

Inverse Trigonometric Functions Assignment

QUESTION 1(i): 5. If $\sin^{-1}\left(\frac{3}{5}\right)$, find $\cos x$

QUESTION 1(ii) We can, define the inverse of cosine function in each of these intervals $[-\pi, 0]$, $[0, \pi]$, $[\pi, 2\pi]$ etc as the cosine function is bijective with range $[-1, 1]$ in these intervals. generalize the intervals.

QUESTION 2: Simplify the expression: $\tan\left[\cos^{-1}\frac{3}{5}\right]$

QUESTION 3: Solve: $\sin\left[\frac{\pi}{3} - \sin^{-1}\left(-\frac{1}{2}\right)\right]$

QUESTION 4. Simplify the given expression: $\tan^{-1}\frac{6}{17} + \tan^{-1}\frac{11}{23}$

QUESTION 5 : Solve for x:

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

QUESTION 6: Solve the equation:

$$(\tan^{-1} x)^2 + (\cot^{-1} x)^2 = \frac{5\pi^2}{8}$$

QUESTION 7: Prove that in the interval $[0,1]$: $\tan^{-1}\sqrt{x} = \frac{1}{2} \cos^{-1}\left[\frac{1-x}{1+x}\right]$

QUESTION 8. Write $\sin\left[\tan^{-1} x\right]$ in terms of x

QUESTION 9: Prove that $\sin^{-1}\left(\frac{8}{17}\right) + \sin^{-1}\left(\frac{3}{5}\right) = \sin^{-1}\left(\frac{77}{85}\right)$

QUESTION 10: Find the principal value of $\sin^{-1}\left(-\frac{1}{2}\right)$

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QUESTION 11: Write in the simplest form :

$$\tan^{-1} \frac{1}{\sqrt{x^2 - 1}}, |x| > 1$$

QUESTION 12:

Solve for x , the equation $\tan^{-1} x + 2 \cot^{-1} x = \frac{2\pi}{3}$.

QUESTION 13:

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

QUESTION 14:

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

QUESTION 15:

If $a > b > c > 0$, then prove that

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