



Precalculus

Topic: Inverse Trigonometric Functions and Their Graphs

Instructions

Solve the following problems related to inverse trigonometric functions and their graphs. Show all work clearly and check your solutions.

Practice Problems

1. Find the values of the inverse trigonometric functions:

- | | |
|--|--|
| (i) $\sin^{-1}\left(\frac{1}{2}\right)$ | (v) $\cos^{-1}(0)$ |
| (ii) $\cos^{-1}\left(\frac{1}{2}\right)$ | (vi) $\tan^{-1}(-\sqrt{3})$ |
| (iii) $\tan^{-1}(1)$ | (vii) $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$ |
| (iv) $\sin^{-1}(-1)$ | (viii) $\cos^{-1}\left(-\frac{1}{2}\right)$ |

2. Find the exact value of the expression, if it is defined.

- | | |
|---|--|
| (i) $\sin\left(\sin^{-1}\left(\frac{1}{4}\right)\right)$ | (iv) $\sin\left(\tan^{-1}(-1)\right)$ |
| (ii) $\tan^{-1}\left(\tan\left(\frac{\pi}{4}\right)\right)$ | (v) $\cos^{-1}\left(\cos\left(\frac{17\pi}{6}\right)\right)$ |
| (iii) $\cos^{-1}\left(\cos\left(-\frac{\pi}{6}\right)\right)$ | |

3. Solve the following inverse trigonometric equations:

$$\begin{aligned} \text{(i)} \quad \sin^{-1}(x) &= \frac{\pi}{6} \\ \text{(ii)} \quad \cos^{-1}(x) &= \frac{\pi}{3} \\ \text{(iii)} \quad \tan^{-1}(x) &= \frac{\pi}{4} \end{aligned}$$

$$\begin{aligned} \text{(iv)} \quad \sin^{-1}(x) &= -\frac{\pi}{4} \\ \text{(v)} \quad \cos^{-1}(x) &= 0 \end{aligned}$$

4. Determine the domain and range of the following inverse trigonometric functions:

$$\begin{aligned} \text{(i)} \quad y &= \sin^{-1}(x) \\ \text{(ii)} \quad y &= \cos^{-1}(x) \\ \text{(iii)} \quad y &= \tan^{-1}(x) \end{aligned}$$

$$\begin{aligned} \text{(iv)} \quad y &= \sin^{-1}(2x - 1) \\ \text{(v)} \quad y &= \cos^{-1}\left(\frac{x}{3}\right) \end{aligned}$$

5. Graph the following inverse trigonometric functions:

$$\begin{aligned} \text{(i)} \quad y &= \sin^{-1}(x) \\ \text{(ii)} \quad y &= \cos^{-1}(x) \\ \text{(iii)} \quad y &= \tan^{-1}(x) \end{aligned}$$

$$\begin{aligned} \text{(iv)} \quad y &= \sin^{-1}(2x) \\ \text{(v)} \quad y &= \cos^{-1}\left(\frac{x}{3}\right) \end{aligned}$$

Multiple-Choice Questions

1. What is the range of the function $y = \sin^{-1}(x)$?

$$\begin{aligned} \text{A.} \quad & \left[-\frac{\pi}{2}, \frac{\pi}{2}\right] \\ \text{B.} \quad & [0, \pi] \end{aligned}$$

$$\begin{aligned} \text{C.} \quad & [-\pi, \pi] \\ \text{D.} \quad & \left[-\frac{\pi}{2}, \pi\right] \end{aligned}$$

2. What is the domain of the function $y = \cos^{-1}(x)$?

$$\begin{aligned} \text{A.} \quad & [-1, 1] \\ \text{B.} \quad & [0, 1] \end{aligned}$$

$$\begin{aligned} \text{C.} \quad & [-\infty, \infty] \\ \text{D.} \quad & [0, \pi] \end{aligned}$$

3. What is the range of the function $y = \tan^{-1}(x)$?

$$\begin{aligned} \text{A.} \quad & (-\infty, \infty) \\ \text{B.} \quad & [0, \pi] \end{aligned}$$

$$\begin{aligned} \text{C.} \quad & \left[-\frac{\pi}{2}, \frac{\pi}{2}\right] \\ \text{D.} \quad & [-\pi, \pi] \end{aligned}$$

4. What is the value of $\cos^{-1}\left(\frac{1}{2}\right)$?

$$\begin{aligned} \text{A.} \quad & \frac{\pi}{3} \\ \text{B.} \quad & \frac{\pi}{4} \end{aligned}$$

$$\begin{aligned} \text{C.} \quad & \frac{\pi}{6} \\ \text{D.} \quad & \frac{\pi}{2} \end{aligned}$$

5. What is the value of $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$?

$$\begin{aligned} \text{A.} \quad & \frac{\pi}{6} \\ \text{B.} \quad & \frac{\pi}{3} \end{aligned}$$

$$\begin{aligned} \text{C.} \quad & \frac{\pi}{2} \\ \text{D.} \quad & \frac{\pi}{4} \end{aligned}$$