

Mathematics

(www.tiwariacademy.in)

(Chapter 2)(Inverse Trigonometric Functions)

(Class XII)

(Exemplar Problems)

Objective Type Questions

Choose the correct answers from the given four options in the following (MCQ):

Question 31:

If $\sin^{-1}\left(\frac{2a}{1+a^2}\right) + \cos^{-1}\left(\frac{1-a^2}{1+a^2}\right) = \tan^{-1}\left(\frac{2x}{1-x^2}\right)$, where $a, x \in]0, 1[$, then the value of x is

(A) 0

(B) $\frac{a}{2}$

(C) a

(D) $\frac{2a}{1-a^2}$

Answer 31:

(D) $\frac{2a}{1-a^2}$

Solution:

Given that: $\sin^{-1}\left(\frac{2a}{1+a^2}\right) + \cos^{-1}\left(\frac{1-a^2}{1+a^2}\right) = \tan^{-1}\left(\frac{2x}{1-x^2}\right)$

Now, we have $\sin^{-1}\left(\frac{2a}{1+a^2}\right) + \cos^{-1}\left(\frac{1-a^2}{1+a^2}\right) = \tan^{-1}\left(\frac{2x}{1-x^2}\right)$

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

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

$$\Rightarrow 4\tan^{-1}a = 2\tan^{-1}x$$

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



Mathematics

(www.tiwariacademy.in)

(Chapter 2)(Inverse Trigonometric Functions)

(Class XII)

$$\Rightarrow \tan^{-1}\left(\frac{2a}{1-a^2}\right) = \tan^{-1}x$$

$$\Rightarrow \left(\frac{2a}{1-a^2}\right) = x$$

Hence, the option (D) is correct.

