MATHS

BOOKS - OSWAAL PUBLICATION MATHS (KANNADA ENGLISH)

INVERSE TRIGONOMETRIC FUNCTIONS

Very Short Answer Type Questions

1. Write the principal value branch of $f(x) = \sin^{-1} x$.

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2. What is the domain of the function $\sin^2 x$?

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3. Find the principal value of the following: $\cos^{-1}\left(-\dfrac{1}{\sqrt{2}}\right)$

4. Write the set of the value of x for which $2\tan^{-1}x = \cos^{-1}\dfrac{1-x^2}{1+x^2}$ holds.

5. Write the domain of $f(x) = \cos^{-1}x$.

6. Write the domain of $f(x) = \sec^{-1}x$

7. Write the set of values of x for which $2\tan^{-1}x = \tan^{-1}\dfrac{2x}{1-x^2}$ holds.

8. Find the principal value of: $\cos^{-1}\left(-\dfrac{1}{2}\right)$

9. Find the principal value of $\cot^{-1}\left(\dfrac{-1}{\sqrt{3}}\right)$.

10. Evaluate :

$$\sin^{-1}(\sin 100) + \cos^{-1}(\cos 100) + \tan^{-1}(\tan 100) + \cot^{-1}(\cot 100)$$

.

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11. Find the principal value of: $\cos^{-1}\left(-\dfrac{1}{\sqrt{2}}\right)$

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12. Write the principal value of $\cos^{-1}\left[\cos\left(680^0\right)\right]$.

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13. Write the principal value of $\tan^{-1}\left[s \in -\left(\dfrac{\pi}{2}\right)\right]$

14. $\cot\left(\dfrac{\pi}{2} - 2\cot^{-1}\sqrt{3}\right)$

15. If $\sin\left(\sin^{-1}.\dfrac{1}{5} + \cos^{-1}x\right) = 1$, then find the value of x

16. If $\tan^{-1}x + \tan^{-1}y = \dfrac{\pi}{4}$, then write the value of $x + y + xy$.

17. Write the value of $\cos^{-1}\left(-\dfrac{1}{2}\right) + 2\sin^{-1}\left(\dfrac{1}{2}\right)$

18. Find the principal values of $\dfrac{\cos^{-1}\left(\sqrt{3}\right)}{2}$ and $\cos^{-1}\left(-\dfrac{1}{2}\right)$

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19. Write the principal value of $\left[\tan^{-1}\left(-\sqrt{3}\right) + \tan^{-1}(1)\right]$.

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20. Evaluate: $\sin^{-1}\left(s \in \dfrac{3\pi}{5}\right)$

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21. Write the principal value of $\tan^{-1}(1) + \cos^{-1}\left(-\dfrac{1}{2}\right)$

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22. Write the value of $\tan\left(2\dfrac{\tan^{-1}1}{5}\right)$.

23. Write the principal value of $\tan^{-1}\sqrt{(3)} - \cot^{-1}\sqrt{(-3)}$.

24. Write the value of $\tan^{-1}\left[2\sin\left(2\dfrac{\cos^{-1}\left(\sqrt{3}\right)}{2}\right)\right]$.

25. Write the principal value of $\tan^{-1}\left(\dfrac{\tan(9pi)}{8}\right)$.

26. Write the value of $\sin\left(2\dfrac{\sin^{-1}3}{5}\right)$.

27. Write $\cot^{-1}\left(\dfrac{1}{\sqrt{x^2-1}}\right)$, $|x| > 1$ in the simplest form.

28. Find the principal value of $\tan^{-1}\sqrt{3} - \sec^{-1}(-2)$.

29. Write the value of $\cos^{-1}\left(-\dfrac{1}{2}\right) + 2\sin^{-1}\left(\dfrac{1}{2}\right)$

30. Write the principal value of $\cos^{-1}\left(\dfrac{1}{2}\right) - 2\sin^{-2}\left(-\dfrac{1}{2}\right)$

31. Write the value of $\cot\left(\tan^{-1}a + \cot^{-1}a\right)$.

32. Find the principal value of: $\sin^{-1}\left(-\dfrac{1}{2}\right)$

33. The value of $\sin^{-1}\left(-\dfrac{\sqrt{3}}{2}\right)$ is -

34. $\sin\left[\dfrac{\pi}{3} - \sin^{-1}\left(-\dfrac{1}{2}\right)\right]$

35. $\tan^{-2}\tan\left(\dfrac{3\pi}{4}\right)$

36. Write the principal value of $\tan^{1}(-1)$

37. Find x, if $\tan^{-1}4 + \cot^{-1}x = \dfrac{\pi}{2}$.

38. Find the principal value of $\cos^{-1}\left(-\dfrac{\sqrt{3}}{2}\right)$.

39. find the value of $\sin^{-1}\left(-\dfrac{1}{2}\right) + \cos^{-1}\left(-\dfrac{1}{2}\right)$

40. Write the principal value of $\sec^{-1}(-2)$

41. Find the principal value of $\cot^{-1}\left(-\sqrt{3}\right)$

1. $\tan^{-1}\left(\dfrac{\cos x + \sin x}{\cos x - \sin x}\right)$

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2. Write $\cot^{-1}\left(\dfrac{1}{\sqrt{x^2 - 1}}\right)$, $|x| > 1$ in the simplest form.

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3. Show that (i)

$$\sin^{-1}\left(2x\sqrt{1 - x^2}\right) = 2\sin^{-1}x, \quad -\dfrac{1}{\sqrt{2}} \le x \le \dfrac{1}{\sqrt{2}} \text{(ii)}$$

$$\sin^{-1}\left(2x\sqrt{1 - x^2}\right) = 2\cos^{-1}x, \quad \dfrac{1}{\sqrt{2}} \le x \le 1$$

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4. Prove that: $2\dfrac{\tan^{-1}1}{2} + \dfrac{\tan^{-1}1}{7} = \dfrac{\tan^{-1}(31)}{17}$

5. Express each of the following in the simplest form: `tan^(-1) {sqrt((1-cosx)/(1+cosx))},\ -pi

6. $\sin\left[\dfrac{\pi}{3} - \sin^{-1}\left(-\dfrac{1}{2}\right)\right]$

7. Prove that $\tan^{-1}x + \cot^{-1}x = \dfrac{\pi}{2}, \ x \in R.$

8. Find the principal value of $\tan^{-1}\sqrt{3} - \sec^{-1}(-2)$

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9. Prove the following:

$$\sin^{-1}\left(2x\sqrt{1-x^2}\right) = 2\sin^{-1}x, \quad -\frac{1}{\sqrt{2}} \le x \le \frac{1}{\sqrt{2}}$$

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10. Evaluate: $\tan^{-1}\left(\dfrac{\tan(5\pi)}{6}\right) + \cos^{-1}\left\{\cos\left(\dfrac{13\pi}{6}\right)\right\}$

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11. Prove that $\tan\left(\cot^{-1}x\right) = \cot\left(\tan^{-1}x\right)$

12. Find the principal value of $\cot^{-1}\left(\dfrac{-1}{\sqrt{3}}\right)$.

13. Find the value of $\tan\left(\cos^{-1}x\right)$ and hence evaluate $\tan\left(\cos^{-1}\left(\dfrac{8}{17}\right)\right)$

Short Answer Type Questions Ii

1. Solve : $\dfrac{\tan^{-1}(x-1)}{x-2} + \dfrac{\tan^{-1}(x+1)}{x+2} = \dfrac{\pi}{4}$

2. Prove that: $3\cos^{-1} x = \cos^{-1}(4x^3 - 3x)$, $x \in \left[\frac{1}{2}, 1\right]$

3. Prove that

$$\tan^{-1} x + \frac{\tan^{-1}(2x)}{1 - x^2} = \tan^{-1}\left(\frac{3x - x^3}{1 - 3x^2}\right), |x| < \frac{1}{\sqrt{3}}$$

4. $\tan^{-1} x + \tan^{-1} y = \pi + \tan^{-1}\left(\frac{x + y}{1 - xy}\right)$

5. Prove that: $2\dfrac{\tan^{-1} 1}{2} + \dfrac{\tan^{-1} 1}{7} = \dfrac{\tan^{-1}(31)}{17}$

6. Prove that $2\sin^{-1}\left[\dfrac{3}{5}\right] - \tan^{-1}\left[\dfrac{17}{31}\right] = \dfrac{\pi}{4}$

7. Solve the equation $\sin^{-1} yx + \sin^{-1} 6\sqrt{3}x = \dfrac{-\pi}{2}$.

8. $\cot^{-1}\left(\dfrac{\sqrt{1 + \sin x} + \sqrt{1 - \sin x}}{\sqrt{1 + \sin x} - \sqrt{1 - \sin x}}\right) = \dfrac{x}{2}, x \in \left(0, \dfrac{\pi}{4}\right)$

9. Solve for x: $\tan^{-1} x + 2\cot^{-1} x = \dfrac{2\pi}{3}$

10. Prove that $s \in^{-1}\left(\dfrac{8}{17}\right) + \sin^{-1}\left(\dfrac{3}{5}\right) = \cos^{-1}\left(\dfrac{36}{85}\right)$

11. Solve for x\ : $\dfrac{\tan^{-1}(1-x)}{1+x} = \dfrac{1}{2}\tan^{-1}\backslash x; x > 0$

12. Prove that

$$2\tan^{-1}\left(\dfrac{1}{5}\right) + \sec^{-1}\left(\dfrac{5\sqrt{2}}{7}\right) + 2\tan^{-1}\left(\dfrac{1}{8}\right) = \dfrac{\pi}{4}.$$

13. Prove that:

$$\tan^{-1}\left[\frac{\sqrt{1+x} - \sqrt{1-x}}{\sqrt{1+x} + \sqrt{1-x}}\right] = \frac{\pi}{4} - \frac{1}{2}\cos^{-1}x, \quad -\frac{1}{\sqrt{2}} \leq x \leq 1$$

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14. If $\tan^{-1}\left(\dfrac{x-2}{x-4}\right) + \tan^{-1}\left(\dfrac{x+2}{x+4}\right) = \dfrac{\pi}{4}$, find the value of x.

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15. Solve for x: $\cos\left(\tan^{-1}x\right) = \sin\left(\dfrac{\cot^{-1}3}{4}\right)$

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16. Prove the following:

$$\cos^{-1}\left(\frac{12}{13}\right) + \sin^{-1}\left(\frac{3}{5}\right) = \sin^{-1}\left(\frac{56}{65}\right)$$

17. Find the value of the following:

$$\frac{\tan 1}{2} \left[\frac{\sin^{-1}(2x)}{1+x^2} + \frac{\cos^{-1}(1-y^2)}{1+y^2} \right], \ |x|\langle 1, y \rangle 0 \text{ and } xy < 1.$$

18. Prove that : $\tan^{-1}\left(\frac{1}{2}\right) + \tan^{-1}\left(\frac{1}{5}\right) + \tan^{-1}\left(\frac{1}{8}\right) = \frac{\pi}{4}$.

19. Show that: $\tan\left(\frac{1}{2} \frac{\sin^{-1} 3}{4}\right) = \frac{4\sqrt{-7}}{3}$

20. Solve for x: $\tan^{-1} 3x + \tan^{-1} 2x = \dfrac{\pi}{4}$

21. $\tan^{-1}\left(\dfrac{3}{4}\right) + \tan^{-1}\left(\dfrac{3}{5}\right) - \tan^{-1}\left(\dfrac{8}{19}\right) =$

22. Prove that $tan^{-1}\left(\dfrac{\cos x}{1 + \sin x}\right) = \dfrac{\pi}{4} - \dfrac{x}{2}, \ x \in \left(-\dfrac{\pi}{2}, \dfrac{\pi}{2}\right)$

23. $\cos\left(\sin^{-1}\left(\dfrac{3}{5}\right) + \cot^{-1}\left(\dfrac{3}{2}\right)\right) = \dfrac{6}{5\sqrt{13}}$

24. $\cos^{-1}\left(\dfrac{4}{5}\right) + \cos^{-1}\left(\dfrac{12}{13}\right) =$

25. Solve for x: $2\tan^{-1}(\sin x) = \tan^{-1}(2\sec x),\ x \neq \dfrac{\pi}{2}$

26. Prove that: $\sin\left[\cot^{-1}\left\{\cos\left(\tan^{-1} x\right)\right\}\right] = \sqrt{\dfrac{x^2 - 1}{x^2 + 2}}$

$\cos\left[\tan^{-1}\left\{\sin\left(\cot^{-1} x\right)\right\}\right] = \sqrt{\dfrac{x^2 + 1}{x^2 + 2}}$

27. Prove that : $2\tan^{-1}\left(\dfrac{3}{4}\right) - \tan^{-1}\left(\dfrac{17}{31}\right) = \dfrac{\pi}{4}.$

28. Solve for x :

$$\tan^{-1}\left(\frac{2x}{1-x^2}\right) + \cot^{-1}\left(\frac{1-x^2}{2x}\right) = \frac{\pi}{3}, \; -1 < x < 1$$

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29. $\tan^{-1}\left(\frac{1}{4}\right) + \tan^{-1}\left(\frac{2}{9}\right) = \frac{1}{2}\tan^{-1}\left(\frac{4}{3}\right)$

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30. solve: $\cos\left(2\sin^{-1}x\right) = \frac{1}{9}$

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31. Find the value of $\tan^{-1}\left(\frac{x}{y}\right) - \tan^{-1}\left(\frac{x-y}{x+y}\right)$

32. $\dfrac{9\pi}{8} - \dfrac{9}{4}\sin^{-1}\dfrac{1}{3} = \dfrac{9}{4}\sin^{-1}\dfrac{2\sqrt{2}}{3}$

$\dfrac{9\pi}{8} - \dfrac{9}{4}\sin^{-1}\dfrac{1}{3}$

$= \dfrac{9}{4}\left(\dfrac{\pi}{2} - \sin^{-1}\dfrac{1}{3}\right) = \dfrac{9}{4}\cos^{-1}\dfrac{1}{3}$

$= \dfrac{9}{4}\sin^{-1}\sqrt{q - \left(\dfrac{1}{3}\right)^2} \quad \left(\therefore \cos^{-1}x = \sin^{-1}\sqrt{1 - x^2}\right)$

$= \dfrac{9}{4}\sin^{-1}\sqrt{\dfrac{8}{9}} = \dfrac{9}{4}\sin^{-1}\left(\dfrac{2\sqrt{2}}{3}\right)$ =RHS Hence Proved.

33. Solve $\sin^{-1}(1 - x) - 2s \in^{-1} x = \dfrac{\pi}{2}$

34. prove that $\tan^{-1}(1) + \tan^{-1}(2) + \tan^{-1}(3) = \pi$

35. Solve for x: $\tan^{-1}(x+2) + \tan^{-1}(x-2) = \tan^{-1}\left(\dfrac{8}{79}\right)$, $x > 0$

36. Solve for $x : \tan^{-1}\left(\dfrac{x}{2}\right) + \tan^{-1}\left(\dfrac{x}{3}\right) = \dfrac{\pi}{4}, \sqrt{6} > x > 0.$

37. prove that $2\dfrac{\tan^{-1}1}{3} + \dfrac{\tan^{-1}1}{7} = \dfrac{\pi}{4}$

38. $\cos^{-1}x + \sin^{-1}\left(\dfrac{x}{2}\right) = \dfrac{\pi}{6}$

39. Prove the following: $\tan^{-1}\sqrt{x} = \dfrac{1}{2}\cos^{-1}\left(\dfrac{1-x}{1+x}\right),\ x\ (0,1)$

40. Prove the following:

$$\tan^{-1}x + \tan^{-1}\left(\dfrac{2x}{1-x^2}\right) = \tan^{-1}\left(\dfrac{3x-x^3}{1-3x^2}\right)$$

41. Prove the following: $\cos\left[\tan^{-1}\left\{\sin\left(\cos t^{-1}x\right)\right\}\right] = \sqrt{\dfrac{1+x^2}{2+x^2}}$

42. Prove that $\tan^{-1}\dfrac{1}{3} + \tan^{-1}\dfrac{1}{5} + \tan^{-1}\dfrac{1}{7} + \tan^{-1}\dfrac{1}{8} = \dfrac{\pi}{4}$

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43. Prove the following:

$$\tan\left[\dfrac{\pi}{4} + \dfrac{1}{2}\cos^{-1}\left(\dfrac{a}{b}\right)\right] + \tan\left[\dfrac{\pi}{4} - \dfrac{1}{2}\cos^{-1}\left(\dfrac{a}{b}\right)\right] = \dfrac{2b}{a}$$

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