $\left[0, \frac{\pi}{2}\right]$

Answer:

(b) $\left[\frac{\pi}{4}, \frac{3\pi}{4}\right]$

Question 37.

$\tan^{-1} \frac{1}{3} + \tan^{-1} \frac{1}{5} + \tan^{-1} \frac{1}{7} + \tan^{-1} \frac{1}{8} =$

- (a) π
- (b) $\frac{\pi}{2}$
- (c) $\frac{\pi}{4}$
- (d) $\frac{3\pi}{4}$

Answer:

(c) $\frac{\pi}{4}$

Question 38.

Find the value of $\sec^2(\tan^{-1} 2) + \operatorname{cosec}^2(\cot^{-1} 3)$

- (a) 12
- (b) 5
- (c) 15
- (d) 9

Question 42.

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

- (a) -1 (b) $\frac{2}{5}$
(c) $\frac{1}{3}$ (d) $\frac{1}{5}$

Answer:

- (d) $\frac{1}{5}$

Question 43.

The equation $2\cos^{-1}x + \sin^{-1}x = \frac{11\pi}{6}$ has

- (a) no solution
(b) only one solution
(c) two solutions
(d) three solutions

Answer:

- (a) no solution

Question 44.

If $x \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$, then the value of

$\tan^{-1}\left(\frac{\tan x}{4}\right) + \tan^{-1}\left(\frac{3\sin 2x}{5 + 3\cos 2x}\right)$ is

- (a) $\frac{x}{2}$ (b) $2x$
(c) $3x$ (d) x

Answer:

- (d) x

Question 45.

If $\tan^{-1}2x + \tan^{-1}3x = \frac{\pi}{4}$, then x is

- (a) $\frac{1}{6}$
(b) 1
(c) $\left(\frac{1}{6}, -1\right)$
(d) none of these

Answer:

(a) $\frac{1}{6}$

Question 46.

$\cos [\tan^{-1} \{\sin(\cot^{-1} x)\}]$ is equal to

(a) $\sqrt{\frac{x^2 + 2}{x^3 + 3}}$

(b) $\sqrt{\frac{x^2 + 2}{x^2 + 1}}$

(c) $\sqrt{\frac{x^2 + 1}{x^2 + 2}}$

(d) None of these

Answer:

(c) $\sqrt{\frac{x^2 + 1}{x^2 + 2}}$

Question 47.

If $\tan^{-1}\left(\frac{a}{x}\right) + \tan^{-1}\left(\frac{b}{x}\right) = \frac{\pi}{2}$, then x is equal to

(a) \sqrt{ab}

(b) $\sqrt{2ab}$

(c) $2ab$

(d) ab

Answer:

(a) \sqrt{ab}

Question 48.

If $\tan^{-1} x - \tan^{-1} y = \tan^{-1} A$, then A is equal to

(a) $x - y$

(b) $x + y$

(c) $\frac{x-y}{1+xy}$

(d) $\frac{x+y}{1-xy}$

Answer:

(c) $\frac{x-y}{1+xy}$

Question 49.

If $\tan^{-1}\left(\frac{x-1}{x+2}\right) + \tan^{-1}\left(\frac{x+1}{x+2}\right) = \frac{\pi}{4}$, then x is equal to

- (a) $\frac{1}{\sqrt{2}}$ (b) $-\frac{1}{\sqrt{2}}$
(c) $\pm\sqrt{\frac{5}{2}}$ (d) $\pm\frac{1}{2}$

Answer:

- (c) $\pm\sqrt{\frac{5}{2}}$

Question 50.

The value of $\cot^{-1} 9 + \operatorname{cosec}^{-1}\left(\frac{\sqrt{41}}{4}\right)$ is given by

- (a) 0
(b) $\frac{\pi}{4}$
(c) $\tan^{-1} 2$
(d) $\frac{\pi}{2}$

Answer:

- (b) $\frac{\pi}{4}$