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Worksheet : Class XII Inverse Trigonometric Functions

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Name:

MATHEMATICS WORKSHEET – II **INVERSE TRIGONOMETRIC FUNCTIONS – 5 Marks**

March 2012

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

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

OR

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

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

OR

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



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March 2010 Delhi- Set 1

5. What is the principal value of $\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$? [1]
6. Prove: $\tan^{-1}\sqrt{x} = \frac{1}{2}\cos^{-1}\left(\frac{1-x}{1+x}\right)$, $x \in (0, 1)$. [4]

OR

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

Set 2

7. What is the principal value of $\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$? [1]

Set 3

8. Find the principal value of $\sin^{-1}\left(-\frac{1}{2}\right) + \cos^{-1}\left(-\frac{1}{2}\right)$. [1]
9. Prove that: $\tan^{-1}(1) + \tan^{-1}(2) + \tan^{-1}(3) = \pi$ [4]

OR

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

March 2010 All India- Set 1

10. Write the principal value of $\sec^{-1}(-2)$. [1]
11. $\tan^{-1}x + \tan^{-1}\left(\frac{2x}{1-x^2}\right) = \tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right)$ [4]

OR



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

Set 2

12. Write the principal value of $\cot^{-1}(-\sqrt{3})$ [1]

13. Prove: $\tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{1}{5}\right) + \tan^{-1}\left(\frac{1}{7}\right) + \tan^{-1}\left(\frac{1}{8}\right) = \frac{\pi}{4}$. [4]

OR

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

Set 3

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

March 2010 Foreign - Set 1

15. What is the domain of the function $\sin^{-1} x$. [1]

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

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17. Using principal value, write the value of $\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$. [1]

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

OR

Solve for x : $\cos(2\sin^{-1} x) = \frac{1}{9}$, $x > 0$.



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EXTRA QUESTIONS

19. Find the principal value of $\tan^{-1}\left(-\frac{1}{\sqrt{3}}\right)$. [1]
20. Find the principal value of $\tan^{-1}(\sqrt{3}) - \sec^{-1}(-2)$. [1]
21. Prove that: $\sin^{-1}\left(\frac{8}{17}\right) + \sin^{-1}\left(\frac{3}{5}\right) = \sin^{-1}\left(\frac{77}{85}\right)$. [1]
22. Prove that: $2\sin^{-1}x = \sin^{-1}\left[2x\sqrt{1-x^2}\right]$, $-\frac{1}{\sqrt{2}} \leq x \leq \frac{1}{\sqrt{2}}$. [1]
23. Prove that: $\tan^{-1}\sqrt{x} = \frac{1}{2}\cos^{-1}\left(\frac{1-x}{1+x}\right)$, $x \in [0, 1]$. [4]
24. Prove that: $\cot^{-1}\left[\frac{\sqrt{1+\sin x} + \sqrt{1-\sin x}}{\sqrt{1+\sin x} - \sqrt{1-\sin x}}\right] = \frac{x}{2}$, $x \in \left(0, \frac{\pi}{4}\right)$. [4]
25. Solve: $\tan^{-1}\left(\frac{1-x}{1+x}\right) = \frac{1}{2}\tan^{-1}x$, $(x > 0)$. [4]

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