

Mathematics

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(Chapter 2)(Inverse Trigonometric Functions)

(Class XII)

(Exemplar Problems)

Objective Type Questions

Fill in the blank in the following:

Question 46:

If $y = 2\tan^{-1}x + \sin^{-1}\frac{2x}{1+x^2}$, then _____ $< y <$ _____.

Answer 46:

Given that: $y = 2\tan^{-1}x + \sin^{-1}\frac{2x}{1+x^2}$

Now, we have

$$y = 2\tan^{-1}x + \sin^{-1}\frac{2x}{1+x^2}$$

$$\Rightarrow y = 2\tan^{-1}x + 2\tan^{-1}x$$

$$\Rightarrow y = 4\tan^{-1}x$$

$$\left[\because 2\tan^{-1}x = \sin^{-1}\left(\frac{2x}{1+x^2}\right) \right]$$

Now, according to principle value of $\tan^{-1}x$, we know that:

$$-\frac{\pi}{2} < \tan^{-1}x < \frac{\pi}{2}$$

$$\Rightarrow -\frac{4\pi}{2} < 4\tan^{-1}x < \frac{4\pi}{2}$$

$$\Rightarrow -2\pi < 4\tan^{-1}x < 2\pi$$

$$\Rightarrow -2\pi < y < 2\pi$$

$$\left[\because y = 4\tan^{-1}x \right]$$

