Important Questions Class 12 Maths Chapter 2 Inverse Trigonometric Functions

1 Mark Questions

1. Find the principal value of $\sin^{-1}\left(\dfrac{1}{\sqrt{2}}\right)$

Ans. Let $\sin^{-1}\left(\dfrac{1}{\sqrt{2}}\right) = \theta$

$$\sin\theta = \frac{1}{\sqrt{2}}$$

We know that $\theta \in \left[\dfrac{-\pi}{2}, \dfrac{\pi}{2}\right]$

$$\sin\theta = \sin\frac{\pi}{4}$$

$$\theta = \frac{\pi}{4}$$

There for P.V. of

$$\sin^{-1}\left(\frac{1}{\sqrt{2}}\right) is \frac{\pi}{4}$$

---

2. Find the value of $\sin^{-1}\left(\sin\dfrac{3\pi}{5}\right)$

Ans.

$$\sin^{-1}\left(\sin\frac{3\pi}{5}\right) = ?$$

$$\sin^{-1}\left(\sin\frac{3\pi}{5}\right) = \sin^{-1}\left[\sin\left(\pi - \frac{3\pi}{5}\right)\right]\left[\because \sin^{-1}\left(\sin\theta\right)\right] = \theta$$

When $\theta \in \left[\dfrac{-\pi}{2}, \dfrac{\pi}{2}\right]$

$$= \frac{2\pi}{5}$$

---

3. Find the value of

$$\tan^{-1}\sqrt{3} - \cot^{-1}(-\sqrt{3})$$

Ans.

$$\tan^{-1}\sqrt{3} - \cot^{-1}\left(-\sqrt{3}\right) = ?$$

$$\tan^{-1}\sqrt{3} - \cot^{-1}\left(-\sqrt{3}\right)$$

$$= \tan^{-1}\sqrt{3} - \left(\pi - \cot^{-1}\sqrt{3}\right)\left[\because \cot^{-1}(-x) = \pi - \cot^{-1}x\right]$$

$$= \tan^{-1}\sqrt{3} - \pi + \cot^{-1}\sqrt{3}$$

$$= \left(\tan^{-1}\sqrt{3} + \cot^{-1}\sqrt{3}\right) - \pi\left[\because \tan^{-1}x + \cot^{-1}x = \frac{\pi}{2}\right]$$

$$= \frac{\pi}{2} - \frac{\pi}{1} = \frac{-\pi}{2}$$

---

4. Find the value of sin

$$\left(\sin^{-1}a + \cos^{-1}a\right)$$

Ans.

$$\sin(\sin^{-1}a + \cos^{-1}a)$$

$$\sin\frac{\pi}{2}\left[\because \sin^{-1}a + \cos^{-1}a = \frac{\pi}{2}\right]$$

$$=1$$

---

5. tan⁻¹

$$\tan^{-1}\left(\frac{x}{y}\right) - \tan^{-1}\left(\frac{x-y}{x+y}\right)$$

evaluate

Ans.

$$\tan^{-1}\left(\frac{x}{y}\right) - \tan^{-1}\left(\frac{\frac{x}{y}-1}{\frac{x}{y}+1}\right)$$

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

$$\tan^{-1}\left(\frac{x}{y}\right) - \left[\tan^{-1}\left(\frac{x}{y}\right) - \tan^{-1}(1)\right]$$

$$\tan^{-1}\left(\frac{x}{y}\right) - \tan^{-1}\left(\frac{x}{y}\right) + \tan^{-1}(1)$$

$$\tan^{-1}\left(\tan\frac{\pi}{4}\right)$$

$$= \frac{\pi}{4}$$

---

6. Find the principal value of

$$\cot^{-1}\left(-\frac{1}{\sqrt{3}}\right).$$

Ans. Let

$$\cot^{-1}\left(\frac{-1}{\sqrt{3}}\right) = \theta$$

$$\cot \theta = \frac{-1}{\sqrt{3}}$$

We know that $\theta \in (0, \pi)$

$$\cot \theta = \cot \left(\pi - \frac{\pi}{3} \right)$$

$$\theta = \frac{2\pi}{3}$$

There four p.v of $\cot^{-1} \left(\frac{-1}{\sqrt{3}} \right) = \frac{2\pi}{3}$