

## 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)  $\pi$

(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  $\theta$  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)  $6\pi$

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.

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 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)  $\pi$

(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  $\sin^{-1}x - \cos^{-1}x = \cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$  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)  $\left(\frac{1}{6}, -1\right)$   
(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)  $\frac{\pi}{4}$