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MATHS

BOOKS - ARIHANT MATHS (HINGLISH)

INVERSE - TRIGONOMETRIC FUNCTIONS

Illustrative Examples

1. Evaluate $\tan^{-1}\sqrt{3} - \cot^{-1}(-\sqrt{3})$

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2. Find the value of $\cos^{-1}\left(\cos.\frac{2\pi}{3}\right) + \sin^{-1}\left(\sin.\frac{2\pi}{3}\right)$.

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3. $\tan^{-1}(\sqrt{3}) + \sec^{-1}(-2) =$

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4. Evaluate :

$$\tan^{-1}\left(2\cos\left(2\sin^{-1}\left(\frac{1}{2}\right)\right)\right)$$

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Frequently Asked Questions

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

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2. If $\tan^{-1} x + \tan^{-1} y = \frac{\pi}{4}, xy < 1$, then prove that $x + y + xy = 1.$

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

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4. If $\sin^{-1} x = \tan^{-1} ym$ what is the value of $\frac{1}{x^2} - \frac{1}{y^2}$?

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5. Prove that $\cos^{-1} x + \cos^{-1}\left[\frac{x}{2} + \frac{\sqrt{3 - 3x^2}}{2}\right] = \frac{\pi}{3}, \frac{1}{2} \leq x \leq 1$

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6. Find the value of :

$$\sin\left(2\tan^{-1}.\frac{1}{4}\right)+\cos\left(\tan^{-1}2\sqrt{2}\right)$$

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

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8. Show that $\frac{\sin^{-1}3}{5}-\frac{\sin^{-1}8}{17}=\frac{\cos^{-1}(84)}{85}$.

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9. Prove that: $\sin^{-1}\left(\frac{5}{13}\right)+\cos^{-1}\left(\frac{4}{5}\right)=\frac{1}{2}\sin^{-1}\left(\frac{3696}{4225}\right)$

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10. Show that : $2\sin^{-1}\left(\frac{3}{5}\right) - \tan^{-1}\left(\frac{17}{31}\right) = \frac{\pi}{4}$

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11. Prove that $\tan\left[\frac{\pi}{4} + \frac{1}{2}\cos^{-1}\frac{a}{b}\right] + \tan\left[\frac{\pi}{4} - \frac{1}{2}\cos^{-1}\frac{a}{b}\right] = 2\frac{b}{a}$

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

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

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

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

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

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13. Prove that

$$\tan^{-1}\left(\frac{6x-8x^3}{1-12x^2}\right)-\tan^{-1}\left(\frac{4x}{1-4x^2}\right)=\tan^{-1}2x;\ |2x|<\frac{1}{\sqrt{3}}$$

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14. Prove that

$$\tan^{-1}.\frac{1}{5}+\tan^{-1}.\frac{1}{7}+\tan^{-1}.\frac{1}{8}=\frac{\pi}{4}$$

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15. Solve : $2\tan^{-1},(\cos x)=\tan^{-1},(2\cos ecx)$

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16. Solve : $\tan^{-1}4x+\tan^{-1}6x=\frac{\pi}{4}$

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17. If $\tan^{-1}\left(\frac{x-3}{x-4}\right)+\tan^{-1}\left(\frac{x+3}{x+4}\right)=\frac{\pi}{4}$,

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18. Solve :

$(i)\quad \tan^{-1}.\frac{x}{2}+\tan^{-1}.\frac{x}{3}=\frac{\pi}{4}, \sqrt{6}>x>0$

$(ii)\quad \sin\left(\sin^{-1}.\frac{1}{5}+\cos^{-1}x\right)=1$

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19. If $\left(\tan^{-1}x\right)^2+\left(\cot^{-1}x\right)^2=\frac{5\pi^2}{8}$, then find x.

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

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21. Express $\sin^{-1}\left(\frac{\sin x+\cos x}{2}\right)$, where $-\frac{\pi}{4}<x<\frac{\pi}{4}$, in the simplest form.

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22. Prove that : $\tan^{-1}x+\tan^{-1}.\frac{2x}{1-x^2}=\tan^{-1}.\frac{3x-x^3}{1-3x^2}, |x|<\frac{1}{\sqrt{3}}$

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23. Simplify $\tan^{-1}\left[\frac{a\cos x-b\sin x}{b\cos x+a\sin x}\right]$, if $\frac{a}{b}\tan x \succ 1$.

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

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Questions From Ncert Exemplar

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

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

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3. Prove that : $\cot^{-1} 7 + \cot^{-1} 8 + \cot^{-1} 18 = \cot^{-1} 3$

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4. Find the value

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Exercise 2 A Short Answer Type Questions

1. Find the principal values of the following

$\cos^{-1}\left(\cos.\ \frac{13\pi}{6}\right)$

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2. Write the principal value of, $\cos^{-1}\left(\frac{\cos(7\pi)}{6}\right)$

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

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4. Using principal value, evaluate the following: $\sin^{-1}\left(\frac{\sin(3\pi)}{5}\right)$

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5. Find the principal values of the following

$\sin\left(\cos^{-1}.\frac{1}{2}\right)$

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6. $\cos\left(\sin^{-1}.\frac{5}{13}\right) =$

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

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

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

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10. Write the principal value of :

$$\cos^{-1}\left(\frac{1}{2}\right) - 2\sin^{-1}\left(-\frac{1}{2}\right)$$

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Exercise 2 A Long Answer Type Questions

1. Find the value of $\cos^{-1}\left(\frac{1}{2}\right) + 2\sin^{-1}\left(\frac{1}{2}\right)$

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2. Find the value of : $\tan^{-1}\left(\frac{-1}{\sqrt{3}}\right)+\cos^{-1}\left(\frac{-\sqrt{3}}{2}\right)+\sin^{-1}\left(\frac{1}{2}\right)$

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

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Exercise 2 B Short Answer Type Questions

1. Find the value of each of the expression in Exercise 16 to 18:

$\sin^{-1}\left(\sin\frac{2\pi}{3}\right)$

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

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3. Find the value of the following :

$\sin^{-1}\left(\sin.\ \frac{4\pi}{5}\right)$

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

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5. Find the value of the following: $\tan^{-1}\left(\frac{\tan(7\pi)}{6}\right)$

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6. Find the value of the following :

$\tan\left(2\tan^{-1}.\frac{1}{5}\right)$

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7. Evaluate: $\cos\left(\sec^{-1}x+\mathrm{cosec}^{-1}x\right),|x|\geq 1$

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8. Find the value of the following expression:

$\cot\left(\tan^{-1}a+\cot^{-1}a\right)$

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9. Evaluate

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

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10. Prove that : 2 sin^(-1), 3/5 = tan^(-1), 24/7`

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

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12. Prove that :

$\tan^{-1}.\frac{3}{5}+\tan^{-1}.\frac{1}{4}=\frac{\pi}{4}$

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13. Prove that :

$\cos^{-1}\left(\cos^2 x - \sin^2 x\right) = 2x$

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

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15. Prove that :

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

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16. Prove that :

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

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17. Prove that :

$2\sin^{-1}.\left(\frac{2x}{1+x^2}\right),\ -1 \leq x < 1$

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18. Prove that :

$\tan^{-1}\left(\frac{2x\sqrt{1-x^2}}{1-2x^2}\right) = 2\sin^{-1}x$ when : $-\frac{1}{\sqrt{2}} \leq x \leq \frac{1}{\sqrt{2}}$

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19. Prove that:$\tan^{-1}\sqrt{x} = \frac{1}{2}\cos^{-1}\left(\frac{1-x}{1+x}\right), x \in [0,1]$

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20. Prove that

$$\tan^{-1}\left(\frac{1-\sqrt{x}}{1+\sqrt{x}}\right)=\frac{\pi}{4}-\tan^{-1}\sqrt{x}, \text{where} x>0$$

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21. Evaluate $\sin^{-1}.\frac{4}{5}+\sin^{-1}.\frac{5}{13}+\sin^{-1}.\frac{16}{65}$

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22. Prove that: $\frac{\sin^{-1}(12)}{13}+\frac{\cos^{-1}4}{5}+\frac{\tan^{-1}(63)}{16}=\pi$

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23. Prove that : $\tan^{-1}1+\tan^{-1}2+\tan^{-1}3=\pi$

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24. Prove that

$$\tan^{-1}.\frac{1}{2}+\tan^{-1}.\frac{2}{11}=\tan^{-1}.\frac{3}{4}$$

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

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26. Prove that

$$2\tan^{-1}.\frac{1}{5}+\tan^{-1}.\frac{1}{4}=\tan^{-1}.\frac{32}{43}$$

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27. Prove that

$$2\tan^{-1}.\frac{1}{5}+\tan^{-1}.\frac{1}{6}=\tan^{-1}.\frac{9}{13}$$

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28. Prove that

$$2\tan^{-1}.\frac{1}{7}+\tan^{-1}.\frac{1}{3}=\tan^{-1}.\frac{9}{13}$$

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29. Prove that

$$\tan^{-1}.\frac{1}{2}+\tan^{-1}.\frac{1}{5}=\frac{1}{2}\cos^{-1}.\frac{16}{65}$$

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30. Prove that: $\tan^{-1}\left(\frac{1}{4}\right)+\tan^{-1}\left(\frac{2}{9}\right)=\frac{1}{2}\cos^{-1}\left(\frac{3}{5}\right).$

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31. Prove that

$$\tan^{-1}.\frac{3}{4}+\tan^{-1}.\frac{3}{5}-\tan^{-1}.\frac{8}{19}=\frac{\pi}{4}$$

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32. Prove that

$$\tan^{-1}.\frac{1}{5}+\tan^{-1}.\frac{1}{7}+\tan^{-1}.\frac{1}{8}=\frac{\pi}{4}$$

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33. Prove that

$$\tan^{-1}.\frac{1}{5}+\tan^{-1}.\frac{1}{7}+\tan^{-1}.\frac{1}{8}=\frac{\pi}{4}$$

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34. Prove that $\cos^{-1}.\frac{4}{5}+\cos^{-1}.\frac{12}{13}=\cos^{-1}.\frac{33}{65}$

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

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36. Prove that $\sin^{-1}\left(\frac{63}{65}\right)=\sin^{-1}\left(\frac{5}{13}\right)+\cos^{-1}\left(\frac{3}{5}\right)$

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37. Prove that

$\sin^{-1}.\frac{8}{17}+\sin^{-1}.\frac{3}{5}=\sin^{-1}.\frac{77}{85}$

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38. Prove that

$$\sin^{-1}.\frac{8}{17}+\cos^{-1}.\frac{4}{5}=\cot^{-1}\left(\frac{36}{77}\right)$$

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39. Prove that

$$\sin^{-1}.\frac{8}{17}+\cos^{-1}.\frac{4}{5}=\cos^{-1}.\frac{36}{85}$$

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

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

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42. Prove that

$$\sin^{-1}.\frac{3}{5}+\cos^{-1}.\frac{12}{13}=\sin^{-1}.\frac{56}{65}$$

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43. Prove that

$$\sin^{-1}.\frac{3}{5}-\sin^{-1}.\frac{8}{17}=\cos^{-1}.\frac{84}{85}$$

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44. $\cos^{-1}\left(\frac{4}{5}\right)+\tan^{-1}\left(\frac{3}{5}\right)=\tan^{-1}\left(\frac{27}{11}\right)$

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45. Prove that : $\frac{\tan^{-1}(63)}{16}=\frac{\sin^{-1}5}{13}+\frac{\cos^{-1}3}{5}$

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46. Prove that: $\sin^{-1}\left(\frac{3}{5}\right)+\cos^{-1}\left(\frac{5}{\sqrt{26}}\right)=\tan^{-1}\left(\frac{19}{17}\right)$

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47. Find the value of :

$4\left(2\tan^{-1}.\frac{1}{3}+\tan^{-1}.\frac{1}{7}\right)$

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48. Prove that :$2\frac{\tan^{-1}1}{5}+\frac{\sec^{-1}\left(5\sqrt{2}\right)}{7}+2\tan^{-1}\frac{1}{8}=\frac{\pi}{4}$

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

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50. Prove that:

$$\cot^{-1}\left(\frac{ab+1}{a-b}\right) + \cot^{-1}\left(\frac{bc+1}{b-c}\right) + \cot^{-1}\left(\frac{ca+1}{c-a}\right) = 0.$$

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51. Find the value of

$$\tan\left\{\frac{1}{2}\sin^{-1}\left(\frac{2x}{1+x^2}\right) + \frac{1}{2}\cos^{-1}\left(\frac{1-y^2}{1+y^2}\right)\right\}$$

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52. Prove that

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

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53. Solve $\tan^{-1} 2x + \tan^{-1} 3x = \frac{\pi}{4}$.

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54. Solve $\tan^{-1}\left(\frac{x+1}{x-1}\right) + \tan^{-1}\left(\frac{x-1}{x}\right) = \tan^{-1}(-7)$

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

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56. Solve $\sin^{-1}(1-x) - 2\sin^{-1} x = \frac{\pi}{2}$

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

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58. Solve : $2\tan^{-1},(\cos x) = \tan^{-1},(2\cos ecx)$

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59. Solve the following equations :

$$\tan^{-1}(x+2) + \tan^{-1}(x-2) = \tan^{-1}\left(\frac{8}{79}\right)$$

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60. Solve the following equations :

$$\tan^{-1}(x+1) + \tan^{-1}(x-1) = \tan^{-1}\left(\frac{8}{31}\right), x > 0$$

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61. Solve the following equations :

$$\tan^{-1}(x+2)+\tan^{-1}(x-2)=\frac{\pi}{4}, x>0$$

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62. If $\tan^{-1}\left(\frac{1-x}{1+x}\right)=\frac{1}{2}\tan^{-1}x, x>0$, then x = ?

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63. Solve the following equations :

$$\tan^{-1}.\frac{2x}{1-x^2}+\cos^{-1}.\frac{1-x^2}{2x}=\frac{\pi}{3}, x>0$$

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64. Solve the following equations :

$$\cos\left(\tan^{-1} x\right) = \sin\left(\cot^{-1}.\ \frac{3}{4}\right)$$

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65. If $\sin\left(\cot^{-1}(x+1)\right) = \cos\tan^{-1}x$, then x=

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66. Solve the following equations :

$$2\tan^{-1}(\sin x) = \tan^{-1}(2\sec x,)0 < x < \frac{\pi}{2}$$

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67. Solve the following equations :

$$\cos\left(\sin^{-1} x\right) = \frac{1}{2}$$

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68. Solve the following equations :

$$\tan^{-1}\left(\frac{x-2}{x-4}\right)+\tan^{-1}\left(\frac{x+2}{x+4}\right)=\frac{\pi}{4}$$

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69. Solve for x ,

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

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70. Solve for x :

$$3\sin^{-1}\left(\frac{2x}{1+x^2}\right)-4\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)+2\tan^{-1}.\left(\frac{2x}{1-x^2}\right)=\frac{\pi}{2}.$$

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71. Express each of the following in the simplest form: `tan^(-1) {(cosx)/(1-sinx)},\ -pi/2

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72. Write the following function in the simplest form: `tan^(-1)((cosx-sinx)/(cosx+sinx)), x

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73. Write the following function in the simplest form: `tan^(-1)((cosx-sinx)/(cosx+sinx)), x

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74. Write the following functions in the simplest form: `tan^(-1) {x/(a^2-x^2)},-a

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75. Write the following function in the simplest form: $\frac{\tan^{-1}\left(\sqrt{1+x^2}-1\right)}{x}, x \neq 0$

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76. Write the following in the simplest form :

$$\tan^{-1}\left(\frac{\sqrt{1-x^2}}{1+x}\right) = \frac{1}{2}\cos^{-1}x$$

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77. Prove that :

$$\tan^{-1}\left(\frac{\sqrt{1-x^2}}{1+x}\right) = \frac{1}{2}\cos^{-1}x$$

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78. prove that $\frac{1}{2}\tan^{-1}x = \cos^{-1}x\sqrt{\frac{1+\sqrt{1+x^2}}{2\sqrt{1+x^2}}}$

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79. Prove that :

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

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80. $\tan^{-1}\left(\frac{\sqrt{1+x^2}+\sqrt{1-x^2}}{\sqrt{1+x^2}-\sqrt{1-x^2}}\right)$

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81. Prove that :

$$\cot^{-1}\left(\frac{\sqrt{1+x}-\sqrt{1-x}}{\sqrt{1+x}+\sqrt{1-x}}\right)=\frac{\pi}{4}+\frac{1}{2}\cos^{-1}x$$

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82. $\cot^{-1}\left(\frac{\sqrt{1+\sin x}+\sqrt{1-\sin x}}{\sqrt{1+\sin x}-\sqrt{1-\sin x}}\right)=\frac{x}{2}$

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83. If $\tan^{-1}x+\tan^{-1}y-\tan^{-1}z=0$, then prove that : $x+y+xyz=z$.

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84. If (i) $\cos^{-1}x+\cos^{-1}y+\cos^{-1}z=\pi,$ prove that : $x^2+y^2+z^2+2xyz=1$

(ii) If $\sin^{-1}x+\sin^{-1}y+\sin^{-1}z=\frac{\pi}{2}$, prove that : $x^2+y^2+z^2+2xyz=1$

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

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

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Exercise 2 B Long Answer Type Questions Ii

1. If $\tan^{-1}\frac{yz}{xr}+\tan^{-1}\frac{zx}{yr}+\tan^{-1}\frac{xy}{zr}=\frac{\pi}{2}$, prove that , $x^2+y^2+z^2+r^2$

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2. If $\cos^{-1}\left(\frac{x}{a}\right)+\cos^{-1}\left(\frac{y}{b}\right)=a$

show that : $\frac{x^2}{a^2}-\frac{2xy}{ab}\cos\alpha+\frac{y^2}{b^2}=\sin^2\alpha.$

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Objective Type Questions A Multiple Choice Questions

1. If $\sin^{-1}x=y$, then

A. $0\leq y\leq\pi$

B. $-\frac{\pi}{2}\leq y\leq\frac{\pi}{2}$

C. $0<y<\pi$

D. $-\frac{\pi}{2}<y<\frac{\pi}{2}$

Answer: B

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2. $\tan^{-1}(\sqrt{3}) + \sec^{-1}(-2)$=

A. π

B. $-\frac{\pi}{3}$

C. $\frac{\pi}{3}$

D. $\frac{2\pi}{3}$

Answer: B

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3. $\cos^{-1}\left(\cos\left(\frac{7\pi}{6}\right)\right)$ is equal to

A. $\frac{7\pi}{6}$

B. $\frac{5\pi}{6}$

C. $\frac{\pi}{3}$

D. $\frac{\pi}{6}$

Answer: B

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4. $\sin\left(\frac{\pi}{3} - \sin^{-1}\left(-\frac{1}{2}\right)\right)$ is equal to(A) $\frac{1}{2}$ (B) $\frac{1}{3}$ (C) $\frac{1}{4}$ (D) 1

A. $\frac{1}{2}$

B. $\frac{1}{3}$

C. $\frac{1}{4}$

D. 1

Answer: D

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5. $\tan^{-1}\sqrt{3} - \cot^{-1}(-\sqrt{3})$ is equal to

A. π

B. $-\frac{\pi}{2}$

C. 0

D. $2\sqrt{3}$

Answer: B

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6. $\sin(\tan^{-1} x), |x| \leq 1$ is equal to :

A. $\frac{x}{\sqrt{1-x^2}}$

B. $\frac{1}{\sqrt{1-x^2}}$

C. $\frac{1}{\sqrt{1+x^2}}$

D. $\frac{x}{\sqrt{1+x^2}}$

Answer: D

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7. $\sin^{-1}(1-x) - 2\sin^{-1}x = \frac{\pi}{2}$, then x is equal to

A. $0, \frac{1}{2}$

B. $1, \frac{1}{2}$

C. 0

D. $\frac{1}{2}$

Answer: C

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8. $\tan^{-1}\left(\frac{x}{y}\right) - \frac{\tan^{-1}(x-y)}{x+y}$ is equal to(A) $\frac{\pi}{2}$ (B) $\frac{\pi}{3}$ (C) $\frac{\pi}{4}$ (D) $\frac{-3\pi}{4}$

A. $\frac{\pi}{2}$

B. $\frac{\pi}{3}$

C. $\frac{\pi}{4}$

D. $-\frac{3\pi}{4}$

Answer: C

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9. The value of $\sin^{-1}\left(\cos\left(\frac{43\pi}{5}\right)\right)$ is :

A. $\frac{3\pi}{5}$

B. $\frac{-7\pi}{5}$

C. $\frac{\pi}{10}$

D. $\frac{-\pi}{10}$

Answer: D

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10. 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. $\frac{\pi}{9}$

Answer: A

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11. The value of $\cot\left(\sin^{-1} x\right)$ is :

A. $\sqrt{1+\frac{x^2}{x}}$

B. $\frac{x}{\sqrt{1+x^2}}$

C. $\frac{1}{x}$

D. $\frac{\sqrt{1-x^2}}{x}$

Answer: D

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12. The domain of $\sin^{-1} 2x$ is :

A. $[0, 1]$

B. $[-1, 1]$

C. $\left[\frac{-1}{2}, \frac{1}{2}\right]$

D. $[-2, 2]$

Answer: C

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13. the greatest and least values of $\left(\sin^{-1}x\right)^2+\left(\cos^{-1}x\right)^2$

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

Answer: A

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14. The principal value of $\sin^{-1}\left(\frac{1}{2}\right)$ is

A. $\frac{\pi}{6}$

B. $\frac{\pi}{4}$

C. $\frac{\pi}{3}$

D. $\frac{\pi}{2}$

Answer: A

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15. $\tan^{-1}\sqrt{3} - \cot^{-1}(-\sqrt{3})$ is equal to(A) π (B) $-\frac{\pi}{2}$ (C) 0 (D) $2\sqrt{3}$

A. π

B. $-\frac{\pi}{2}$

C. 0

D. $2\sqrt{3}$

Answer: B

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16. $\cos^{-1}\left(\cos\left(\frac{7\pi}{6}\right)\right)$ is equal to

A. $\frac{7\pi}{6}$

B. $\frac{5\pi}{6}$

C. $\frac{\pi}{3}$

D. $\frac{\pi}{6}$

Answer: B

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17. $\sin\left(\frac{\pi}{3}-\sin^{-1}\left(-\frac{1}{2}\right)\right)$ is equal to(A) $\frac{1}{2}$ (B) $\frac{1}{3}$ (C) $\frac{1}{4}$ (D) 1

A. $\frac{1}{2}$

B. $\frac{1}{3}$

C. $\frac{1}{4}$

D. 1

Answer: D

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18. $\sin\left(\frac{\pi}{3} - \sin^{-1}\left(-\frac{1}{2}\right)\right)$ is equal to

A. 1

B. $\frac{1}{2}$

C. $\frac{1}{\sqrt{2}}$

D. 0

Answer: A

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

A. $-\frac{\pi}{3}$

B. $-\frac{\pi}{6}$

C. $-\frac{\pi}{4}$

D. None of these

Answer: B

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20. If $\cos^{-1} x = y$ then :

A. $-\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$

B. $-\pi \leq y \leq \pi$

C. $0 \leq y \leq \frac{\pi}{2}$

D. $0 \leq y \leq \pi$

Answer: D

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21. Find the principal value of $\sin^{-1}\left(\frac{1}{\sqrt{2}}\right)$

A. $\frac{\pi}{6}$

B. $\frac{\pi}{2}$

C. $\frac{\pi}{3}$

D. $\frac{\pi}{4}$

Answer: D

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22. The value of $\sin\left(\frac{\cos^{-1}3}{5}\right)$ is

A. $\frac{4}{5}$

B. $\frac{3}{5}$

C. $\frac{2}{5}$

D. None of these

Answer: A

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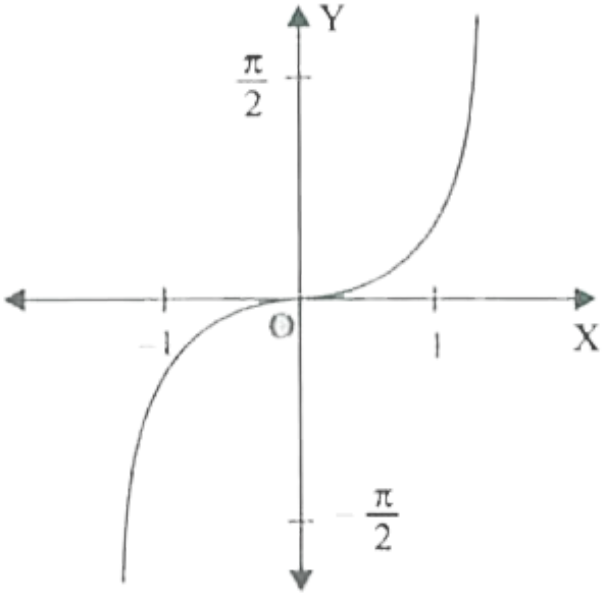
23. Identify the function from the following figure :



A. $\tan^{-1} x$

B. $\sin^{-1} x$

C. $\cos^{-1} x$

D. $\text{cosec}^{-1} x$

Answer: B

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

A. $\frac{\pi}{6}$

B. $\frac{\pi}{4}$

C. $\frac{2\pi}{3}$

D. π

Answer: C

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25. Principal value of $\cos^{-1}\left[\cos\left(\frac{4\pi}{3}\right)\right]$ is

A. $\frac{4\pi}{5}$

B. $\frac{2\pi}{3}$

C. 0

D. π

Answer: B

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26. The principle value of $\sin^{-1}\left(\sin\frac{2\pi}{3}\right)$ is

A. $\frac{2\pi}{3}$

B. $\frac{\pi}{3}$

C. $-\frac{\pi}{3}$

D. $-\frac{2\pi}{3}$

Answer: B

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Objective Type Questions B Fill In The Blanks

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

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2. Find the principal value of $\sin^{-1}\left(-\frac{1}{\sqrt{2}}\right)$.

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

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4. The principal value of $\tan^{-1}\left(-\sqrt{3}\right)$ is

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5. Find the principal value of $\tan^{-1}(1)$

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6. Principal value of $\cot^{-1}(\sqrt{3})$ is _____

Watch Video Solution

7. The principal value of $\operatorname{cosec}^{-1}(-\sqrt{2})$ is

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8. $\sin^{-1} x + \cos^{-1} x = ?$

Watch Video Solution

9. $\tan^{-1} x + \cot^{-1} x =$ _____

Watch Video Solution

10. $\sec^{-1} x + \text{cosec}^{-1} x$ _____

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Objective Type Questions C True False Questions

1. $2\tan^{-1} x = \tan^{-1}.\dfrac{2x}{1-x^2}$

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2. $2\tan^{-1} x = \sin^{-1}\left(\dfrac{2x}{1+x^2}\right), 1 \leq x \leq 1$

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3. $\sin^{-1} x + \cos^{-1} x = \frac{\pi}{4}$

Watch Video Solution

4. Is $\sec^{-1}(-x) = \pi - \sec^{-1} x, |x| \geq 1$?

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5. Is $\cot^{-1}(-x) = \pi - \cot^{-1} x, x \in R$

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6. $\tan^{-1}.\frac{3}{5} + \tan^{-1}.\frac{1}{4} = \frac{\pi}{2}$

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Objective Type Questions D Very Short Answer Types Questions

1. Find the principal value of the following

(i) $\sin^{-1}.\frac{1}{2}$

(ii) $\tan^{-1}.\frac{1}{\sqrt{3}}$

(iii) $\cot^{-1}(-\sqrt{3})$

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2. Find the principal values of the following :

$$\sin^{-1}\left(\frac{1}{\sqrt{2}}\right)$$

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3. Find the principal values of the following :

$$\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$$

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4. Find the principal value of each of the following:

i) $\cos^{-1}\left(-\frac{1}{\sqrt{2}}\right)$, ii) $\cos^{-1}\left(-\frac{1}{2}\right)$, iii) $\cot^{-1}\left(-\frac{1}{\sqrt{3}}\right)$

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

(ii) $\cos^{-1}\left(-\frac{1}{\sqrt{2}}\right)$

Watch Video Solution

6. Find the principal value of each of the following:

i) $\cos^{-1}\left(-\frac{1}{\sqrt{2}}\right)$, ii) $\cos^{-1}\left(-\frac{1}{2}\right)$, iii) $\cot^{-1}\left(-\frac{1}{\sqrt{3}}\right)$

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7. Find the principal values of the following :

$\tan^{-1}(-1)$

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8. Find the principal values of the following :

$\tan^{-1}(-\sqrt{3})$

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9. Find the principal values of each of the following: $\cot^{-1}\left(-\frac{1}{\sqrt{3}}\right)$

(ii) $\cot^{-1}\left(\frac{\tan(3\pi)}{4}\right)$

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10. Find the principal values of each of the following: $\cot^{-1}(-\sqrt{3})$

(ii) $\cot^{-1}(\sqrt{3})$

Watch Video Solution

11. Find the principal values of the following :

$\sec^{-1}(-2)$

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12. Find the principal values of the following :

$$\sec^{-1}\left(\frac{2}{\sqrt{3}}\right)$$

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13. Find the principal value of the following:

(i) $\cos ec^{-1}(2)$ (ii) $\tan^{-1}(-\sqrt{3})$ (iii) $\cos^{-1}\left(-\frac{1}{\sqrt{2}}\right)$

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14. Find the principal values of the following :

$\text{cosec}^{-1}(-\sqrt{2})$

Watch Video Solution

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

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16. If $\sec^{-1}(2)+\text{cosec}^{-1}(y)=\frac{\pi}{2}$, then find y .

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17. Write down the domain of :

(i) $f(x) = \sin^{-1} x$

(ii) $f(x) = \cos^{-1} x$

(iii) $f(x) = \tan^{-1} x$

(iv) $f(x) = \sec^{-1} x$

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18. Write down the range of :

(i) $f(x) = \cos^{-1} x$

(ii) $f(x) = \cot^{-1} x$

(iii) $f(x) = \text{cosec}^{-1} x$

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19. Write down the value of $\text{cosec}^{-1}x + \sec^{-1}x,$ when $x \geq 1$.

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20. If $4\sin^{-1}x + \cos^{-1}x = \pi$, then: x=

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21. Evaluate $\tan^{-1}1 + \cos^{-1}.\frac{1}{3} + \sin^{-1}.\frac{1}{3}$

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22. $\sec^2\left(\tan^{-1}2\right) + \text{cosec}^2\left(\cot^{-1}3\right) =$

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Ncert File Question From Ncert Book Exercise 2 1

1. Find the principal values of the following :

$\sin^{-1}\left(-\frac{1}{2}\right)$

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

(ii) $\cos^{-1}\left(-\frac{1}{\sqrt{2}}\right)$

Watch Video Solution

3. Find the principal value of the following:

(i) $\cos ec^{-1}(2)$ (ii) $\tan^{-1}\left(-\sqrt{3}\right)$ (iii) $\cos^{-1}\left(-\frac{1}{\sqrt{2}}\right)$

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4. Find the principal values of the following :

$\tan^{-1}(-\sqrt{3})$

Watch Video Solution

5. Find the principal values of the following :

$\cos^{-1}\left(-\frac{1}{2}\right)$

Watch Video Solution

6. Find the principal values of the following :

$\tan^{-1}(-1)$

Watch Video Solution

7. Find the principal values of the following :

$$\sec^{-1}\left(\frac{2}{\sqrt{3}}\right)$$

Watch Video Solution

8. Find the principal values of each of the following: $\cot^{-1}(-\sqrt{3})$

(ii) $\cot^{-1}(\sqrt{3})$

Watch Video Solution

9. Find the principal values of the following :

$$\cos^{-1}\left(-\frac{1}{\sqrt{2}}\right)$$

Watch Video Solution

10. What is the value of the following functions (using principal value)

$\text{cosec}^{-1}(\sqrt{2}) + \sec^{-1}(\sqrt{2})$

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11. Find the principal values of the following :

$\tan^{-1}(1) + \cos^{-1}\left(-\frac{1}{2}\right) + \sin^{-1}\left(-\frac{1}{2}\right)$

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12. Find the principal values of the following :

$\cos^{-1}\left(\frac{1}{2}\right) + 2\sin^{-1}\left(\frac{1}{2}\right)$

Watch Video Solution

13. Find the principal values of the following :

If $\sin^{-1} x = y$ then :

A. $0 < y < \pi$

B. $-\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$

C. $0 < y < \pi$

D. $-\frac{\pi}{2} < y < \frac{\pi}{2}$

Answer: B

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14. Find the principal values of the following :

$\tan^{-1} \sqrt{3} - \sec^{-1}(-2)$ is equal to :

A. π

B. $-\frac{\pi}{3}$

C. $\frac{\pi}{3}$

D. $\frac{2\pi}{3}$

Answer: B

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Ncert File Question From Ncert Book Exercise 2 2

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

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

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3. Prove that: $\frac{\tan^{-1}2}{11}+\frac{\tan^{-1}7}{24}=\frac{\tan^{-1}1}{2}$

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4. Prove the following

$2\tan^{-1}.\frac{1}{2}+\tan^{-1}.\frac{1}{7}=\tan^{-1}.\frac{31}{17}$

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5. If $x<0$, then prove that $\cos^{-1}x=\pi+\tan^{-1}.\frac{\sqrt{1-x^2}}{x}$

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6. Prove that $\tan^{-1}.\frac{1}{\sqrt{x^2-1}}=\frac{\pi}{2}-\sec^{-1}x, x>1$

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7. convert in the simplest form: $\tan^{-1}\left(\sqrt{\frac{1-\cos x}{1+\cos x}}\right), x < \pi$

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8. Find the value of

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

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9. $\tan^{-1}\frac{x}{\sqrt{a^2-x^2}}, |x| < a$

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10. Write the following function in the simplest form:

$\tan^{-1}\left(\frac{3a^2x - x^3}{a^3 - 3ax^2}\right), a > 0; \frac{-a}{\sqrt{3}} \leq x \leq \frac{a}{\sqrt{3}}$

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11. Find the values of each of the following :

$$\tan^{-1}\left[2\cos\left(2\sin^{-1}.\frac{1}{2}\right)\right]$$

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12. Evaluate $\cot\left(\tan^{-1}a+\cot^{-1}a\right)$

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13. $\tan\left[\frac{1}{2}\left(\sin^{-1}\left(\frac{2x}{1+x^2}\right)+\cos^{-1}\left(\frac{1-y^2}{1+y^2}\right)\right]\right.$

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

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

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16. $\sin^{-1}\left(\sin\frac{2\pi}{3}\right)=$

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

Watch Video Solution

18. Prove that : $\tan\left(\sin^{-1}\left(\frac{3}{5}+\cot^{-1},\frac{3}{2}\right)\right)=\frac{17}{6}$

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19. $\cos^{-1}\left(\cos\left(\frac{7\pi}{6}\right)\right)$ is equal to

A. $\frac{7\pi}{6}$

B. $\frac{5\pi}{6}$

C. $\frac{\pi}{3}$

D. $\frac{\pi}{6}$

Answer: B

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20. $\sin\left(\frac{\pi}{3}-\sin^{-1}\left(-\frac{1}{2}\right)\right)$ is equal to(A) $\frac{1}{2}$ (B) $\frac{1}{3}$ (C) $\frac{1}{4}$ (D) 1

A. $\frac{1}{2}$

B. $\frac{1}{3}$

C. $\frac{1}{4}$

D. 1

Answer: D

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21. $\tan^{-1}\sqrt{3} - \cot^{-1}(-\sqrt{3})$ is equal to(A) π (B) $-\frac{\pi}{2}$ (C) 0 (D) $2\sqrt{3}$

A. π

B. $-\frac{\pi}{2}$

C. 0

D. $2\sqrt{3}$

Answer: B

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Misellaneous Exercise On Chapter 2

1. Find the value the following :

$$\cos^{-1}\left(\cos.\ \frac{13\pi}{6}\right)$$

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2. Find the value the following :

$$\tan^{-1}\left(\tan.\ \frac{7\pi}{6}\right)$$

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3. Prove that : 2 sin^(-1), 3/5 = tan^(-1), 24/7`

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4. $\sin^{-1}\frac{8}{17}+\sin^{-1}\frac{3}{5}=\tan^{-1}\frac{77}{36}$

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5. Prove that $\cos^{-1}.\frac{4}{5}+\cos^{-1}.\frac{12}{13}=\cos^{-1}.\frac{33}{65}$

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

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7. Prove that: $\frac{\tan^{-1}(63)}{16}=\frac{\sin^{-1}5}{13}+\frac{\cos^{-1}3}{5}$

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8. Prove that

$$\tan^{-1}.\frac{1}{5}+\tan^{-1}.\frac{1}{7}+\tan^{-1}.\frac{1}{8}=\frac{\pi}{4}$$

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9. Prove that:$\tan^{-1}\sqrt{x}=\frac{1}{2}\cos^{-1}\left(\frac{1-x}{1+x}\right), x\in[0,1]$

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10. $\cot^{-1}\left(\frac{\sqrt{1+\sin x}+\sqrt{1-\sin x}}{\sqrt{1+\sin x}-\sqrt{1-\sin x}}\right)=\frac{x}{2}$

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11.

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

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

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

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

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

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

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13. Solve : $2\tan^{-1},(\cos x) = \tan^{-1},(2\cos ecx)$

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14. If $\tan^{-1}\left(\frac{1-x}{1+x}\right) = \frac{1}{2}\tan^{-1}x, x > 0$, then x = ?

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15. $\sin\left(\tan^{-1} x\right), |x| \leq 1$ is equal to :

A. $\frac{x}{\sqrt{1-x^2}}$

B. $\frac{1}{\sqrt{1-x^2}}$

C. $\frac{1}{\sqrt{1+x^2}}$

D. $\frac{x}{\sqrt{1+x^2}}$

Answer: D

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16. $\sin^{-1}(1-x) - 2\sin^{-1} x = \frac{\pi}{2}$, then x is equal to

A. $0, \frac{1}{2}$

B. $1, \frac{1}{2}$

C. 0

D. $\frac{1}{2}$

Answer: C

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17. $\tan^{-1}\left(\frac{x}{y}\right) - \frac{\tan^{-1}(x-y)}{x+y}$ is equal to(A) $\frac{\pi}{2}$ (B) $\frac{\pi}{3}$ (C) $\frac{\pi}{4}$ (D) $\frac{-3\pi}{4}$

A. $\frac{\pi}{2}$

B. $\frac{\pi}{3}$

C. $\frac{\pi}{4}$

D. $-\frac{3\pi}{4}$

Answer: C

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Exercise

1. The value of $\cos^{-1}\left(\cos, \frac{3\pi}{2}\right)$ is

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2. Evaluate $\tan^{-1}\left\{\sin\left(-\frac{\pi}{2}\right)\right\}$

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3. $\sin^{-1}\left\{\cos\left(\frac{\sin^{-1}\left(\sqrt{3}\right)}{2}\right)\right\}$

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4. Find the value of $\sec\left(\tan^{-1}\left(\frac{y}{2}\right)\right)$

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5. FInd the value of $\sin\left[2\cot^{-1}\left(-\frac{5}{12}\right)\right]$

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6. What is greater, $\tan 1$ or $\tan^{-1} 1$?

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7. Evaluate: $\cos\left(\frac{\sin^{-1} 1}{4}+\frac{\sec^{-1} 4}{3}\right)$

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8. Find the value of expression: $\sin\left(2\frac{\tan^{-1} 1}{3}\right)+\cos\left(\tan^{-1} 2\sqrt{2}\right)$

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9. Solve $\sin^{-1} x + \sin^{-1}(1-x) = \cos^{-1} x$

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10. Find the solution of the equation $\tan^{-1} x - \cot^{-1} x = \tan^{-1}\left(\frac{1}{\sqrt{3}}\right)$

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Revision Exercise

1. $\sec\left(cosec^{-1} x\right) =$

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2. Show that :

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

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3. Prove that : (i) $\sin\left(\tan^{-1}1\right) = \frac{1}{\sqrt{2}}$

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4. Prove that : $\left[\tan^{-1}\left(-\sqrt{3}\right)\right] = -\frac{2}{\sqrt{3}}$

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5. Solve : $3\tan^{-1}\left(\frac{1}{2+\sqrt{3}}\right) - \tan^{-1}\left(\frac{1}{x}\right) = \tan^{-1}\left(\frac{1}{3}\right)$

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6. Solve $\sin^{-1}\left(\frac{5}{x}\right)+\sin^{-1}\left(\frac{12}{x}\right)=\frac{\pi}{2}$

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7. Show that :(i) $\sin^{-1}\left[\sin.\frac{3\pi}{4}\right]\neq\frac{3\pi}{4}$

(ii) $\tan^{-1}\left[\tan.\frac{5\pi}{6}\right]\neq\frac{5\pi}{6}$. What is its value ?

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8. Prove that : (i) $\tan^{-1}x+\cot^{-1}(x+1)=\tan^{-1}\left(x^2+x+1\right)$

(ii) $\cot^{-1}3+\operatorname{cosec}^{-1}\sqrt{5}=\frac{\pi}{4}$

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9. Prove that

$\sec^2\left(\tan^{-1}2\right)+\cos ec^2\left(\cot^{-1}3\right)=15$

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10. prove that $2\tan^{-1}\left(\sqrt{\frac{a-b}{a+b}}\tan\left(\frac{\theta}{2}\right)\right)=\cos^{-1}\left(\frac{a\cos\theta+b}{a+b\cos\theta}\right)$

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Check Your Understanding

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

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2. The principal value of $\sin^{-1}\left(\frac{1}{2}\right)$ is

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3. Write the principal value of $\tan^{-1}(\sqrt{3}) + \operatorname{cosec}^{-1}(-2)$

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4. If $\sec^{-1}(x) + \operatorname{cosec}^{-1}\left(\frac{1}{3}\right) = \frac{\pi}{2}$, then find x .

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5. Is $\cos^{-1}(-x) = \pi - \cos^{-1} x, x \in [-1, 1]$?

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6. $\sin\left(\sec^{-1} x + \operatorname{cosec}^{-1} x\right)$

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7. Write down the value of $\tan^{-1} x + \cot^{-1} x, x \in R$

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8. Write down the value of $2\sin^{-1}.\frac{3}{5}$

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9. Find the solution of $\tan^{-1} 2x + \tan^{-1} 3x = \frac{\pi}{4}, x > 0$

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10. Is $\tan^{-1}\left(\sqrt{\frac{1-x^2}{1+x^2}}\right) = \frac{1}{2}\cos^{-1} x$ true ?

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Completition File Questions From Jee Main

1. If $\cos^{-1} x - \cos^{-1}.\frac{y}{2} = \alpha$, then $4x^2 - 4xy\cos\alpha + y^2$ is equal to

A. 4

B. $2\sin^2\alpha$

C. $-4\sin^2\alpha$

D. $4\sin^2\alpha$

Answer: d

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2. If $\sin^{-1}\left(\frac{x}{5}\right) + \cos ec^{-1}\left(\frac{5}{4}\right) = \frac{\pi}{2}$, then the value of x is

A. 3

B. 4

C. 5

D. 1

Answer: a

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

A. $\frac{5}{17}$

B. $\frac{6}{17}$

C. $\frac{3}{17}$

D. $\frac{4}{17}$

Answer: b

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4. If $0 < x < 1$, then $\sqrt{1+x^2}\left[\left\{x\cos\left(\cot^{-1}x\right)+\sin\left(\cot^{-1}x\right)\right\}^2-1\right]^{1/2}$ is equal to

A. $\frac{x}{\sqrt{1+x^2}}$

B. x

C. $x\sqrt{1+x^2}$

D. $\sqrt{1+x^2}$

Answer: c

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5. The value of $\cot\left(\sum_{n=1}^{23}\cot^{-1}\left(1+\sum_{k=1}^{n}2k\right)\right)$ is

A. $\frac{23}{25}$

B. $\frac{25}{23}$

C. $\frac{23}{24}$

D. $\frac{24}{23}$

Answer: B

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

Then, the value of y is

A. $\frac{3x - x^3}{1 - 3x^2}$

B. $\frac{3x + x^3}{1 - 3x^2}$

C. $\frac{3x - x^3}{1 + 3x^2}$

D. $\frac{3x + x^3}{1 + 3x^2}$

Answer: a

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7. Considering only the principal values of inverse functions, the set $A = \left\{x \geq 0 : \tan^{-1}(2x) + \tan^{-1}(3x) = \frac{\pi}{4}\right\}$

A. is a singleton

B. contains two elements

C. contains more than two elements

D. is an empty set .

Answer: a

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Chapter Test 2

1. If $\sin^{-1} x = y$, then

A. $0 \leq y \leq \pi$

B. $-\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$

C. $0 < y < \pi$

D. $-\frac{\pi}{2} < y < \frac{\pi}{2}$

Answer: b

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2. The principal value of $\tan^{-1}(-\sqrt{3})$ is

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3. Find the value of $\sin^{-1}\left(\sin.\frac{4\pi}{5}\right)$

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4. Prove that : 2 sin^(-1), 3/5 = tan^(-1), 24/7`

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5. Simplify and write the value of $\tan^{-1}\left[2\sin\left[2\cos^{-1}\left[\frac{\sqrt{3}}{2}\right]\right]\right]$

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6. Prove that

$$\tan^{-1}.\frac{1}{2}+\tan^{-1}.\frac{1}{5}+\tan^{-1}.\frac{1}{8}=\frac{\pi}{4}$$

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

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8. Prove that $\frac{\tan^{-1}(\cos x)}{1+\sin x} = \left(\frac{\pi}{4} - \frac{x}{2}\right)$

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9. Show that : $2\sin^{-1}.\left(\frac{3}{5}\right) - \tan^{-1}\left(\frac{17}{31}\right) = \frac{\pi}{4}$

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10. Prove that

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

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11. Prove that: `tan^(-1){(sqrt(1+x)-sqrt(1-x))/(sqrt(1+x)+sqrt(1-x))}=pi/4-1/2\ cos^(-1)x ,\ \ 0

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