



## MATHS

### BOOKS - RS AGGARWAL MATHS (HINGLISH)

### INVERSE TRIGNOMETRIC FUNCTIONS

#### Solved Examples

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

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

ii)  $\frac{\cos^{-1}(\sqrt{3})}{2}$

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

iv)  $\operatorname{cosec}^{-1}(2)$



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

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

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

iii)  $\tan^{-1}\left(-\frac{1}{\sqrt{3}}\right)$

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

v)  $\operatorname{cosec}^{-1}(-2)$

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



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

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

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

iii)  $\operatorname{cosec}^{-1}(-1).$

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

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6. Find the value of:

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

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

B.

C.

D.

**Answer:**

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



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8. Find the value of:

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

ii)  $\cos^{-1}\left(\frac{\cos(2\pi)}{3}\right)$ ,

iii)  $\tan^{-1}\left(\frac{\tan \pi}{4}\right)$



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9. Find the value of:

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

$$\text{ii) } \cos^{-1}\left(\frac{\cos(7\pi)}{6}\right),$$

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

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**10.** Find the value of:

$$\text{i) } \sin^{-1}\left(\frac{\sin(3\pi)}{5}\right), \quad \text{ii) } \cos^{-1}\left(\frac{\cos(13\pi)}{6}\right), \quad \text{iii) } \tan^{-1}\left(\frac{\tan(7\pi)}{6}\right).$$

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**11. i)** Show that  $\sin^{-1}\left\{\sin\left(\frac{3\pi}{4}\right)\right\} \neq \frac{3\pi}{4}$  and find its value.

**ii)** Show that  $\cos^{-1}\left\{\cos\left(-\frac{\pi}{3}\right)\right\} \neq -\frac{\pi}{3}$  and find its

value.

iii) Show that  $\tan^{-1}\left\{\tan\left(\frac{5\pi}{6}\right)\right\} \neq \frac{5\pi}{6}$  and find its

value.

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**12. Evaluate:**

i)  $\sin\left(\cos^{-1}\left(\frac{3}{5}\right)\right)$ ,

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

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**13. Evaluate:**

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

ii)  $\sin\left(\frac{1}{2} \cos^{-1} \frac{4}{5}\right)$

iii)  $\sin(\cot^{-1} x)$

iv)  $\frac{\tan 1}{2} \left(\frac{\cos^{-1} \sqrt{5}}{3}\right)$

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14. Evaluate  $\sin\left[2 \cos^{-1}\left(-\frac{3}{5}\right)\right]$ .

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15. Evaluate:  $\cos\left(\frac{\sin^{-1} 3}{5} + \frac{\sin^{-1} 5}{13}\right)$

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16. Find the value of:  $\tan^{-1} \left[ 2 \cos \left( 2 \sin^{-1} \left( \frac{1}{2} \right) \right) \right]$

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17. if  $\tan^{-1} \left( \frac{4}{3} \right) = \theta$ , find the value of  $\cos \theta$ .

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18. If  $\cot^{-1} \left( -\frac{1}{5} \right) = \theta$ , find the values of  $\sin \theta$ .

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19. Prove that  $\tan^{-1} \left( \frac{1}{7} \right) + \tan^{-1} \left( \frac{1}{13} \right) = \tan^{-1} \left( \frac{2}{9} \right)$



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

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21. Prove that

$$\tan^{-1} \frac{1}{3} + \tan^{-1} \frac{1}{5} + \tan^{-1} \frac{1}{7} + \tan^{-1} \frac{1}{8} = \frac{\pi}{4}$$

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22. Prove that:

$$2 \tan^{-1} \left( \frac{1}{2} \right) + \tan^{-1} \left( \frac{1}{7} \right) = \tan^{-1} \left( \frac{31}{17} \right)$$

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

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

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

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

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

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

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30. Solve  $\tan^{-1}(x + 1) + \tan^{-1}(x - 1) = \tan^{-1}\left(\frac{8}{31}\right)$

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31. Simplify the following :

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

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32. निम्नलिखित समीकरणों को सरल कीजिए :

$$2 \tan^{-1}(\cos x) = \tan^{-1}(2 \operatorname{cosec} x)$$

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33. Prove that  $\tan^{-1} \left( \sqrt{\frac{1 - \cos x}{1 + \cos x}} \right) = \frac{x}{2}, x < \pi.$

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34. Prove that

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

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

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36.  $\tan^{-1} \frac{\cos x}{1 - \sin x}$ ,  $-\frac{3\pi}{2} < x < \frac{\pi}{2}$ , को सरलता रूप में व्यक्त कीजिए।

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37. Prove that  $\tan^{-1} \frac{3a^2x - x^3}{a^3 - 3ax^2} = 3 \tan^{-1} \frac{x}{a}$ .

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38.  $\tan^{-1} \left[ \frac{a \cos x - b \sin x}{b \cos x + a \sin x} \right]$  को सरल कीजिए, यदि  $\frac{a}{b} \tan x \leq -1$

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39.

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

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40. Prove that:  $\tan^{-1} \left\{ \frac{\sqrt{1+x} - \sqrt{1-x}}{\sqrt{1+x} + \sqrt{1-x}} \right\} = \frac{\pi}{4} - \frac{1}{2} \cos^{-1} x, x \in [0, 1]$

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41. Prove that  $\tan^{-1} \frac{\sqrt{1+x^2} - 1}{x} = \frac{1}{2} \tan^{-1} x$ .

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42. Prove that  $\tan^{-1} \left( \frac{x}{\sqrt{a^2 - x^2}} \right) = \frac{\sin^{-1} x}{a}$ .

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43. सिद्ध कीजिए

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

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

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45. Prove that

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

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

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**47.**

Prove

that

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

, where  $|x| < 1$ ,  $y > 0$  and  $xy < 1$ .

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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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Prove

that:

$$\tan^{-1} \left( \frac{4}{5} \right) + \cos^{-1} \left( \frac{12}{13} \right) = \cos^{-1} \left( \frac{33}{65} \right)$$



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50. Prove that

$$\sin^{-1} \left( \frac{8}{17} \right) + \sin^{-1} \left( \frac{3}{5} \right) = \cos^{-1} \left( \frac{36}{85} \right)$$



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51. Prove the following:

$$2 \frac{\tan^{-1} 3}{4} - \frac{\tan^{-1}(17)}{31} = \frac{\tan^{-1} \pi}{4}$$



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52. Prove that :

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

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53. Prove that:  $\cos^{-1}(x) + \cos^{-1}\left\{\frac{x}{2} + \frac{\sqrt{3-3x^2}}{2}\right\} = \frac{\pi}{3}$

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54. Prove that  $\cos(\tan^{-1}(\sin(\cot^{-1} x))) = \sqrt{\frac{x^2 + 1}{x^2 + 2}}$

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55. Prove the following results:

$$\tan\left(\cos^{-1}\frac{4}{5} + \tan^{-1}\frac{2}{3}\right) = \frac{17}{6}$$

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

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56. Evaluate:

$$\text{i) } \tan\left\{\frac{1}{2}\frac{\cos^{-1}\sqrt{5}}{3}\right\},$$

$$\text{ii) } \tan\left\{2\frac{\tan^{-1}1}{5} - \frac{\pi}{4}\right\}$$

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57. Prove that:

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

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58. Prove that

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

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

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60. Prove the following:

$$\frac{\tan^{-1} 1}{4} + \frac{\tan^{-1} 2}{9} = \frac{1}{2} \frac{\cos^{-1} 3}{5} = \frac{1}{2} \frac{\sin^{-1} 4}{5}$$

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61. निम्नलिखित समीकरणों को सरल कीजिए :

$$2 \tan^{-1}(\cos x) = \tan^{-1}(2 \operatorname{cosec} x)$$

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62. If  $\sin\left(\sin^{-1}\left(\frac{1}{5}\right) + \cos^{-1}(x)\right) = 1$  Find the value of

$x$

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63. If  $\sin\left(\sin^{-1}\left(\frac{1}{5}\right) + \cos^{-1}(x)\right) = 1$  Find the value of

x

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64. If  $\sin\left(\sin^{-1}\left(\frac{1}{5}\right) + \cos^{-1}(x)\right) = 1$  Find the value of

x

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

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66. 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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67. Solve for  $x$ :

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

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## Exercise 4 A

1. Find the principal value of:

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

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

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

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

v)  $\tan^{-1}\left(\frac{1}{\sqrt{3}}\right)$

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

vii)  $\operatorname{cosec}^{-1}(\sqrt{2})$ .



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2. Find the principal value of:

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

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

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

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

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

$$\text{vii) } \cot^{-1}\left(-\frac{1}{\sqrt{3}}\right).$$

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$$3. \cos\left\{\cos^{-1}\left(\frac{-\sqrt{3}}{2}\right) + \frac{\pi}{6}\right\}$$

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$$4. \text{ Evaluate } \sin\left\{\frac{\pi}{2} - \sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)\right\}.$$

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## Exercise 4 B

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

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

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

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



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



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6.  $\cot^{-1}(-1)$



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



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



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9.  $\operatorname{cosec}^{-1}(2)$



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10. प्रश्न संख्या 16 से 18में दिए प्रत्येक व्यंजन का मान ज्ञात कीजिए :

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



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11. प्रश्न संख्या 16 से 18में दिए प्रत्येक व्यंजन का मान ज्ञात कीजिए :

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

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12.  $\cos^{-1}\left(\cos \frac{7\pi}{6}\right)$  का मान बराबर है

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13. निम्नलिखित के मान ज्ञात कीजिए :

$$\cos^{-1}\left(\cos \frac{3\pi}{6}\right)$$

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14. निम्नलिखित के मान ज्ञात कीजिए :

$$\tan^{-1} \left( \tan \frac{3\pi}{6} \right)$$

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

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

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17.  $\cot(\tan^{-1} x + \cot^{-1} x)$

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18.  $\operatorname{cosec}(\sin^{-1} x + \cos^{-1} x)$

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

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

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21. Find the value of:

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

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

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## Exercise 4 C

1. Prove that

i) 
$$\frac{\tan^{-1}(1+x)}{1-x} = \frac{\pi}{4} + \tan^{-1}x, x < 1$$

ii) 
$$\tan^{-1}x + \cot^{-1}(x+1) = \tan^{-1}(x^2+x+1)$$

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2. दर्शाइए कि

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

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

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3. Prove that:

$$i) \sin^{-1} (3x - 4x^3) = 3 \sin^{-1} x, \quad |x| \leq \frac{1}{2}$$

$$ii) \cos^{-1} (4x^2 - 3x) = 3 \cos^{-1} x, \quad \frac{1}{2} \leq x \leq 1$$

$$iii) \tan^{-1} \frac{3x - x^3}{1 - 3x^2} = 3 \tan^{-1} x, \quad |x| < \frac{1}{\sqrt{3}}$$

$$iv) \tan^{-1} x + \tan^{-1} \frac{2x}{1-x^2} = \tan^{-1} \frac{3x - x^3}{1-3x^2}$$

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4. Prove that

$$\text{i) } \cos^{-1}(1 - 2x^2) = 2 \sin^{-1} x$$

$$\text{ii) } \cos^{-1}(2x^2 - 1) = 2 \cos^{-1} x.$$

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

$$\text{iv) } \cot^{-1}\left(\sqrt{1 - x^2} - x\right) = \frac{\pi}{2} - \frac{1}{2} \cot^{-1} x.$$



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5. Prove that:

$$\text{i) } \frac{\tan^{-1}(\sqrt{x} + \sqrt{y})}{1 - \sqrt{xy}} = \tan^{-1} \sqrt{x} + \tan^{-1} \sqrt{y}$$

$$\text{ii) } \frac{\tan^{-1}(x + \sqrt{x})}{1 - x^{3/2}} = \tan^{-1} x + \tan^{-1} \sqrt{x}$$

$$\text{iii) } \frac{\tan^{-1}(\sin x)}{1 + \cos x} = \frac{x}{2}$$



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6. Prove that i)  $\frac{\tan^{-1} 1}{2} + \frac{\tan^{-1} 2}{11} = \frac{\tan^{-1} 3}{4}$  ii)

$$\frac{\tan^{-1} 2}{11} + \frac{\tan^{-1} 7}{24} = \frac{\tan^{-1} 1}{2} \quad \text{iii)}$$

$$\tan^{-1} 1 + \frac{\tan^{-1} 1}{2} + \frac{\tan^{-1} 1}{3} = \frac{\pi}{2} \quad \text{iv)}$$

$$2 \frac{\tan^{-1} 1}{3} + \frac{\tan^{-1} 1}{17} = \frac{\pi}{4} \quad \text{v)}$$

$$\tan^{-1} 2 - \tan^{-1} 1 = \frac{\tan^{-1} 1}{3} \quad \text{vi)}$$

$$\tan^{-1} 1 + \tan^{-1} 2 + \tan^{-1} 3 = \pi \quad \text{vii)}$$

$$\frac{\tan^{-1} 1}{2} + \frac{\tan^{-1} 1}{5} + \frac{\tan^{-1} 1}{8} = \frac{\pi}{4} \quad \text{viii)}$$

$$\frac{\tan^{-1} 1}{4} + \frac{\tan^{-1} 2}{9} = \frac{1}{2} \frac{\tan^{-1} 4}{3}$$

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7. Prove that: i)  $\sin^{-1} \left( \frac{1}{\sqrt{5}} \right) + \sin^{-1} \left( \frac{2}{\sqrt{5}} \right) = \frac{\pi}{2}$

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8. Solve for  $x$ :

$$(i) \tan^{-1}(x + 1) + \tan^{-1}(x - 1) = \tan^{-1} \frac{8}{31}$$

$$(ii) \tan^{-1}(2 + x) + \tan^{-1}(2 - x) = \tan^{-1} \frac{2}{3}$$

$$(iii) \cos(\sin^{-1} x) = \frac{1}{9}$$

$$(iv) \cos(2 \sin^{-1} x) = \frac{1}{9}$$



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9. Solve for  $x$  :

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

$$ii) \tan^{-1} x = \frac{\sin^{-1} 1}{\sqrt{2}}$$

$$iii) \sin^{-1} x - \cos^{-1} x = \frac{\pi}{6}$$



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## Exercise 4 D

1. Write down the interval for the principal-value branch of each of the following functions and draw its graph:

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

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2. Write down the interval for the principal-value branch of each of the following functions and draw its graph:

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

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3. Write down the interval for the principal-value branch of each of the following functions and draw its graph:

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



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4. Write down the interval for the principal-value branch of each of the following functions and draw its graph:

$$\cot^{-1} x$$



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5. Write down the interval for the principal-value branch of each of the following functions and draw its graph :

$$\sec^{-1} x$$

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6. Range of  $\operatorname{cosec}^{-1} x$  is

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## Objective Questions

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

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

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

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

D. none of these

**Answer: A**

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2. Find the principal value of the following:

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

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

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

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

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

**Answer: B**

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

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

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

C.  $\frac{3\pi}{4}$

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

**Answer: C**

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

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

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

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

D. none of these

**Answer: A**



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

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

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

C.  $(4\pi)/3$

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

**Answer: B**



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

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

B.  $\frac{4\pi}{3}$

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

D. none of these

**Answer: C**



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7. The principal value of  $\cot^{-1}(-1)$  is

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

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

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

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

**Answer: D**



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

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

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

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

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

**Answer: C**



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

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

B.  $\frac{3\pi}{4}$

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



D. none of these

**Answer: A**

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**10.** Find the principal values of each of the following:

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

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

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

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

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

**Answer: D**

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

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

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

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

D. none of these

**Answer: C**

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12. The value of  $\cos^{-1}\left(\cos\left(14\frac{\pi}{6}\right)\right)$  is

A.  $\frac{13\pi}{6}$

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

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

D.  $2\frac{\pi}{6}$

**Answer: D**



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13. The value of  $\tan^{-1}\left(\tan\left(8 \cdot \frac{\pi}{6}\right)\right)$  is

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

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

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

D. none of these

**Answer: C**

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

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

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

C.  $\frac{3\pi}{4}$

D. none of these

**Answer: A**

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15. The value of  $\sec^{-1}\left(\frac{\sec(8\pi)}{5}\right)$  is

A.  $\frac{2\pi}{5}$

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

C.  $\frac{8\pi}{5}$

D. none of these

**Answer: A**



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16. The value of  $\operatorname{cosec}^{-1}\left(\operatorname{cosec}\frac{4\pi}{3}\right)$  is

A.  $\frac{3\pi}{4}$

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

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

D. none of these

**Answer: B**

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17. प्रश्न संख्या 16 से 18में दिए प्रत्येक व्यंजन का मान ज्ञात कीजिए :

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

A.  $\frac{3\pi}{4}$

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

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

D. none of these

**Answer: C**

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

A. 0

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

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

D.  $\pi$

**Answer: C**

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19. The value of  $\sin\left(\sin^{-1}\left(\frac{1}{2}\right) + \cos^{-1}\left(\frac{1}{2}\right)\right) = ?$

A. 0

B. 1

C. -1

D. none of these

**Answer: B**



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20. If  $x \neq 0$  then  $\cos(\tan^{-1} + \cot^{-1} x) = ?$

A. -1



B. 1

C. 0

D. none of these

**Answer: C**



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

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

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

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

D. none of these

**Answer: B**



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**22.** What is the value of

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

A.  $\frac{4\pi}{3}$

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

C.  $\frac{3\pi}{4}$

D.  $\pi$

**Answer: D**



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

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

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

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

D. none of these

**Answer: B**



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

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

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

C.  $2\pi$

D. none of these

**Answer: A**



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**25.** Find the value of:

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

A.  $\pi$

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

C.  $\frac{3\pi}{4}$

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

**Answer: C**

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26. Evaluate:  $\tan\left\{2\tan^{-1}\frac{1}{5} - \frac{\pi}{4}\right\}$

A.  $\frac{7}{17}$

B.  $-\frac{7}{17}$

C.  $\frac{7}{12}$

D.  $-\frac{7}{12}$

**Answer: B**

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$$27. \tan\left(\frac{1}{2}\cos^{-1}\frac{\sqrt{5}}{3}\right)$$

A.  $\frac{3 - \sqrt{5}}{2}$

B.  $\frac{3 + \sqrt{5}}{2}$

C.  $\frac{5 - \sqrt{3}}{2}$

D.  $\frac{5 + \sqrt{3}}{2}$

**Answer: A**



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$$28. \sin\left[\cos^{-1}\left(\frac{3}{5}\right)\right]$$

A.  $\frac{3}{4}$

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

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

D. none of these

**Answer: B**



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

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

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

C.  $\frac{4}{9}$

D. none of these

**Answer: B**

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

A. 1

B. 0

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

D. none of these

**Answer: A**

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31. Evaluate:  $\sin\left(\frac{1}{2} \cos^{-1} \frac{4}{5}\right)$

A.  $\frac{1}{\sqrt{5}}$

B.  $\frac{2}{\sqrt{5}}$

C.  $\frac{1}{\sqrt{10}}$

D.  $\frac{2}{\sqrt{10}}$

**Answer: C**



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32. Find the value of:  $\tan^{-1}\left[2 \cos\left(2 \sin^{-1}\left(\frac{1}{2}\right)\right)\right]$

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

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

C.  $\frac{3\pi}{4}$

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

**Answer: B**



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33. If  $\cot^{-1}\left(-\frac{1}{5}\right) = x$  then  $\sin x = ?$

A.  $\frac{1}{\sqrt{26}}$

B.  $\frac{5}{\sqrt{26}}$

C.  $\frac{1}{\sqrt{24}}$

D. none of these

**Answer: B**

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**34.** For the principal values, evaluate each of the following :

$$\sin^{-1}\left(-\frac{1}{2}\right) + 2\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right) \quad (\text{ii})$$

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

A.  $\frac{1}{\sqrt{26}}$

B.  $\frac{5}{\sqrt{26}}$

C.  $\frac{1}{\sqrt{24}}$

D. none of these

**Answer: C**

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**35.** For the principal value, evaluate

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

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

B.  $\pi$

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

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

**Answer: A**

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36.  $\cot(\tan^{-1} x + \cot^{-1} x)$

A. 1

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

C. 0

D. none of these

**Answer: C**



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37.  $\tan^{-1} 1 + \frac{\tan^{-1} 1}{3} = ?$

A.  $\frac{\tan^{-1} 4}{3}$

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

C.  $\tan^{-1} 2$

D.  $\tan^{-1} 3$

**Answer: C**



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38.  $\tan^{-1}\left(\frac{1}{2}\right) + \tan^{-1}\left(\frac{1}{3}\right) = ?$

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

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

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

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

**Answer: B**

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39.  $2 \tan^{-1} \left( \frac{1}{3} \right) = ?$

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

B.  $\frac{\tan^{-1} 3}{4}$

C.  $\frac{\tan^{-1} 4}{3}$

D. none of these

**Answer: B**

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40.  $\cos\left(2 \tan^{-1}\left(\frac{1}{2}\right)\right) = ?$

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

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

C.  $\frac{7}{8}$

D. none of these

**Answer: A**



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41.  $\sin\left[2 \tan^{-1}\left(\frac{5}{8}\right)\right]$

A.  $\frac{25}{64}$

B.  $\frac{80}{89}$



C.  $\frac{75}{128}$

D. none of these

**Answer: B**

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42.  $\sin \left[ 2 \sin^{-1} \left( \frac{4}{5} \right) \right]$

A.  $\frac{12}{25}$

B.  $\frac{16}{25}$

C.  $\frac{24}{25}$

D. none of these

**Answer: C**



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43. If  $\tan^{-1} x = \frac{\pi}{4} - \tan^{-1} \left( \frac{1}{3} \right)$  then  $x$  is

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

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

C.  $\frac{1}{6}$

D. none of these

**Answer: A**



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44. If  $\tan^{-1}(1+x) + \tan^{-1}(1-x) = \frac{\pi}{2}$  then  $x = ?$

A. 1

B.  $-1$

C. 0

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

**Answer: C**



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

equal to

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

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

C.  $\pi$

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

**Answer: B**



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46.  $(\tan^{-1} 2 + \tan^{-1} 3) = ?$

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

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

C.  $\frac{3\pi}{4}$

D.  $\pi$

**Answer: C**



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47. If  $\tan^{-1} 3 + \tan^{-1} x = \tan^{-1} 87$  then  $x =$

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

B.  $\frac{1}{5}$

C. 3

D. 5

**Answer: B**



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

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

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

C.  $\frac{1}{4}$  or  $-2$

D.  $\frac{1}{6}$  or  $-1$

**Answer: D**



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**49.** Prove the following results:

$$\tan\left(\frac{\cos^{-1} 4}{5} + \frac{\tan^{-1} 2}{3}\right) = \frac{17}{6}$$

A.  $\frac{13}{6}$

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

C.  $\frac{19}{6}$

D.  $\frac{23}{6}$

**Answer: B**



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50.  $\cot^{-1} 9 + \operatorname{cosec}^{-1} \frac{\sqrt{41}}{4} =$

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

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

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

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

**Answer: B**



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51. Range of  $\sin^{-1} x$  is

A.  $\left[0, \frac{\pi}{2}\right]$

B.  $[0, \pi]$

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

D. none of these

**Answer: C**



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52. Range of  $\cos^{-1} x$  is



A.  $[0, \pi]$

B.  $\left[0, \frac{\pi}{2}\right]$

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

D. none of these

**Answer: A**



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**53.** The range of  $\tan^{-1} x$  is

A.  $\left(0, \frac{\pi}{2}\right)$

B.  $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

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

D. none of these

**Answer: B**

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54. Range of  $\sec^{-1} x$  is

A.  $\left[0, \frac{\pi}{2}\right]$

B.  $[0, \pi]$

C.  $[0, \pi] - \left\{\frac{\pi}{2}\right\}$

D. none of these

**Answer: C**

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55. Range of  $\operatorname{cosec}^{-1} x$  is

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. none of these

**Answer: C**



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56. Domain of  $\cos^{-1} x$  is

A.  $[0, 1]$

B.  $[-1, 1]$

C.  $[-1, 0]$

D. none of these

**Answer: B**



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**57.** Domain of  $\sec^{-1} x + \cos^{-1} x$  is

A.  $[-1, 1]$

B.  $\mathbb{R} - \{0\}$

C.  $\mathbb{R} - (-1, 1)$

D.  $\{-1, 1\}$

**Answer: D**



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