

Mathematics

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(Chapter 2)(Inverse Trigonometric Functions)

(Class XII)

(Exemplar Problems)

Short Answer (S.A.)

Question 1:

Find the value of $\tan^{-1}\left(\tan\frac{5\pi}{6}\right) + \cos^{-1}\left(\cos\frac{13\pi}{6}\right)$

Answer 1:

$$\begin{aligned} \text{We have: } & \tan^{-1}\left(\tan\frac{5\pi}{6}\right) + \cos^{-1}\left(\cos\frac{13\pi}{6}\right) \\ &= \tan^{-1}\left[\tan\left(\pi - \frac{\pi}{6}\right)\right] + \cos^{-1}\left[\cos\left(2\pi + \frac{\pi}{6}\right)\right] \\ &= \tan^{-1}\left(-\tan\frac{\pi}{6}\right) + \cos^{-1}\left(\cos\frac{\pi}{6}\right) \\ &= \tan^{-1}\left[\tan\left(-\frac{\pi}{6}\right)\right] + \cos^{-1}\left(\cos\frac{\pi}{6}\right) \\ &= -\frac{\pi}{6} + \frac{\pi}{6} = 0 \end{aligned}$$

[As we know that the range of the principal value branch of \tan^{-1} is $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ and \cos^{-1} is $[0, \pi]$.]

Hence, the value of $\tan^{-1}\left(\tan\frac{5\pi}{6}\right) + \cos^{-1}\left(\cos\frac{13\pi}{6}\right) = 0$

