



## MATHS

### BOOKS - VIKRAM PUBLICATION ( ANDHRA PUBLICATION)

### INVERSE TRIGONOMETRIC FUNCTIONS

#### Textual Exercises Exercise 8 A I

1. Evaluate the following.

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



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2. Evaluate the following.

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

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3. Evaluate the following.

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

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4. Evaluate the following.

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

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5. Find the values of the following:

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

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6. Find the values of the following:

$$\sin^{-1}\left(\sin\frac{5\pi}{6}\right)$$

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

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8. Find the values of

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



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9. Find the values of the following

$$\tan\left(\operatorname{cosec}^{-1}\frac{65}{63}\right)$$



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10. Find the value of the following:

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



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11. Find the values of the following:

$$\sin^{-1}\left(\sin\frac{33\pi}{7}\right)$$



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12. Find the values of the following:

$$\cos^{-1}\left(\cos\frac{17\pi}{6}\right)$$

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13.  $\tan^{-1}\left[\frac{\sigma\nu.\xi}{1+\chi\sigma\xi}\right]$

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14. Simplify each of the following:

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

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15. simplify each of the following.

$$(iii) \tan^{-1} \sqrt{\frac{1 - \cos \theta}{1 + \cos \theta}}$$

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16. కింది వాటిని సూక్ష్మీకరించండి.

$$\sin^{-1}(2 \cos^2 \theta - 1) + \cos^{-1}(1 - 2 \sin^2 \theta)$$

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17. Simplify each of the following:

$$\tan^{-1}(x + \sqrt{1 + x^2}), x \in R$$

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

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2. Prove that  $\sin^{-1}\frac{3}{5} + \cos^{-1}\frac{12}{13} = \cos^{-1}\frac{33}{65}$ .

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3. Prove that  $\cot^{-1}9 + \operatorname{cosec}^{-1}\frac{\sqrt{41}}{4} = \frac{\pi}{4}$ .

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4. P.T.  $\cos^{-1}\left(\frac{4}{5}\right) + \sin^{-1}\left(\frac{3}{\sqrt{34}}\right) = \tan^{-1}\left(\frac{27}{11}\right)$ .

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5. Find the value of  $\sin\left(\frac{\cos^{-1} 3}{5} + \frac{\cos^{-1} 12}{13}\right)$

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6. Find the value of  $\tan\left(\frac{\sin^{-1} 3}{5} + \frac{\cos^{-1} 5}{\sqrt{34}}\right)$ .

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7. Find  $\cos\left(\frac{\sin^{-1} 3}{5} + \frac{\sin^{-1} 5}{13}\right)$

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

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9. Show that  $\tan \left[ 2 \tan^{-1} \left( \frac{\sqrt{5} - 1}{2} \right) \right] = 2$

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10. కింది వాటిని రుజువు చేయండి.  
 $\cos \left\{ 2 \left[ (\tan^{-1}) \frac{1}{4} + (\tan^{-1}) \frac{2}{9} \right] \right\} = \frac{3}{5}$

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11. Prove that

$$\tan^{-1} \frac{1}{7} + \tan^{-1} \frac{1}{13} - \tan^{-1} \frac{2}{9} = 0$$

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

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14. Show that  $\frac{\tan^{-1} 1}{7} + \frac{\tan^{-1} 1}{8} = \frac{\cot^{-1} 201}{43} + \cot^{-1} 18$

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15.  $\sec^2(\tan^{-1}(2)) + \operatorname{cosec}^2(\cot^{-1}(2)) =$

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16. Find the value of  $\tan\left(\frac{\cos^{-1} 4}{5} + \frac{\tan^{-1} 2}{3}\right)$

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17. If  $\sin^{-1} x - \cos^{-1} x = \frac{\pi}{6}$  then find  $x$ .

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### Textual Exercises Exercise 8 A iii

1. Prove that  $2 \sin^{-1} \left( \frac{3}{5} \right) - \cos^{-1} \frac{5}{13} = \cos^{-1} \left( \frac{323}{325} \right)$ .

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2. Prove that  $\sin^{-1} \left( \frac{4}{5} \right) + 2 \tan^{-1} \left( \frac{1}{3} \right) = \frac{\pi}{2}$ .

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3. కింది వాటిని రుజువు చేయండి.

$$4 \tan^{-1}\left(\frac{1}{5}\right) + \tan^{-1}\left(\frac{1}{99}\right) - \tan^{-1}\left(\frac{1}{70}\right) = \frac{\pi}{4}$$

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4. If  $\alpha = \tan^{-1}\left(\frac{\sqrt{1+x^2} - \sqrt{1-x^2}}{\sqrt{1+x^2} + \sqrt{1-x^2}}\right)$  then prove that  $x^2 = \sin 2\alpha$ .

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

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$$6. \text{ Prove that } \sin \left[ \frac{\cot^{-1}(2x)}{1-x^2} + \cos^{-1} \left( \frac{1-x^2}{1+x^2} \right) \right] = 1.$$

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7. Prove that

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

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8. If  $\cos^{-1} p + \cos^{-1} q + \cos^{-1} r = \pi$  then,  
P. T.  $p^2 + q^2 + r^2 = 2pqr = 1$

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9. If  $\frac{\sin^{-1}(2p)}{1+p^2} - \cos^{-1} \left( \frac{1-q^2}{1+q^2} \right) = \frac{\tan^{-1}(2x)}{1-x^2}$ , then prove that  
$$x = \frac{p-q}{1+pq}$$

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10. If  $a, b, c$  are distinct non-zero real numbers having the same sign. Prove that

$$\cot^{-1}\left(\frac{ab+1}{a-b}\right) + \cot^{-1}\left(\frac{bc+1}{b-c}\right) + \cot^{-1}\left(\frac{ca+1}{c-a}\right) = \pi \text{ ( or ) } 2\pi$$

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11. If  $\sin^{-1}(x) + \sin^{-1}(y) + \sin^{-1}(z) = \pi$ , prove that

$$x\sqrt{1-x^2} + y\sqrt{1-y^2} + z\sqrt{1-z^2} = 2xyz.$$

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12. If  $\tan^{-1}x + \tan^{-1}y + \tan^{-1}z = \pi$  then prove that

$$x + y + z = xyz.$$

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

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

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15. The arithmetic mean of the non-zero solutions of the equation

$$\tan^{-1} \frac{1}{2x+1} + \tan^{-1} \frac{1}{4x+1} = \tan^{-1} \frac{2}{x^2} \text{ is}$$

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16.

Solve

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

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17. Solve the following equations :

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

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18. solve the following equations

$$\cot^{-1}\left(\frac{1+x}{1-x}\right) = \frac{1}{2}\cot^{-1}\left(\frac{1}{x}\right), x > 0 \text{ and } x \neq 1$$

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19. Solve the following equations.

$$(ii) \tan\left[\chi o \sigma^{-1} \frac{1}{\xi}\right] = \sin\left[\chi o \tau^{-1} \frac{1}{2}\right], x \neq 0$$

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20. Solve the following equations.

$$\cos^{-1} x + \sin^{-1} \frac{x}{2} = \frac{\pi}{6}$$

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21. solve the following equations

$$\cos^{-1}(\sqrt{3} \cdot x) + \cos^{-1}(x) = \frac{\pi}{2}$$

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22. Solve the following equations.

$$\sin \left[ \sin^{-1} \left( \frac{1}{5} \right) + \cos^{-1} x \right] = 1$$

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1. Find the values of the following.

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

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

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3. Find the values of the following:

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

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4. Find the values of the following:

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

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5. Evaluate the following.

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

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6. Find the values of the following:  $\cos ec^{-1}\left(\frac{2}{\sqrt{3}}\right)$

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7. Find the values of the following:

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

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8. Find the values of the following:

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

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9. Find the values of the following:

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

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10. Find the values of the following:

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

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11. Find the values of the following:

$$\tan\left(\sec^{-1}\frac{25}{7}\right)$$

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12. Find the values of the following

$$\cos\left(\tan^{-1}\frac{24}{7}\right)$$

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**13.** Find the values of the following:

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

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**14.** Find the values of the following:

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

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**15.** Find the value of the following:

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

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16. Show that

$$\sec^2(\cot^{-1} 3) + (\cos e c^2(\tan^{-1} 2)) = \frac{85}{36}$$



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17. Find the value of the following

$$\cot^{-1}\left(\frac{1}{2}\right) + \cot^{-1}\left(\frac{1}{3}\right)$$



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18. Prove that  $\sin^{-1}\left(\frac{4}{5}\right) + \frac{\sin^{-1} 7}{25} = \frac{\sin^{-1} 117}{125}$ .



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19. If  $x \in (-1, 1)$  prove that  $2 \tan^{-1} x = \tan^{-1} \frac{2x}{1-x^2}$



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$$20. \sin^{-1}\left(\frac{4}{5}\right) + \sin^{-1}\left(\frac{5}{13}\right) + \sin^{-1}\left(\frac{16}{65}\right) =$$

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$$21. \text{ Prove that } \cot^{-1} 9 + \operatorname{cosec}^{-1} \frac{\sqrt{41}}{4} = \frac{\pi}{4}.$$

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$$22. \text{ Show that } \cot\left(\sin^{-1} \sqrt{\frac{13}{17}}\right) = \sin\left(\tan^{-1} \frac{2}{3}\right).$$

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$$23. \text{ Find the value of } \tan\left(2\tan^{-1}\left(\frac{1}{5}\right) - \frac{\pi}{4}\right)$$

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24. Prove that  $\sin^{-1}\left(\frac{4}{5}\right) + 2 \tan^{-1}\left(\frac{1}{3}\right) = \frac{\pi}{2}$ .

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25. Prove that  $\cos\left(2\frac{\tan^{-1} 1}{7}\right) = \sin\left(4\frac{\tan^{-1} 1}{3}\right)$

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26. If  $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z = \pi$ , then prove that  $x^4 + y^4 + z^4 + 4x^2y^2z^2 = 2(x^2y^2 + y^2z^2 + z^2x^2)$ .

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27. If  $\cos^{-1}\frac{P}{a} + \cos^{-1}\frac{q}{b} = \alpha$ , then prove that

$$\frac{p^2}{a^2} - \frac{2pq}{ab} \cdot \cos \alpha + \frac{q^2}{b^2} = \sin^2 \alpha$$



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



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29. Solve  $\sin^{-1} \frac{3x}{5} + \sin^{-1} \frac{4x}{5} = \sin^{-1} x$



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30. Solve  $\sin^{-1} x + \sin^{-1} 2x = \frac{\pi}{3}$ .



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31.  $\sin[2 \cos^{-1}\{\cot(2 \tan^{-1} x)\}] = 0$  Find x



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



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