

## INVERSE TRIGONOMETRIC FUNCTIONS

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### ONE MARK QUESTIONS

1. Find the principal value of the following:  
a)  $\sin^{-1}\left(\frac{1}{\sqrt{2}}\right)$    b)  $\cos^{-1}\left(\frac{-1}{\sqrt{2}}\right)$    c)  $\tan^{-1}\left(\frac{-1}{\sqrt{3}}\right)$    d)  $\operatorname{cosec}^{-1}(-2)$    e)  $\sec^{-1}\left(-\frac{2}{\sqrt{3}}\right)$
2. Find the value of the following:  
a)  $\sin^{-1}\left(\sin\frac{3\pi}{5}\right)$    b)  $\cos^{-1}\left(\cos\frac{13\pi}{6}\right)$    c)  $\tan^{-1}\left(\tan\frac{7\pi}{6}\right)$    d)  $\operatorname{cosec}^{-1}\left(\operatorname{cosec}\frac{\pi}{8}\right)$    e)  $\sec^{-1}\left(\sec\frac{3\pi}{4}\right)$ .
3. Evaluate the following:  
a)  $\sin\left\{\frac{\pi}{3} - \sin^{-1}\left(\frac{-1}{2}\right)\right\}$    b)  $\sin\left(\frac{1}{2}\cos^{-1}\frac{4}{5}\right)$    c)  $\tan\frac{1}{2}\left(\cos^{-1}\frac{\sqrt{5}}{3}\right)$ .
4. Evaluate:  $\cos\left(\sin^{-1}\frac{3}{5} + \cos^{-1}\frac{12}{13}\right)$ .
5. Show that  $\sin^{-1}(\sqrt{x}) = \frac{1}{2}\cos^{-1}\left(\frac{1-x}{1+x}\right)$ .

### FOUR MARKS QUESTIONS

6. Prove that  $\tan^{-1}\left\{\frac{\sqrt{1+x^2} + \sqrt{1-x^2}}{\sqrt{1+x^2} - \sqrt{1-x^2}}\right\} = \frac{\pi}{4} + \frac{1}{2}\cos^{-1}x^2$ .
  7. Prove that  $\tan^{-1}\frac{1}{4} + \tan^{-1}\frac{2}{9} = \frac{1}{2}\cos^{-1}\frac{3}{5}$ .
  8. Prove that  $\cot^{-1}\left(\frac{ab+1}{a-b}\right) + \cot^{-1}\left(\frac{bc+1}{b-c}\right) + \cot^{-1}\left(\frac{ca+1}{c-a}\right) = 0$ . (NCERT EXEMPLAR)
  9. Prove that  $\tan^{-1}\frac{3}{4} + \tan^{-1}\frac{3}{5} - \tan^{-1}\frac{8}{19} = \frac{\pi}{4}$ .
  10. Prove that  $\cos^{-1}\frac{4}{5} + \cos^{-1}\frac{12}{13} = \cos^{-1}\frac{33}{65}$ .
  11. Solve for x:  $\sin^{-1}(1-x) - 2\sin^{-1}x = \frac{\pi}{2}$ .
  12. If  $\cos^{-1}\frac{x}{a} + \cos^{-1}\frac{y}{b} = \theta$ , then prove that  $\frac{x^2}{a^2} - \frac{2xy}{ab}\cos\theta + \frac{y^2}{b^2} = \sin^2\theta$ . (NCERT EXEMPLAR)
  13. Prove that  $\tan\left(\frac{\pi}{4} + \frac{1}{2}\cos^{-1}\frac{a}{b}\right) + \tan\left(\frac{\pi}{4} - \frac{1}{2}\cos^{-1}\frac{a}{b}\right) = \frac{2b}{a}$ . (CBSE 2010, 2013)
  14. Solve for x:  $\cos^{-1}\left(\frac{x^2-1}{x^2+1}\right) + \tan^{-1}\left(\frac{2x}{x^2-1}\right) = \frac{2\pi}{3}$ .
  15. Solve for x:  $\tan^{-1}\left(\frac{x-1}{x-2}\right) + \tan^{-1}\left(\frac{x+1}{x+2}\right) = \frac{\pi}{4}$ .
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