

# Mathematics

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## (Chapter 2)(Inverse Trigonometric Functions)

(Class XII)

### (Exemplar Problems)

#### Long Answer (L.A.)

#### Question 13:

Find the simplified form of  $\cos^{-1} \left[ \frac{3}{5} \cos x + \frac{4}{5} \sin x \right]$ , where  $x \in \left[ -\frac{3\pi}{4}, \frac{\pi}{4} \right]$ .

#### Answer 13:

Given that:

$$\cos^{-1} \left[ \frac{3}{5} \cos x + \frac{4}{5} \sin x \right]$$

$$\left[ \text{Let } \frac{3}{5} = \cos \theta \text{ and } \frac{4}{5} = \sin \theta \right]$$

$$= \cos^{-1} [\cos \theta \cos x + \sin \theta \sin x]$$

$$= \cos^{-1} [\cos(\theta - x)]$$

$$[\text{As } \cos(A - B) = \cos A \cos B + \sin A \sin B]$$

$$= \theta - x$$

$$= \cos^{-1} \frac{3}{5} - x \quad \text{or} \quad \sin^{-1} \frac{4}{5} - x \quad \text{or} \quad \tan^{-1} \frac{4}{3} - x$$

$$\left[ \text{As } \frac{3}{5} = \cos \theta, \quad \frac{4}{5} = \sin \theta \text{ and } \frac{4}{3} = \tan \theta \right]$$

