

Inverse Trigonometric Functions

JEE Main 2021 (July) Chapter-wise Questions

Questions with Answer Keys

MathonGo

Q1 (20 July 2021 Shift 1)

The number of real roots of the equation

$$\tan^{-1} \sqrt{x(x+1)} + \sin^{-1} \sqrt{x^2+x+1} = \frac{\pi}{4}$$

(1) 1

(2) 2

(3) 4

(4) 0

Q2 (20 July 2021 Shift 2)

The value of $\tan\left(2\tan^{-1}\left(\frac{3}{5}\right) + \sin^{-1}\left(\frac{5}{13}\right)\right)$ is equal to:

(1) $\frac{-181}{69}$

(2) $\frac{220}{21}$

(3) $\frac{-291}{76}$

(4) $\frac{151}{63}$

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Answer Key

Q1 (4) Q2 (2)

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Hints and Solutions

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Q1 mathongo mathongo mathongo mathongo mathongo mathongo mathongo mathongo

$$\tan^{-1} \sqrt{x^2+x} + \sin^{-1} \sqrt{x^2+x+1} = \frac{\pi}{4}$$

For equation to be defined,

$$x^2 + x \geq 0$$

$$\Rightarrow x^2 + x + 1 \geq 1$$

∴ only possibility that the equation is defined

$$x^2 + x = 0 \Rightarrow x = 0; x = -1$$

None of these values satisfy

∴ No of roots = 0

Q2 mathongo mathongo mathongo mathongo mathongo mathongo mathongo

$$\tan^{-1} \frac{3}{5} + \tan^{-1} \frac{3}{5} + \tan^{-1} \frac{5}{12}$$

$x > 0, y > 0, xy < 1$

$$\tan^{-1} \frac{\frac{6}{5}}{1 - \frac{9}{25}} = \tan^{-1} \frac{15}{8} + \tan^{-1} \frac{5}{12}$$

$x > 0, y > 0, xy < 1$

$$\tan^{-1} \frac{\frac{15}{8} + \frac{5}{12}}{1 - \frac{15}{8} \cdot \frac{5}{12}} = \tan^{-1} \frac{220}{21}$$

$$\tan\left(\tan^{-1} \frac{220}{21}\right) = \frac{220}{21}$$

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