## Mathematics : Inverse Trigonometric Function

# Practice Paper – 01

1. If $x \in \left(-\frac{\pi}{2}, \frac{3\pi}{2}\right)$, then $\tan^{-1}\left(\frac{\cos x}{1+\sin x}\right) =$

(A) $\frac{\pi}{4}+\frac{x}{2}$ (B) $\frac{\pi}{4}-\frac{x}{2}$ (C) $\frac{x}{2}-\frac{\pi}{4}$ (D) $\frac{x}{2}-\frac{\pi}{2}$

2. If $\cot^{-1} x + \cot^{-1} y + \cot^{-1} z = \frac{\pi}{2}$, then x + y + z is equal to

(A) $\frac{1}{x}+\frac{1}{y}+\frac{1}{z}$ (B) xyz (C) xy + yz + zx (D) none of these

**3.** If $\theta = \cot^{-1}\sqrt{\cos x} - \tan^{-1}\sqrt{\cos x}$ , then $\sin\theta =$

(A) $\tan \frac{1}{2}x$ (B) $\tan^2 (x/2)$ (C) $\frac{1}{2}\tan^{-1}(x/2)$ (D) None of these

**4.** If a, b, c be positive real numbers and the value of $\theta = \tan^{-1}\sqrt{\frac{a(a+b+c)}{bc}} + \tan^{-1}\sqrt{\frac{b(a+b+c)}{ca}} + \tan^{-1}\sqrt{\frac{c(a+b+c)}{ab}}$ then $\tan\theta$ is equal to -

(A) 0 (B) 1 (C) $\frac{a+b+c}{abc}$ (D) None of these

5. $\cos^{-1}\left(\cos\frac{17\pi}{6}\right)$ is equal to

(A) $\pi/6$ (B) $17\pi/6$ (C) $5\pi/6$ (D) none of these

**6.** The value of $\tan^{-1}(1) + \cos^{-1}(-1/2) + \sin^{-1}(-1/2)$ is equal to -

(A) $\pi/4$ (B) $5\pi/12$ (C) $3\pi/4$ (D) $13\pi/12$

7. The sum of the series $\cot^{-1}2 + \cot^{-1}8 + \cot^{-1}18 + \cot^{-1}32 + \ldots..$ is

(A) $\frac{\pi}{2}$ (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{3}$ (D) $\pi$

8. $\cos^{-1}\sqrt{\frac{a-x}{a-b}} = \sin^{-1}\sqrt{\frac{x-b}{a-b}}$ possible if

(A) $a > x > b$ or $a < x < b$ (B) $a = x = b$

(C) $a > b$ and x takes any value (D) $a < b$ and x takes any value

9. If $\sin^{-1}x - \cos^{-1}x = \frac{\pi}{6}$ then x is

(A) $\frac{1}{2}$ (B) $\frac{\sqrt{3}}{2}$ (C) $-\frac{1}{2}$ (D) None of these

10. value of $\sin^{-1}\left(\sin\frac{3\pi}{4}\right)$

(A) $\frac{\pi}{4}$ (B) $\frac{-\pi}{4}$ (C) $\frac{3\pi}{4}$ (D) None

11. The Greatest value among $\tan 1, \tan^{-1}1, \sin 1, \sin^{-1}1, \cos 1$

(A) tan1 (B) $\tan^{-1}1$ (C) sin1 (D) $\sin^{-1}$

12. If $\sin^{-1}\left(\sin\frac{33\pi}{7}\right)+\cos^{-1}\left(\cos\frac{46\pi}{7}\right)+\tan^{-1}\left(-\tan\frac{13\pi}{8}\right)+\cot^{-1}\left(\cot\left(-\frac{19\pi}{8}\right)\right)=\frac{a\pi}{b}$

Where a and b are in their lowest form, then (a + b) equal to

(A) 17 (B) 20 (C) 23 (D) None of these

**13.** If $3\cos^{-1}(x^2 - 7x + 25/2) = \pi$, then x =

(A) only 3 (B) only 4 (C) 3 or 4 (D) None of these

14. If $\cos\left[\tan^{-1}\left\{\sin\left(\cot^{-1}\sqrt{3}\right)\right\}\right] = y,$ then

(A) $y = \frac{4}{5}$ (B) $y = \frac{2}{\sqrt{5}}$ (C) $y = -\frac{2}{\sqrt{5}}$ (D) $y^2 = \frac{10}{11}$

**15.** If $\tan(x + y) = 33$ and $x = \tan^{-1} 3$, then y will be

(A) 0.3 (B) $\tan^{-1}(1.3)$ (C) $\tan^{-1}(0.3)$ (D) $\tan^{-1}\left(\frac{1}{18}\right)$

16. Value of $\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{5} + \tan^{-1}\frac{1}{8}$

(A) $\frac{\pi}{4}$ (B) $\frac{-\pi}{4}$ (C) $\frac{3\pi}{4}$ (D) None

17. The number of solutions of the equation $\tan^{-1}\left(\frac{x}{1-x^2}\right) + \tan^{-1}\left(\frac{1}{x^3}\right) = \frac{3\pi}{4}$ belonging to the interval $(0,1)$ is

(A) 0 (B) 1 (C) 2 (D) 3

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

(A) $\frac{6}{17}$ (B) $\frac{7}{17}$ (C) $\frac{16}{7}$ (D) $\frac{17}{6}$

19. The number of solution of $\sin^{-1} x + \sin^{-1} 2x = \frac{\pi}{3}$

(A) 3 (B) 5 (C) 7 (D) 9

20. If $\left[\sin^{-1}\cos^{-1}\sin^{-1}\tan^{-1}x\right] = 1$, where $[.]$ denotes the greatest integer function, then x belongs to the interval.

(A) $[\tan\sin\cos 1, \tan\sin\cos\sin 1]$ (B) $[\tan\sin\cos 1, \tan\sin\cos\sin 2]$

(C) $[-1,1]$ (D) $[\sin\cos\tan 1, \sin\cos\sin\tan 1]$

21. 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

(A) $\frac{\pi}{2}$ (B) $\pi$ (C) $-\frac{\pi}{2}$ (D) $-\frac{3\pi}{4}$

**22.** The principal value of $\cos^{-1}\left(\cos\frac{2\pi}{3}\right) + \sin^{-1}\left(\sin\frac{2\pi}{3}\right)$ is-

(A) $\pi$ (B) $\pi/2$ (C) $\pi/3$ (D) $4\pi/3$

23. If $x_1, x_2, x_3, x_4$ are roots of the equation

$x^4 - x^3 \sin 2\beta + x^2 \cos 2\beta - x\cos\beta - \sin\beta = 0, \& \left(\sin\beta \neq \frac{1}{2}\right)$ then

$\text{Tan}^{-1}(x_1) + \text{Tan}^{-1}(x_2) + \text{Tan}^{-1}(x_3) + \text{Tan}^{-1}(x_4)$ can be equal to

(A) $\beta$ (B) $\frac{\pi}{2} - \beta$ (C) $\pi - \beta$ (D) $-\beta$

24. The number of solutions of $\sin\left[2\cos^{-1}\cot\left(2\text{Tan}^{-1}x\right)\right] = 0$ is/are

(A) 2 (B) 3 (C) 4 (D) 6

25. If xy + yz + zx = 1, then, $\tan^{-1}x + \tan^{-1}y + \tan^{-1}z$ =

(A) $\pi$ (B) $\pi/2$ (C) 1 (D) None of these

26. If $0 < A < \frac{\pi}{2}$, then the value of $\tan^{-1}(\sin A) + \tan^{-1}(\sin^3 A) + \tan^{-1}(\cot A \cos A)$ is

(A) $\pi$ (B) $\pi/2$ (C) $-\pi/2$ (D) 0

27. The equation $\sin^{-1}\left(\frac{3x}{5}\right) + \sin^{-1}\left(\frac{4x}{5}\right) = \sin^{-1}x$, has

(A) 3 roots whose sum is zero (B) 2 roots

(C) 3 roots which are in G.P. (D) 3 roots which are in H.P.

28. The number of real solution of $\tan^{-1}\sqrt{x(x+1)} + \sin^{-1}\sqrt{x^2+x+1} = \frac{\pi}{2}$, is

(A) zero (B) one (C) two (D) infinite

29. If $0 < x < 1$, the number of solutions of the equation

$\tan^{-1}(x-1) + \tan^{-1}x + \tan^{-1}(x+1) = \tan^{-1}3x$ is

(A) 0 (B) 1 (C) 2 (D) 3

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

(A) $\pi$ (B) $\pi/2$ (C) 0 (D) None of these