

## INVERSE TRIGONOMETRIC FUNCTIONS

### OBJECTIVE TYPE QUESTIONS (MCQs)

1. The principal value of  $\tan^{-1}(-\sqrt{3})$  is  
(A)  $\frac{\pi}{3}$                       (B)  $-\frac{\pi}{3}$                       (C)  $\frac{\pi}{4}$                       (D)  $-\frac{\pi}{6}$
  
2. Principal value of  $\cot^{-1}\left(-\frac{1}{\sqrt{3}}\right)$  is  
(A)  $\frac{\pi}{3}$                       (B)  $-\frac{\pi}{3}$                       (C)  $\frac{\pi}{6}$                       (D)  $\frac{2\pi}{3}$
  
3.  $\tan^{-1}\sqrt{3} - \cot^{-1}(-\sqrt{3})$  is equal to  
(A)  $\pi$                       (B)  $-\frac{\pi}{2}$                       (C)  $0$                       (D)  $2\sqrt{3}$
  
4. The principal value of  $\tan^{-1}(-1)$  is  
(A)  $\frac{\pi}{4}$                       (B)  $-\frac{\pi}{6}$                       (C)  $-\frac{\pi}{4}$                       (D)  $\frac{\pi}{6}$
  
5. The principal value of  $\cot^{-1}(-1)$  is  
(A)  $\frac{3\pi}{4}$                       (B)  $\frac{\pi}{4}$                       (C)  $-\frac{\pi}{4}$                       (D)  $-\frac{3\pi}{4}$
  
6. The principal value of  $\cos^{-1}\left(-\frac{1}{2}\right)$  is  
(A)  $\frac{\pi}{3}$                       (B)  $\frac{2\pi}{3}$                       (C)  $-\frac{\pi}{3}$                       (D)  $\frac{\pi}{6}$
  
7. The principal value of  $\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$  is  
(A)  $\frac{\pi}{6}$                       (B)  $\frac{\pi}{3}$                       (C)  $-\frac{\pi}{6}$                       (D)  $\frac{\pi}{4}$
  
8. If  $\cos^{-1}x > \sin^{-1}x$ , then

(A)  $\frac{1}{\sqrt{2}} < x \leq 1$  (B)  $0 \leq x < \frac{1}{\sqrt{2}}$  (C)  $-1 \leq x < \frac{1}{\sqrt{2}}$  (D)  $x > 0$

9. Which of the following corresponds to the principal value branch of  $\tan^{-1} x$ ?

(A)  $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$  (B)  $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$  (C)  $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right) - \{0\}$  (D)  $(0, \pi)$

10. The principal value branch of  $\sec^{-1} x$  is

(A)  $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right] - \{0\}$  (B)  $[0, \pi] - \left\{\frac{\pi}{2}\right\}$   
 (C)  $(0, \pi)$  (D)  $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

11. Value of  $\cos\left[\frac{\pi}{6} + \cos^{-1}\left(-\frac{1}{2}\right)\right]$  is

(A)  $-\frac{\sqrt{3}}{2}$  (B)  $\frac{\sqrt{3}-1}{2\sqrt{2}}$  (C)  $\frac{\sqrt{5}-1}{4}$  (D)  $\frac{\sqrt{3}+1}{2\sqrt{2}}$

12. If  $\sin^{-1} : [-1, 1] \rightarrow \left[\frac{\pi}{2}, \frac{3\pi}{2}\right]$  is a function, then value of  $\sin^{-1}\left(-\frac{1}{2}\right)$  is

(A)  $\frac{\pi}{6}$  (B)  $-\frac{\pi}{6}$  (C)  $\frac{5\pi}{6}$  (D)  $\frac{7\pi}{6}$

13. Which of the following is the principal value branch of  $\cos^{-1} x$ ?

(A)  $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$  (B)  $(0, \pi)$  (C)  $[0, \pi]$  (D)  $(0, \pi) - \left\{\frac{\pi}{2}\right\}$

14. Which of the following is the principal value branch of  $\operatorname{cosec}^{-1} x$ ?

(A)  $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$  (B)  $[0, \pi] - \left\{\frac{\pi}{2}\right\}$   
 (C)  $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$  (D)  $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right] - \{0\}$

15. The domain of the function  $\cos^{-1}(2x-1)$  is

(A)  $[0, 1]$  (B)  $[-1, 1]$  (C)  $(-1, 1)$  (D)  $[0, \pi]$

16. One branch of  $\cos^{-1} x$  other than the principal value branch corresponds to  
 (A)  $\left[\frac{\pi}{2}, \frac{3\pi}{2}\right]$  (B)  $[\pi, 2\pi] - \left\{\frac{3\pi}{2}\right\}$  (C)  $(0, \pi)$  (D)  $[2\pi, 3\pi]$
17. The principal value of  $\sin^{-1}\left(\frac{-\sqrt{3}}{2}\right)$  is  
 (A)  $-\frac{2\pi}{3}$  (B)  $-\frac{\pi}{3}$  (C)  $\frac{4\pi}{3}$  (D)  $\frac{5\pi}{3}$
18. The domain of the function  $f = \sin^{-1}(-x^2)$  is  
 (A)  $[0, 1]$  (B)  $(0, 1)$  (C)  $[-1, 1]$  (D)  $\phi$
19. The domain of  $y = \cos^{-1}(x^2 - 4)$  is  
 (A)  $[3, 5]$  (B)  $[0, \pi]$   
 (C)  $[-\sqrt{5}, -\sqrt{3}] \cap [-\sqrt{5}, \sqrt{3}]$  (D)  $[-\sqrt{5}, -\sqrt{3}] \cup [\sqrt{3}, \sqrt{5}]$
20. The domain of  $\sin^{-1} 2x$  is  
 (A)  $[0, 1]$  (B)  $[-1, 1]$  (C)  $\left[-\frac{1}{2}, \frac{1}{2}\right]$  (D)  $[-2, 2]$
21. The value of  $x$  for which  $\sin(\cot^{-1}(1+x)) = \cos(\tan^{-1} x)$  is  
 (A)  $\frac{1}{2}$  (B)  $1$  (C)  $0$  (D)  $-\frac{1}{2}$
22. If  $0 < x < 1$ , then  $\sqrt{1+x^2} \left[ \left\{ x \cos(\cot^{-1} x) + \sin(\cot^{-1} x)^2 \right\} - 1 \right]^{\frac{1}{2}}$  is equal to  
 (A)  $\frac{x}{\sqrt{1+x^2}}$  (B)  $x$  (C)  $x\sqrt{1+x^2}$  (D)  $\sqrt{1+x^2}$
23. Let  $\theta = \sin^{-1}(\sin(-600^\circ))$ . Then the value of  $\theta$  is  
 (a)  $\frac{\pi}{3}$  (B)  $\frac{\pi}{2}$  (C)  $\frac{2\pi}{3}$  (D)  $\frac{-2\pi}{3}$
24. The value of  $\sin(2\sin^{-1}(.6))$  is

- (A) .48                      (B) .96                      (C) 1.2                      (D)  $\sin 1.2$
25. The value of  $\sin^{-1}\left(\cos\left(\frac{33\pi}{5}\right)\right)$  is  
 (A)  $\frac{3\pi}{5}$                       (B)  $-\frac{7\pi}{5}$                       (C)  $\frac{\pi}{10}$                       (D)  $-\frac{\pi}{10}$
26. The principal value of the expression  $\cos^{-1}[\cos(-680^\circ)]$  is  
 (A)  $\frac{2\pi}{9}$                       (B)  $-\frac{2\pi}{9}$                       (C)  $\frac{34\pi}{9}$                       (D)  $\frac{\pi}{9}$
27. The value of  $\tan^2(\sec^{-1}2) + \cot^2(\operatorname{cosec}^{-1}3)$  is  
 (A) 5                      (B) 11                      (C) 13                      (D) 15
28. The value of  $\tan\left(2 \tan^{-1}\frac{1}{5}\right)$  is  
 (A)  $\frac{12}{5}$                       (B)  $\frac{5}{12}$                       (C)  $\frac{5}{17}$                       (D)  $\frac{17}{5}$
29. 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)  $\frac{2\pi}{3}$                       (C)  $\frac{4\pi}{3}$                       (D)  $2\pi$
30. If  $4 \sin^{-1}x + \cos^{-1}x = \pi$ , then  $x$  is equal to  
 (a)  $-\frac{1}{4}$                       (B)  $\frac{1}{4}$                       (C)  $-\frac{1}{2}$                       (D)  $\frac{1}{2}$
31. If  $\cos(2 \sin^{-1}x) = \frac{1}{9}$ , then the value of  $x$  is  
 (A)  $\frac{3}{2}$                       (B)  $\frac{2}{3}$                       (C)  $\frac{1}{2}$                       (D) 1
32. The value of  $\sec\left[\tan^{-1}\left(\frac{b+a}{b-a}\right) - \tan^{-1}\left(\frac{a}{b}\right)\right]$  is  
 (A) 1                      (B)  $\sqrt{2}$                       (C) 2                      (D) 4

33. The value of  $\tan^{-1}\left(\frac{x}{y}\right) - \tan^{-1}\left(\frac{x-y}{x+y}\right)$ ,  $\left(\frac{x}{y} \geq 0\right)$  is
- (A)  $\frac{\pi}{4}$                       (B)  $\frac{\pi}{3}$                       (C)  $\frac{\pi}{2}$                       (D)  $\pi$
34. If  $\cos^{-1}\left(\frac{x}{5}\right) + \operatorname{cosec}^{-1}\left(\frac{5}{4}\right) = \frac{\pi}{2}$ , then the value of  $x$  is
- (A) 1                      (B) 3                      (C) 5                      (D) 4
35. The value of  $\cot^{-1}\left(\frac{\sqrt{1-\sin x} + \sqrt{1+\sin x}}{\sqrt{1-\sin x} - \sqrt{1+\sin x}}\right)$ ,  $\left(0 < x < \frac{\pi}{2}\right)$  is
- (A)  $\frac{x}{2}$                       (B)  $\frac{\pi}{2} - 2x$                       (C)  $2\pi - x$                       (D)  $\pi - \frac{x}{2}$
36. If  $3 \tan^{-1} x + \cot^{-1} x = \pi$ , then  $x$  equals
- (A) 0                      (B) 1                      (C) -1                      (D)  $\frac{1}{2}$
37. If  $\cos\left(\sin^{-1}\frac{2}{5} + \cos^{-1} x\right) = 0$ , then  $x$  is equal to
- (A)  $\frac{1}{5}$                       (B)  $\frac{2}{5}$                       (C) 0                      (D) 1
38. If  $\tan^{-1} x = \frac{\pi}{10}$  for some  $x \in \mathbf{R}$ , then the value of  $\cot^{-1} x$  is
- (A)  $\frac{\pi}{5}$                       (B)  $\frac{2\pi}{5}$                       (c)  $\frac{3\pi}{5}$                       (d)  $\frac{4\pi}{5}$
39. If  $\sin^{-1} x + \sin^{-1} y = \frac{\pi}{2}$ , then value of  $\cos^{-1} x + \cos^{-1} y$  is
- (A)  $\frac{\pi}{2}$                       (B)  $\pi$                       (C) 0                      (D)  $\frac{2\pi}{3}$
40. If  $\sin^{-1}\frac{2a}{1+a^2} + \cos^{-1}\frac{1-a^2}{1+a^2} = \tan^{-1}\frac{2x}{1-x^2}$ , where  $a, x \in ]0, 1[$ , then the value of  $x$  is

- (A) 0                      (B)  $\frac{a}{2}$                       (C)  $a$                       (D)  $\frac{2a}{1-a^2}$
41. If  $\cos^{-1} \alpha + \cos^{-1} \beta + \cos^{-1} \gamma = 3\pi$ , then  $\alpha(\beta + \gamma) + \beta(\gamma + \alpha) + \gamma[\alpha + \beta]$  is equal to  
 (A) 0                      (B) 1                      (C) 6                      (D) 12
42. The value of  $\cot(\sin^{-1} x)$  is  
 (A)  $\frac{\sqrt{1+x^2}}{x}$                       (B)  $\frac{x}{\sqrt{1+x^2}}$                       (C)  $\frac{1}{x}$                       (D)  $\frac{\sqrt{1-x^2}}{x}$
43. The greatest and least values of  $(\sin^{-1} x)^2 + (\cos^{-1} x)^2$  are respectively  
 (A)  $\frac{5\pi^2}{4}$  and  $\frac{\pi^2}{8}$                       (B)  $\frac{\pi}{2}$  and  $\frac{-\pi}{2}$                       (C)  $\frac{\pi^2}{4}$  and  $\frac{-\pi^2}{4}$                       (D)  $\frac{\pi^2}{4}$  and 0
44. The equation  $\tan^{-1} x - \cot^{-1} x = \tan^{-1}\left(\frac{1}{\sqrt{3}}\right)$  has  
 (A) no solution                      (B) unique solution  
 (C) infinite number of solutions                      (D) two solutions
45. The principal value of  $\cos^{-1}\left(-\frac{1}{\sqrt{2}}\right)$  is  
 (A)  $\frac{3\pi}{4}$                       (B)  $\frac{\pi}{4}$                       (C)  $-\frac{\pi}{4}$                       (D)  $\frac{5\pi}{4}$
46. The principal value of  $\tan^{-1}\left(\tan\frac{35\pi}{3}\right)$  is  
 (A)  $\frac{35\pi}{3}$                       (B)  $\frac{5\pi}{3}$                       (C)  $\frac{\pi}{3}$                       (D)  $-\frac{\pi}{3}$
47. The value of  $\sin^{-1}\left(\sin\frac{5\pi}{3}\right)$  is  
 (A)  $-\frac{\pi}{3}$                       (B)  $\frac{5\pi}{3}$                       (C)  $\frac{\pi}{3}$                       (D)  $\frac{2\pi}{3}$
48. Value of  $\cos\left(\tan^{-1}\frac{4}{3}\right)$  is  
 (A)  $\frac{2}{3}$                       (B)  $\frac{1}{2}$                       (C)  $\frac{3}{4}$                       (D)  $\frac{3}{5}$