Inverse trig functions

Lesson 8 · Module 0 — Foundations · The Calculus Course · dailymaths.uk/course

Practice problems

1. Evaluate $\arccos(-\frac{\sqrt{2}}{2})$ in radians.
2. Evaluate $\arctan(-1)$ in radians.
3. Find the value of $\arcsin(\sin(\frac{2\pi}{3}))$.

Solutions

1. Evaluate $\arccos(-\frac{\sqrt{2}}{2})$ in radians.

   - We look for an angle θ such that $\cos(\theta) = -\frac{\sqrt{2}}{2}$ within the range $[0, \pi]$.
   - The reference angle for $\frac{\sqrt{2}}{2}$ is $\frac{\pi}{4}$.
   - Since the cosine is negative, the angle must be in the second quadrant.
   - The angle is $\pi - \frac{\pi}{4} = \frac{3\pi}{4}$.

   Answer: \frac3\pi4

2. Evaluate $\arctan(-1)$ in radians.

   - We look for an angle θ such that $\tan(\theta) = -1$ within the range $(-\frac{\pi}{2}, \frac{\pi}{2})$.
   - We know $\tan(\frac{\pi}{4}) = 1$.
   - Since tangent is an odd function, $\tan(-\frac{\pi}{4}) = -1$.
   - The angle $-\frac{\pi}{4}$ is within the required range.

   Answer: -\frac\pi4

3. Find the value of $\arcsin(\sin(\frac{2\pi}{3}))$.

   - First, evaluate the inner part: $\sin(\frac{2\pi}{3}) = \frac{\sqrt{3}}{2}$.
   - Now we need to find $\arcsin(\frac{\sqrt{3}}{2})$.
   - We look for an angle θ in the range $[-\frac{\pi}{2}, \frac{\pi}{2}]$ such that $\sin(\theta) = \frac{\sqrt{3}}{2}$.
   - The angle $\frac{\pi}{3}$ satisfies this and is within the range.

   Answer: \frac\pi3