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

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

Question 4.

The value of $\tan^{-1}\left(\frac{3}{4}\right)+\tan^{-1}\left(\frac{1}{7}\right)$ is

(a) π (b) $\frac{\pi}{2}$

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

Answer:
(d) $\frac{\pi}{4}$

Question 5.
If $\sin^{-1}(x^2 - 7x + 12) = n\pi$, $\forall$ n $\in$ I, then x =
(a) -2
(b) 4
(c) -3
(d) 5
Answer:
(b) 4

Question 6.
If $\cos^{-1} x + \sin^{-1} x = \pi$, then the value of x is
(a) $\frac{3}{2}$
(b) $\frac{1}{\sqrt{2}}$
(c) $\frac{\sqrt{3}}{2}$
(d) $\frac{2}{\sqrt{3}}$
Answer:
(c) $\frac{\sqrt{3}}{2}$

Question 7.
If $\sin^{-1} x - \cos^{-1} x = \frac{\pi}{6}$, then x =
(a) $\frac{1}{2}$
(b) $\frac{\sqrt{3}}{2}$

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

$\cos^{-1}\frac{1}{2} + 2\sin^{-1}\frac{1}{2}$ 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 sinx 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 $\cot\left(\text{cosec}^{-1}\frac{5}{3} + \tan^{-1}\frac{2}{3}\right)$ 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) π/3
(c) π/4
(d) π/2
Answer:
(c) π/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.

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

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

(a) all x (b) $x>0$

(c) $x\in[-1,1]$ (d) $\frac{1}{\sqrt{2}}\le x\le 1$

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

Question 35.
$\cos^{-1}[\cos(2\cot^{-1}(\sqrt{2}-1))]$ = _____
(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

Answer:
(c) 15

Question 39.

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

(a) x (b) $\frac{1}{x}$

(c) $2x$ (d) $\frac{2}{x}$

Answer:
(d) $\frac{2}{x}$

Question 40.

The equation $\sin^{-1} x - \cos^{-1} x = \cos^{-1}(\frac{\sqrt{3}}{2})$ has
(a) unique solution
(b) no solution
(c) infinitely many solution
(d) none of these
Answer:
(a) unique solution

Question 41.

$3 \tan^{-1} a$ is equal to

(a) $\tan^{-1}\left(\frac{3a+a^3}{1+3a^2}\right)$ (b) $\tan^{-1}\left(\frac{3a-a^3}{1+3a^2}\right)$

(c) $\tan^{-1}\left(\frac{3a+a^3}{1-3a^2}\right)$ (d) $\tan^{-1}\left(\frac{3a-a^3}{1-3a^2}\right)$

Answer:
(d) $\tan^{-1}\left(\frac{3a-a^3}{1-3a^2}\right)$

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) $(\frac{1}{6}, -1)$
(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 $\cot^{-1} 9 + \text{cosec}^{-1}(\frac{\sqrt{41}}{4})$ is given by

(a) 0

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

(c) $\tan^{-1} 2$

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

Answer:

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