

# Class12-Mathematics

Holiday HW-May 2021

## Chapter-2: Inverse trigonometric Functions

1. Simplify  $\cos(\tan^{-1} x)$ .
2. Simplify  $\tan\left[\sec^{-1} \sqrt{1+x^2}\right]$ .
3. Find the value of  $\sec^{-1}\left[\sec\left(\frac{\pi}{6}\right)\right]$ .
4. Simplify  $\tan^{-1}\left[\frac{\cos x}{1+\sin x}\right]$ .
5. Simplify  $\tan^{-1} \frac{1}{\sqrt{x^2-1}}$ .
6. Find the value of  $\sec^2(\tan^{-1} 2) + \operatorname{cosec}^2(\cot^{-1} 3)$ .
7. Simplify  $\sin^{-1}\left[x\sqrt{1-x} - \sqrt{x}\sqrt{1-x^2}\right]$ .
8. If  $\tan^{-1} \frac{1-x}{1+x} = \frac{1}{2} \tan^{-1} x$ , then find the value of  $x$ .
9. Find the value of  $\cos^{-1}\left(\cos \frac{7\pi}{6}\right)$ .
10. The value of  $\sin\left[\cot^{-1}\left(\tan\left(\cos^{-1} x\right)\right)\right]$  is equal to:
11. If  $\sin\left(\sin^{-1} \frac{1}{5} + \cos^{-1} x\right) = 1$ , then  $x$  is equal to:
12. If  $\sin^{-1} x = \theta + \beta$  and  $\sin^{-1} y = \theta - \beta$ , then  $1+xy$  is equal to:
13. If  $\sin^{-1} \frac{1}{3} + \sin^{-1} \frac{2}{3} = \sin^{-1} x$ , then  $x$  is equal to;
14.  $\tan(\cos^{-1} x)$  is equal to:
15. The principal value of  $\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$  is equal to:
16. Find the value of  $\cot\left[\cos^{-1}\left(\frac{7}{25}\right)\right]$ .
17. If  $\frac{\pi}{2} \leq x \leq \frac{3\pi}{2}$ , then  $\sin^{-1}(\sin x)$  is equal to:
18. If  $\pi \leq x \leq 2\pi$ , then  $\cos^{-1}(\cos x)$  is equal to:
19. The value of is equal to :
20. The principal value of  $\sin^{-1}\left(\sin \frac{5\pi}{3}\right)$  is equal to :
21. Find the solution set of the equation  $\sin^{-1} x = 2 \tan^{-1} x$ .
22. Find the value of  $\cos(\tan^{-1}(\tan 2))$  is equal to :

23. Find the value of  $\sin\left[\frac{\pi}{2} - \sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)\right]$ .

24. Simplify :  $\sin[\cot^{-1}(\cos \tan^{-1} x)]$ .

25. If  $\sin(\cot^{-1}(x+1)) = \cos(\tan^{-1} x)$ , then find the value of  $x$ .

26. Find the value of  $\cos^{-1} \frac{4}{5} + \tan^{-1} \frac{3}{5}$ .

27. Find the value of  $2 \tan^{-1} \frac{1}{3} + \tan^{-1} \frac{1}{2}$ .

28. Find the value of  $\tan\left[\cos^{-1} \frac{4}{5} + \tan^{-1} \frac{2}{3}\right]$ .

29. Simplify  $\tan^{-1} 1 + \tan^{-1} 2 + \tan^{-1} 3$ .

30. Find the value of  $\cot^{-1} \frac{3}{4} + \sin^{-1} \frac{5}{13}$ .

31. If  $\tan^{-1} \frac{x-1}{x+2} + \tan^{-1} \frac{x+1}{x+2} = \frac{\pi}{4}$ , then Find the value of  $x$ .

32. Find the value of  $\cos\left[2 \cos^{-1} \frac{1}{5} + \sin^{-1} \frac{1}{5}\right]$ .

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

34. If  $\cot^{-1} x + \tan^{-1} 3 = \frac{\pi}{2}$ , then  $x$  is equal to :

35. Simplify  $\cos\left[\tan^{-1} \frac{1}{3} + \tan^{-1} \frac{1}{2}\right]$ .

36. Find the value of  $\tan^{-1} x + \cot^{-1}(x+1)$ .

37. Find the value of  $\cot^{-1} \frac{xy+1}{x-y} + \cot^{-1} \frac{yz+1}{y-z} + \cot^{-1} \frac{zx+1}{z-x}$ , if  $x > y > z > 0$

38. If  $\tan^{-1} \frac{a+x}{a} + \tan^{-1} \frac{a-x}{a} = \frac{\pi}{6}$ , then  $x^2$  is equal to :

39. If  $\cos^{-1} \frac{3}{5} - \sin^{-1} \frac{4}{5} = \cos^{-1} x$ , then  $x$  is equal to :

40. Find the value of  $\cot^{-1} 3 + \operatorname{cosec}^{-1} \sqrt{5}$ .

41. If  $\tan^{-1}(x-1) + \tan^{-1} x + \tan^{-1}(x+1) = \tan^{-1} 3x$ , then  $x$  is:

42. If  $\cos^{-1} x + \cos^{-1} y = 2\pi$ , then  $\sin^{-1} x + \sin^{-1} y$  is equal to

43. Find the value of  $\sin^{-1} \frac{1}{\sqrt{5}} + \cot^{-1} 3$ .

44. Find the value of  $\cos^{-1} \frac{1}{2} + 2 \sin^{-1} \frac{1}{2}$ .

45. Find the value of  $\tan^{-1} \frac{3}{4} + \tan^{-1} \frac{3}{5} - \tan^{-1} \frac{8}{19}$ . ]

46. Find the value of  $4 \tan^{-1} \frac{1}{5} - \tan^{-1} \frac{1}{70} + \tan^{-1} \frac{1}{99}$ .

47. If  $\sin^{-1} x + \sin^{-1} y = \frac{2\pi}{3}$ , then find  $\cos^{-1} x + \cos^{-1} y$ .

48. Simplify  $\tan^{-1} \left( \frac{1}{4} \right) + \tan^{-1} \left( \frac{2}{9} \right)$ .

### Topic-Derivatives

1. Find the differentiation of  $\tan(2x + b)$  w.r.t.  $x$ .
2. If  $x = \sin t$  and  $y = \cos t$ , then find  $\frac{dy}{dx}$  at  $t = \frac{\pi}{4}$ .
3. Find  $\frac{dy}{dx}$  if  $x + y = xy$ .
4. Find  $f'(1)$ , if  $f(x) = \tan^{-1} x$ .
5. Differentiate  $\log(1-2x)$ .
6. Differentiate  $\tan x$  w.r.t.  $x^2$ .
7. Find the value of  $k$  for which  $f(x) = \begin{cases} \frac{\sin 2x}{5x}, & \text{when } x \neq 0 \\ k, & \text{when } x = 0 \end{cases}$  is continuous at  $x = 0$ .
8. Show that the function  $f(x) = |x| + |x - 1|$  is continuous for all  $x \in R$ .
9. Give an example of a function which is continuous but not differentiable at at least two points.
10. Differentiate  $\sin^2(x^2)$  w.r.t  $x^2$
11. Differentiate  $\frac{(3x-7)}{\sqrt{x^3}}$  w.r.t  $x$
12. Differentiate  $\sqrt{e^{\sqrt{x}}}$  w.r.t  $x$
13. Differentiate  $x^a a^x$  w.r.t  $x$
14. Find the maximum values of  $f(x) = |x - 2| + 5$
15. Find the minimum values of  $f(x) = |x| + 3$
16. If  $f(x) = \tan^{-1}(\cot x)$ , show that  $f'(x) = -1$
17. If  $y = 3\sin x - 4 \sin^3 x$ , find  $\frac{dy}{dx}$  at  $x = \pi/6$
18. Is the function  $f(x) = x - |x|$  derivable at  $x = 0$