EdLoop JEE

MATHEMATICS · JEE MAIN

Inverse Trigonometric Functions

Previous Year Questions with answers

108 questions · **99** papers · **2002–2026** · newest paper first

Step-by-step solutions for every question: free in the EdLoop JEE app (Google Play) · pyq.edloop.in

What is in this PDF: every Inverse Trigonometric Functions question we hold from past JEE Main and AIEEE papers, with its options and answer. Where an answer comes from a source other than the official final key, it says so next to the answer.

Step-by-step solutions for every question are free in the EdLoop JEE app (Google Play) and on app.edloop.in. More chapters: pyq.edloop.in/free-pdfs/

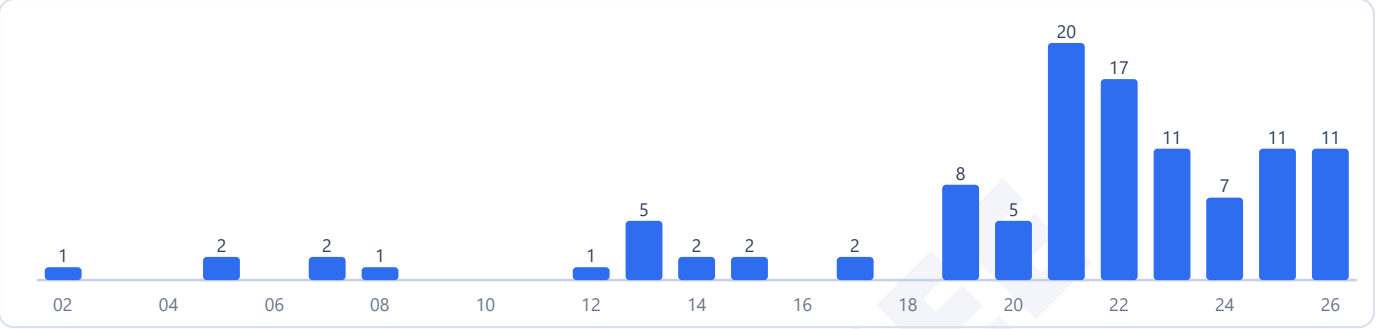
EdLoop

Chapter at a glance

2%	108	83 of 162	93 / 15
of Mathematics questions, 2019–2026	questions, 2002–2026	papers asked it, 2019–2026	MCQ / numerical, 2002–2026

Trend. Steady: 0.5 questions per paper in 2024–2026 against 0.6 in 2019–2023.

Questions per year



Counts are the questions we hold: 108 in 99 papers. No question in this chapter was found repeated across papers.

Most-asked topics in this chapter (2002–2026)

Properties & Equations	70
Domain, Range & Graphs	38

How often it comes up

Inverse trigonometric functions provides the bridge between circular ratios and single-valued functions under Unit 14: Trigonometry in the Class 12 curriculum, placing it at rank 23 among the 29 chapters in the subject. Between 2019 and 2026, 90 questions were catalogued from this chapter across 162 papers, representing 2.0 percent of all mathematics questions. It appeared in 83 of those 162 papers and has been tested every single year since 2019. Over the recent 2024 to 2026 testing sessions, it contributed 29 questions across 58 papers, averaging 0.5 questions per paper with a 1.9 percent subject share. Comparing the earlier 2002 to 2018 share of 1.4 percent against 2024 to 2026 indicates that its long-term share is up, while comparing 2019 to 2026 with 2024 to 2026 shows it is about the same. Across the complete historical record from 2002 to 2026 spanning 200 papers, 108 questions appeared in 99 papers, with 15 numerical answer questions appearing between 2019 and 2026.

In the 2024, 2025, and 2026 test cycles, the question numbers were 7, 11, and 11 questions respectively.

Beyond standalone appearances, inverse trigonometric expressions appear constantly across limits, differentiation, and definite integrals. Questions commonly probe domain restrictions, principal value branch evaluations, telescoping series involving inverse tangents, and root determination for inverse trigonometric equations.

Most-asked topics

Questions in this chapter group into two primary categories:

1. **Properties & Equations (57 questions, 2019-2026; 70 total, last asked 2026)** The largest subtopic in the chapter. Covers addition and subtraction formulas for inverse tangents, solving equations involving sums of inverse circular functions, telescoping inverse tangent summations where terms split via the identity for arctan of x minus y over one plus xy, and algebraic equations involving compositions.

2. **Domain, Range & Graphs (33 questions, 2019-2026; 38 total, last asked 2026)** Focuses on finding valid real domains for functions containing inverse sines, inverse cosines, or inverse secants of algebraic arguments. Also tests

principal value ranges, piecewise linear graphs of compositions like sin inverse of sin x, and extremum values on bounded intervals.

What the questions look like

Examiners test inverse circular functions using several dependable problem designs:

- **Domain Determination for Compound Arguments**: Finding the domain of a composite expression where arguments of inverse sine or inverse cosine must be restricted strictly between minus one and plus one, combined with denominator non-zero criteria.
- **Telescoping Inverse Tangent Series**: Evaluating finite or infinite sums of inverse tangents where the argument of each term is converted into the difference of two adjacent sequence terms divided by one plus their product.
- **Root Counting for Inverse Trigonometric Equations**: Solving equations of the form arctan of a linear expression plus arctan of another linear expression equals a constant angle fraction of pi, followed by rejecting roots that violate principal branch boundaries.
- **Extrema of Squared Inverse Sums**: Expressions such as the sum of squared inverse sine and squared inverse cosine over a bounded interval, optimized by expressing one in terms of the complementary angle pi over two minus the other.

How to practise it

Solving inverse trigonometric problems cleanly requires strict adherence to principal branches:

- **Keep principal value ranges memorized**: Never forget that inverse sine maps to the closed interval from minus pi over two to plus pi over two, inverse cosine maps to zero to pi, and inverse tangent maps to the open interval from minus pi over two to plus pi over two. Answers outside these intervals are invalid.
- **Convert inverse sums to inverse tangents**: Whenever possible, convert inverse sines and inverse cosines of positive arguments into inverse tangents. The addition identity for inverse tangents is algebraic and easier to manipulate than radical-heavy inverse sine additions.
- **Check product conditions in addition formulas**: When using arctan x plus arctan y, verify whether the product xy is less than one or greater than one. If x and y are positive with xy greater than one, you must add pi to the standard formula to stay in the correct principal branch.
- **Split general terms in series**: For summations of arctan expressions, manipulate the numerator to express it as the difference of two terms whose product appears in the denominator added to one. This collapses the entire series into a telescoping difference between boundary terms.

EdLoop JEE

Q1 JEE Main 2026 · 8 Apr · Shift 2 MCQ

Let $\alpha = 3\sin^{-1}\left(\frac{6}{11}\right)$ and $\beta = 3\cos^{-1}\left(\frac{4}{9}\right)$, where inverse trigonometric functions take only the principal values.

Given below are two statements :

Statement I : $\cos(\alpha+\beta) > 0$.

Statement II : $\cos(\alpha) < 0$.

In the light of the above statements, choose the **correct** answer from the options given below :

(A) Both **Statement I** and **Statement II** are true
(B) Both **Statement I** and **Statement II** are false
(C) **Statement I** is true but **Statement II** is false
(D) **Statement I** is false but **Statement II** is true

Answer: (A) Both **Statement I** and **Statement II** are true · Official NTA final key

Q2 JEE Main 2026 · 6 Apr · Shift 1 MCQ

Let $0 < \alpha < 1$, $\beta = \frac{1}{3\alpha}$ and $\tan^{-1}(1-\alpha) + \tan^{-1}(1-\beta) = \frac{\pi}{4}$. Then $6(\alpha+\beta)$ is equal to:

(A) 6
(B) 7
(C) 8
(D) 9

Answer: (B) 7 · Official NTA final key

Q3 JEE Main 2026 · 6 Apr · Shift 2 MCQ

If $\sin\left(\tan^{-1}(x\sqrt{2})\right) = \cot\left(\sin^{-1}\sqrt{1-x^2}\right)$, $x \in (0,1)$, then the value of x is :

(A) $\frac{1}{2}$
(B) $\frac{1}{3}$
(C) $\frac{2}{3}$
(D) $\frac{5}{8}$

Answer: (A) $\frac{1}{2}$ · Official NTA final key

Q4 JEE Main 2026 · 5 Apr · Shift 1 Numerical

If $\frac{\pi}{4} + \sum_{p=1}^{11}\tan^{-1}\left(\frac{2^{p-1}}{1+2^{2p-1}}\right) = \alpha$, then $\tan\alpha$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 2048. · Official NTA final key

Q5 JEE Main 2026 · 4 Apr · Shift 2 MCQ

The integral $\int_0^1 \cot^{-1}\left(1+x+x^2\right) dx$ is equal to:

(A) $2\tan^{-1}2+\frac{1}{2}\log_e\left(\frac{5}{4}\right)+\frac{\pi}{2}$

(B) $2\tan^{-1}2+\frac{1}{2}\log_e\left(\frac{5}{4}\right)-\frac{\pi}{2}$

(C) $2\tan^{-1}2-\frac{1}{2}\log_e\left(\frac{5}{4}\right)+\frac{\pi}{2}$

(D) $2\tan^{-1}2-\frac{1}{2}\log_e\left(\frac{5}{4}\right)-\frac{\pi}{2}$

Answer: (D) $2\tan^{-1}2-\frac{1}{2}\log_e\left(\frac{5}{4}\right)-\frac{\pi}{2}$ · Official NTA final key

---

Q6 JEE Main 2026 · 28 Jan · Shift 1 Numerical

If $k=\tan\left(\frac{\pi}{4}+\frac{1}{2}\cos^{-1}\left(\frac{2}{3}\right)\right)+\tan\left(\frac{1}{2}\sin^{-1}\left(\frac{2}{3}\right)\right)$, then the number of solutions of the equation $\sin^{-1}(kx-1)=\sin^{-1}x-\cos^{-1}x$ is _____.

Numerical value type: the answer is a number.

Answer: 1. · Official NTA final key

Q7 JEE Main 2026 · 28 Jan · Shift 2 MCQ

Considering the principal values of inverse trigonometric functions, the value of the expression $\tan\left(2\sin^{-1}\left(\frac{2}{\sqrt{13}}\right)-2\cos^{-1}\left(\frac{3}{\sqrt{10}}\right)\right)$ is equal to :

(A) $\frac{33}{56}$

(B) $-\frac{33}{56}$

(C) $\frac{16}{63}$

(D) $-\frac{16}{63}$

Answer: (A) $\frac{33}{56}$ · Official NTA final key

Q8 JEE Main 2026 · 24 Jan · Shift 2 MCQ

If the domain of the function $f(x)=\sin^{-1}\left(\frac{1}{x^2-2x-2}\right)$, is $(-\infty,\alpha]\cup[\beta,\gamma]\cup[\delta,\infty)$, then $\alpha+\beta+\gamma+\delta$ is equal to

(A) 5

(B) 2

(C) 4

(D) 3

Answer: (C) 4 · Official NTA final key

Q9 JEE Main 2026 · 22 Jan · Shift 1 MCQ

The number of solutions of $\tan^{-1} 4x + \tan^{-1} 6x = \frac{\pi}{6}$, where $-\frac{1}{2\sqrt{6}} < x < \frac{1}{2\sqrt{6}}$, is equal to

(A) 1
(B) 2
(C) 0
(D) 3

Answer: (A) 1 · Official NTA final key

Q10 JEE Main 2026 · 21 Jan · Shift 1 MCQ

If the domain of the function $f(x) = \cos^{-1}\left(\frac{2x-5}{11-3x}\right) + \sin^{-1}\left(2x^2 - 3x + 1\right)$ is the interval $[\alpha, \beta]$, then $\alpha + 2\beta$ is equal to :

(A) 3
(B) 5
(C) 1
(D) 2

Answer: (A) 3 · Official NTA final key

Q11 JEE Main 2026 · 21 Jan · Shift 2 Numerical

Let the maximum value of $(\sin^{-1} x)^2 + (\cos^{-1} x)^2$ for $x \in \left[-\frac{\sqrt{3}}{2}, \frac{1}{\sqrt{2}}\right]$ be $\frac{m}{n}\pi^2$, where $\gcd(m, n) = 1$. Then $m + n$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 65. · Official NTA final key

Q12 JEE Main 2025 · 8 Apr · Shift 2 MCQ

The value of $\cot^{-1}\left(\frac{\sqrt{1+\tan^2(2)}-1}{\tan(2)}\right) - \cot^{-1}\left(\frac{\sqrt{1+\tan^2\left(\frac{1}{2}\right)}+1}{\tan\left(\frac{1}{2}\right)}\right)$ is equal to

(A) $\pi + \frac{5}{2}$
(B) $\pi - \frac{3}{2}$
(C) $\pi - \frac{5}{4}$
(D) $\pi + \frac{3}{2}$

Answer: (C) $\pi - \frac{5}{4}$ · Key from source paper

Q13 JEE Main 2025 · 4 Apr · Shift 1 MCQ

Considering the principal values of the inverse trigonometric functions,

$\sin^{-1}\left(\frac{\sqrt{3}}{2}x+\frac{1}{2}\sqrt{1-x^2}\right), -\frac{1}{2}<x<\frac{1}{\sqrt{2}}$, is equal to

(A) $\frac{5\pi}{6}-\sin^{-1}x$
(B) $\frac{\pi}{4}+\sin^{-1}x$
(C) $\frac{-5\pi}{6}-\sin^{-1}x$
(D) $\frac{\pi}{6}+\sin^{-1}x$

Answer: (D) $\frac{\pi}{6}+\sin^{-1}x$ · Key from source paper

---

Q14 JEE Main 2025 · 4 Apr · Shift 2 MCQ

The sum of the infinite series $\cot^{-1}\left(\frac{7}{4}\right)+\cot^{-1}\left(\frac{19}{4}\right)+\cot^{-1}\left(\frac{39}{4}\right)+\cot^{-1}\left(\frac{67}{4}\right)+\ldots$ is :

(A) $\frac{\pi}{2}-\tan^{-1}\left(\frac{1}{2}\right)$
(B) $\frac{\pi}{2}+\tan^{-1}\left(\frac{1}{2}\right)$
(C) $\frac{\pi}{2}+\cot^{-1}\left(\frac{1}{2}\right)$
(D) $\frac{\pi}{2}-\cot^{-1}\left(\frac{1}{2}\right)$

Answer: (A) $\frac{\pi}{2}-\tan^{-1}\left(\frac{1}{2}\right)$ · Key from source paper

---

Q15 JEE Main 2025 · 2 Apr · Shift 2 Numerical

If $y=\cos\left(\frac{\pi}{3}+\cos^{-1}\frac{x}{2}\right)$, then $(x-y)^2+3y^2$ is equal to

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q16 JEE Main 2025 · 29 Jan · Shift 1 Numerical

Let $S=\left\{x:\cos^{-1}x=\pi+\sin^{-1}x+\sin^{-1}(2x+1)\right\}$. Then $\sum_{x\in S}(2x-1)^2$ is equal to _____ .

Numerical value type: the answer is a number.

Answer: 5. · Key from source paper

Q17 JEE Main 2025 · 28 Jan · Shift 1 MCQ

$\cos\left(\sin^{-1}\frac{3}{5}+\sin^{-1}\frac{5}{13}+\sin^{-1}\frac{33}{65}\right)$ is equal to:

(A) 1
(B) 0
(C) $\frac{32}{65}$
(D) $\frac{33}{65}$

Answer: (B) 0 · Key from source paper

Q18 JEE Main 2025 · 28 Jan · Shift 2 MCQ

Let $[x]$ denote the greatest integer less than or equal to x. Then the domain of $f(x)=\sec^{-1}(2[x]+1)$ is :

(A) $(-\infty, -1] \cup [0, \infty)$
(B) $(-\infty, -1] \cup [1, \infty)$
(C) $(-\infty, \infty)$
(D) $(-\infty, \infty) - \{0\}$

Answer: (C) $(-\infty, \infty)$ · Key from source paper

Q19 JEE Main 2025 · 24 Jan · Shift 1 · Numerical

If for some α, β; $\alpha \leq \beta$, $\alpha + \beta = 8$ and $\sec^2\left(\tan^{-1}\alpha\right) + \operatorname{cosec}^2\left(\cot^{-1}\beta\right) = 36$, then $\alpha^2 + \beta$ is _____ .

Numerical value type: the answer is a number.

Answer: 14. · Key from source paper

Q20 JEE Main 2025 · 24 Jan · Shift 2 · MCQ

If $\alpha > \beta > \gamma > 0$, then the expression $\cot^{-1}\left\{\beta + \frac{(1+\beta^2)}{(\alpha-\beta)}\right\} + \cot^{-1}\left\{\gamma + \frac{(1+\gamma^2)}{(\beta-\gamma)}\right\} + \cot^{-1}\left\{\alpha + \frac{(1+\alpha^2)}{(\gamma-\alpha)}\right\}$ is equal to :

(A) π
(B) 0
(C) $\frac{\pi}{2} - (\alpha + \beta + \gamma)$
(D) 3π

Answer: (A) π · Key from source paper

Q21 JEE Main 2025 · 23 Jan · Shift 1 · MCQ

If $\frac{\pi}{2} \leq x \leq \frac{3\pi}{4}$, then $\cos^{-1}\left(\frac{12}{13}\cos x + \frac{5}{13}\sin x\right)$ is equal to

(A) $x - \tan^{-1}\frac{4}{3}$
(B) $x + \tan^{-1}\frac{4}{5}$
(C) $x - \tan^{-1}\frac{5}{12}$
(D) $x + \tan^{-1}\frac{5}{12}$

Answer: (C) $x - \tan^{-1}\frac{5}{12}$ · Key from source paper

---

Q22 JEE Main 2025 · 22 Jan · Shift 1 · MCQ

Using the principal values of the inverse trigonometric functions, the sum of the maximum and the minimum values of $16\left(\left(\sec^{-1}x\right)^2 + \left(\operatorname{cosec}^{-1}x\right)^2\right)$ is :

(A) $24\pi^2$
(B) $22\pi^2$
(C) $31\pi^2$
(D) $18\pi^2$

Answer: (B) $22\pi^2$ · Key from source paper

Q23 JEE Main 2024 · 9 Apr · Shift 2 Numerical

Let the inverse trigonometric functions take principal values. The number of real solutions of the equation $2\sin^{-1}x + 3\cos^{-1}x = \frac{2\pi}{5}$, is _____

Numerical value type: the answer is a number.

Answer: 0. · Key from source paper

Q24 JEE Main 2024 · 6 Apr · Shift 1 Numerical

For $n \in N$, if $\cot^{-1}3 + \cot^{-1}4 + \cot^{-1}5 + \cot^{-1}n = \frac{\pi}{4}$, then n is equal to _____

Numerical value type: the answer is a number.

Answer: 47. · Key from source paper

Q25 JEE Main 2024 · 4 Apr · Shift 2 MCQ

Given that the inverse trigonometric function assumes principal values only. Let x, y be any two real numbers in $[-1, 1]$ such that $\cos^{-1}x - \sin^{-1}y = \alpha$, $\frac{-\pi}{2} \le \alpha \le \pi$. Then, the minimum value of $x^2 + y^2 + 2xy\sin\alpha$ is

(A) 0
(B) -1
(C) $\frac{1}{2}$
(D) $-\frac{1}{2}$

Answer: (A) 0 · Key from source paper

Q26 JEE Main 2024 · 31 Jan · Shift 1 MCQ

For $\alpha, \beta, \gamma \neq 0$. If $\sin^{-1}\alpha + \sin^{-1}\beta + \sin^{-1}\gamma = \pi$ and $\alpha + \beta + \gamma\alpha - \gamma + \beta = 3\alpha\beta$, then γ equal to

(A) $\frac{\sqrt{3}}{2}$
(B) $\frac{1}{\sqrt{2}}$
(C) $\frac{\sqrt{3}-1}{2\sqrt{2}}$
(D) $\sqrt{3}$

Answer: (A) $\frac{\sqrt{3}}{2}$ · Key from source paper

Q27 JEE Main 2024 · 31 Jan · Shift 2 MCQ

If $a = \sin^{-1}\sin 5$ and $b = \cos^{-1}\cos 5$, then $a^2 + b^2$ is equal to

(A) $4\pi^2 + 25$
(B) $8\pi^2 - 40\pi + 50$
(C) $4\pi^2 - 20\pi + 50$
(D) 25

Answer: (B) $8\pi^2 - 40\pi + 50$ · Key from source paper

Q28 JEE Main 2024 · 29 Jan · Shift 2 MCQ

Let $x = \frac{m}{n}$ (m, n are co-prime natural numbers) be a solution of the equation $\cos\left(2\sin^{-1} x\right) = \frac{1}{9}$ and let $\alpha, \beta(\alpha > \beta)$ be the roots of the equation $mx^2 - nx - m + n = 0$. Then the point (α, β) lies on the line

(A) $3x + 2y = 2$
(B) $5x - 8y = -9$
(C) $3x - 2y = -2$
(D) $5x + 8y = 9$

Answer: (D) $5x + 8y = 9$ · Key from source paper

Q29 JEE Main 2024 · 27 Jan · Shift 2 MCQ

Considering only the principal values of inverse trigonometric functions, the number of positive real values of x satisfying $\tan^{-1}(x) + \tan^{-1}(2x) = \frac{\pi}{4}$ is :

(A) More than 2
(B) 1
(C) 2
(D) 0

Answer: (B) 1 · Key from source paper

Q30 JEE Main 2023 · 13 Apr · Shift 1 Numerical

If $S = \left\{x \in \mathbb{R} : \sin^{-1}\left(\frac{x+1}{\sqrt{x^2+2x+2}}\right) - \sin^{-1}\left(\frac{x}{\sqrt{x^2+1}}\right) = \frac{\pi}{4}\right\}$ then $\sum_{x\in S}\left(\sin\left((x^2+x+5)\frac{\pi}{2}\right) - \cos\left((x^2+x+5)\pi\right)\right)$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 4. · Key from source paper

Q31 JEE Main 2023 · 13 Apr · Shift 2 MCQ

The range of $fx = 4\sin^{-1}\frac{x^2}{x^2+1}$ is

(A) $[0, 2\pi]$
(B) $[0, \pi]$
(C) $[0, 2\pi)$
(D) $[0, \pi)$

Answer: (C) $[0, 2\pi)$ · Key from source paper

Q32 JEE Main 2023 · 13 Apr · Shift 2 Numerical

For $x \in (-1, 1]$, the number of solutions of the equation $\sin^{-1} x = 2\tan^{-1} x$ is equal to

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q33 JEE Main 2023 · 1 Feb · Shift 1 MCQ

Let S be the set of all solutions of the equation $\cos^{-1} 2x - 2\cos^{-1}\sqrt{1-x^2} = \pi, x \in -\frac{1}{2}, \frac{1}{2}$. Then $\sum_{x\in S} 2\sin^{-1} x^2 - 1$ is equal to

(A) 0
(B) $\frac{-2\pi}{3}$
(C) $\pi - \sin^{-1}\frac{\sqrt{3}}{4}$
(D) $\pi - 2\sin^{-1}\frac{\sqrt{3}}{4}$

Answer: (A) 0 · Key from source paper

Q34 JEE Main 2023 · 1 Feb · Shift 2 MCQ

Let $S = \left\{x \in R : 0 < x < 1 \text{ and } 2\tan^{-1}\left(\frac{1-x}{1+x}\right) = \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)\right\}$. If $n(S)$ denotes the number of elements in S then :

(A) n(S) = 2 and only one element in S is less then $\frac{1}{2}$
(B) n(S) = 1 and the element in S is more than $\frac{1}{2}$
(C) n(S) = 1 and the element in S is less then $\frac{1}{2}$
(D) n(S) = 0

Answer: (C) n(S) = 1 and the element in S is less then $\frac{1}{2}$ · Key from source paper

Q35 JEE Main 2023 · 31 Jan · Shift 1 MCQ

If $\sin^{-1}\frac{\alpha}{17} + \cos^{-1}\frac{4}{5} - \tan^{-1}\frac{77}{36} = 0, 0 < \alpha < 13$, then $\sin^{-1}\sin\alpha + \cos^{-1}\cos\alpha$ is equal to

(A) π
(B) 16
(C) 0
(D) $16-5\pi$

Answer: (A) π · Key from source paper

Q36 JEE Main 2023 · 31 Jan · Shift 1 MCQ

Let $y=fx$ represent a parabola with focus $-\frac{1}{2},0$ and directrix $y=-\frac{1}{2}$. Then $S=x\in\mathbb{R}:$ $\tan^{-1}\sqrt{fx}+\sin^{-1}\sqrt{fx+1}=\frac{\pi}{2}$:

(A) contains exactly two elements
(B) contains exactly one element
(C) is an infinite set
(D) is an empty set

Answer: (A) contains exactly two elements · Key from source paper

---

Q37 JEE Main 2023 · 31 Jan · Shift 2 MCQ

Let $(a,b)\subset(0,2\pi)$ be the largest interval for which $\sin^{-1}(\sin\theta)-\cos^{-1}(\sin\theta)>0,\ \theta\in(0,2\pi)$, holds. If $\alpha x^2+\beta x+\sin^{-1}(x^2-6x+10)+\cos^{-1}(x^2-6x+10)=0$ and $\alpha-\beta=b-a$, then α is equal to;

(A) $\frac{\pi}{8}$
(B) $\frac{\pi}{48}$
(C) $\frac{\pi}{16}$
(D) $\frac{\pi}{12}$

Answer: (D) $\frac{\pi}{12}$ · Key from source paper

Q38 JEE Main 2023 · 30 Jan · Shift 2 MCQ

Let $a_1=1, a_2, a_3, a_4, \ldots\ldots$ be consecutive natural numbers. Then $\tan^{-1}\left(\frac{1}{1+a_1a_2}\right)+\tan^{-1}\left(\frac{1}{1+a_2a_3}\right)+\ldots\ldots\cdots+\tan^{-1}\left(\frac{1}{1+a_{2021}a_{2022}}\right)$ is equal to

(A) $\frac{\pi}{4}-\cot^{-1}(2022)$
(B) $\cot^{-1}(2022)-\frac{\pi}{4}$
(C) $\tan^{-1}(2022)-\frac{\pi}{4}$
(D) $\frac{\pi}{4}-\tan^{-1}(2022)$

Answer: (A) $\frac{\pi}{4}-\cot^{-1}(2022)$ · Key from source paper

Q39 JEE Main 2023 · 25 Jan · Shift 1 · Numerical

If the sum of all the solutions of $\tan^{-1}\left(\frac{2x}{1-x^2}\right)+\cot^{-1}\left(\frac{1-x^2}{2x}\right)=\frac{\pi}{3}$, $-1<x<1, x\neq 0$, is $\alpha-\frac{4}{\sqrt{3}}$, then α is equal to _____ .

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q40 JEE Main 2023 · 24 Jan · Shift 1 · MCQ

$\tan^{-1}\frac{1+\sqrt{3}}{3+\sqrt{3}}+\sec^{-1}\sqrt{\frac{8+4\sqrt{3}}{6+3\sqrt{3}}}=$

(A) $\frac{\pi}{4}$
(B) $\frac{\pi}{2}$
(C) $\frac{\pi}{3}$
(D) $\frac{\pi}{6}$

Answer: (C) $\frac{\pi}{3}$ · Key from source paper

Q41 JEE Main 2022 · 29 Jul · Shift 2 · MCQ

The domain of the function $fx=\sin^{-1}\frac{x^2-3x+2}{x^2+2x+7}$ is

(A) $[1,\infty)$
(B) $(-1,2]$
(C) $[-1,\infty)$
(D) $(-\infty,2]$

Answer: (C) $[-1,\infty)$ · Key from source paper

Q42 JEE Main 2022 · 28 Jul · Shift 1 · MCQ

Considering the principal values of the inverse trigonometric functions, the sum of all the solutions of the equation $\cos^{-1}x-2\sin^{-1}x=\cos^{-1}2x$ is equal to

(A) 0
(B) 1
(C) $\frac{1}{2}$
(D) $-\frac{1}{2}$

Answer: (A) 0 · Key from source paper

Q43 JEE Main 2022 · 28 Jul · Shift 1 · MCQ

Considering only the principal values of the inverse trigonometric functions, the domain of the function $fx=\cos^{-1}\frac{x^2-4x+2}{x^2+3}$ is

(A) $-\infty, \frac{1}{4}$
(B) $-\frac{1}{4}, \infty$
(C) $-\frac{1}{3}, \infty$
(D) $-\infty, \frac{1}{3}$

Answer: (B) $-\frac{1}{4}, \infty$ · Key from source paper

Q44 JEE Main 2022 · 27 Jul · Shift 1 · Numerical

For $k \in \mathbb{R}$, let the solutions of the equation $\cos\left(\sin^{-1}\left(x \cot\left(\tan^{-1}\left(\cos\left(\sin^{-1} x\right)\right)\right)\right)\right) = k$, $0 < |x| < \frac{1}{\sqrt{2}}$ be α and β, where the inverse trigonometric functions take only principal values. If the solutions of the equation $x^2 - bx - 5 = 0$ are $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$ and $\frac{\alpha}{\beta}$, then $\frac{b}{k^2}$ is equal to _____ .

Numerical value type: the answer is a number.

Answer: 12. · Key from source paper

Q45 JEE Main 2022 · 26 Jul · Shift 1 · MCQ

$\tan\left(2\tan^{-1}\frac{1}{5} + \sec^{-1}\frac{\sqrt{5}}{2} + 2\tan^{-1}\frac{1}{8}\right)$ is equal to:

(A) 1
(B) 2
(C) $\frac{1}{4}$
(D) $\frac{5}{4}$

Answer: (B) 2 · Key from source paper

Q46 JEE Main 2022 · 26 Jul · Shift 2 · MCQ

If $0 < x < \frac{1}{\sqrt{2}}$ and $\frac{\sin^{-1} x}{\alpha} = \frac{\cos^{-1} x}{\beta}$, then a value of $\sin\frac{2\pi\alpha}{\alpha+\beta}$ is

(A) $4\sqrt{1-x^2}\,1-2x^2$
(B) $4x\sqrt{1-x^2}\,1-2x^2$
(C) $2x\sqrt{1-x^2}\,1-4x^2$
(D) $4\sqrt{1-x^2}\,1-4x^2$

Answer: (B) $4x\sqrt{1-x^2}\,1-2x^2$ · Key from source paper

Q47 JEE Main 2022 · 25 Jul · Shift 2 · Numerical

Let $x = \sin\left(2\tan^{-1}\alpha\right)$ and $y = \sin\left(\frac{1}{2}\tan^{-1}\frac{4}{3}\right)$. If $S = \{\alpha \in \mathbb{R} : y^2 = 1 - x\}$, then $\sum_{\alpha \in S} 16\alpha^3$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 130. · Key from source paper

Q48 JEE Main 2022 · 29 Jun · Shift 1 MCQ

The domain of the function $\cos^{-1}\left(\frac{2\sin^{-1}\left(\frac{1}{4x^2-1}\right)}{\pi}\right)$ is

(A) $\left(-\infty,-\frac{1}{\sqrt{2}}\right]\cup\left[\frac{1}{\sqrt{2}},\infty\right)\cup\{0\}$

(B) $\left(-\infty,-\frac{1}{\sqrt{2}}\right]\cup\left[\frac{1}{\sqrt{2}},\infty\right)$

(C) $\left(-\infty,-\frac{1}{\sqrt{2}}\right)\cup\left(\frac{1}{2},\infty\right)\cup\{0\}$

(D) $R-\left\{-\frac{1}{2},\frac{1}{2}\right\}$

Answer: (A) $\left(-\infty,-\frac{1}{\sqrt{2}}\right]\cup\left[\frac{1}{\sqrt{2}},\infty\right)\cup\{0\}$ · Key from source paper

Q49 JEE Main 2022 · 29 Jun · Shift 1 Numerical

$50\tan\left(3\tan^{-1}\left(\frac{1}{2}\right)+2\cos^{-1}\left(\frac{1}{\sqrt{5}}\right)\right)+4\sqrt{2}\tan\left(\frac{1}{2}\tan^{-1}\left(2\sqrt{2}\right)\right)$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 29. · Key from source paper

Q50 JEE Main 2022 · 28 Jun · Shift 2 MCQ

The value of $\lim_{n\to\infty}6\tan\left\{\sum_{r=1}^{n}\tan^{-1}\left(\frac{1}{r^2+3r+3}\right)\right\}$ is equal to

(A) 1

(B) 2

(C) 3

(D) 6

Answer: (C) 3 · Key from source paper

Q51 JEE Main 2022 · 27 Jun · Shift 1 MCQ

$\sin^{-1}\left(\sin\frac{2\pi}{3}\right)+\cos^{-1}\left(\cos\frac{7\pi}{6}\right)+\tan^{-1}\left(\tan\frac{3\pi}{4}\right)$ is equal to

(A) $\frac{11\pi}{12}$

(B) $\frac{17\pi}{12}$

(C) $\frac{31\pi}{12}$

(D) $-\frac{3\pi}{4}$

Answer: (A) $\frac{11\pi}{12}$ · Key from source paper

Q52 JEE Main 2022 · 27 Jun · Shift 2 MCQ

The value of $\cot\left(\sum_{n=1}^{50}\tan^{-1}\left(\frac{1}{1+n+n^2}\right)\right)$ is

(A) $\frac{25}{26}$
(B) $\frac{50}{51}$
(C) $\frac{26}{25}$
(D) $\frac{52}{51}$

Answer: (C) $\frac{26}{25}$ · Key from source paper

Q53 JEE Main 2022 · 26 Jun · Shift 1 MCQ

Let $f(x) = 2\cos^{-1} x + 4\cot^{-1} x - 3x^2 - 2x + 10$, $x \in [-1, 1]$. If $[a, b]$ is the range of the function, then $4a - b$ is equal to

(A) 11
(B) $11 - \pi$
(C) $11 + \pi$
(D) $15 - \pi$

Answer: (B) $11 - \pi$ · Key from source paper

Q54 JEE Main 2022 · 26 Jun · Shift 2 MCQ

If the inverse trigonometric functions take principal values, then $\cos^{-1}\left(\frac{3}{10}\cos\left(\tan^{-1}\left(\frac{4}{3}\right)\right) + \frac{2}{5}\sin\left(\tan^{-1}\left(\frac{4}{3}\right)\right)\right)$ is equal to

(A) 0
(B) $\frac{\pi}{4}$
(C) $\frac{\pi}{3}$
(D) $\frac{\pi}{6}$

Answer: (C) $\frac{\pi}{3}$ · Key from source paper

Q55 JEE Main 2022 · 25 Jun · Shift 2 MCQ

The value of $\tan^{-1}\frac{\cos\frac{15\pi}{4} - 1}{\sin\frac{\pi}{4}}$ is equal to

(A) $-\frac{\pi}{4}$
(B) $-\frac{\pi}{8}$
(C) $-\frac{5\pi}{12}$
(D) $-\frac{4\pi}{9}$

Answer: (B) $-\frac{\pi}{8}$ · Key from source paper

Q56 JEE Main 2022 · 24 Jun · Shift 1 MCQ

The set of all values of k for which $\left(\tan^{-1} x\right)^3 + \left(\cot^{-1} x\right)^3 = k\pi^3$, $x \in R$, is the interval

(A) $\left[\frac{1}{32}, \frac{7}{8}\right)$
(B) $\left(\frac{1}{24}, \frac{13}{16}\right)$
(C) $\left[\frac{1}{48}, \frac{13}{16}\right]$
(D) $\left[\frac{1}{32}, \frac{9}{8}\right)$

Answer: (A) $\left[\frac{1}{32}, \frac{7}{8}\right)$ · Key from source paper

Q57 JEE Main 2022 · 24 Jun · Shift 2 MCQ

Let $x \times y = x^2 + y^3$ and $(x \times 1) \times 1 = x \times (1 \times 1)$. Then a value of $2\sin^{-1}\left(\frac{x^4+x^2-2}{x^4+x^2+2}\right)$ is

(A) $\frac{\pi}{4}$
(B) $\frac{\pi}{3}$
(C) $\frac{\pi}{6}$
(D) π

Answer: (B) $\frac{\pi}{3}$ · Key from source paper

Q58 JEE Main 2021 · 1 Sep · Shift 2 MCQ

$\cos^{-1}(\cos(-5)) + \sin^{-1}(\sin(6)) - \tan^{-1}(\tan(12))$ is equal to :
(The inverse trigonometric functions take the principal values)

(A) $3\pi + 1$
(B) $3\pi - 11$
(C) $4\pi - 11$
(D) $4\pi - 9$

Answer: (C) $4\pi - 11$ · Key from source paper

Q59 JEE Main 2021 · 31 Aug · Shift 2 MCQ

The domain of the function, $fx = \sin^{-1}\frac{3x^2+x-1}{(x-1)^2} + \cos^{-1}\frac{x-1}{x+1}$ is:

(A) $0, \frac{1}{2}$
(B) $0, \frac{1}{4}$
(C) $\frac{1}{4}, \frac{1}{2} \cup 0$
(D) $-2, 0 \cup \frac{1}{4}, \frac{1}{2}$

Answer: (C) $\frac{1}{4}, \frac{1}{2} \cup 0$ · Key from source paper

Q60 JEE Main 2021 · 27 Aug · Shift 1 MCQ

If $(\sin^{-1}x)^2 - (\cos^{-1}x)^2 = a;\ 0 < x < 1,\ a \neq 0$, then the value of $2x^2 - 1$ is

(A) $\cos\left(\frac{2a}{\pi}\right)$
(B) $\sin\left(\frac{2a}{\pi}\right)$
(C) $\cos\left(\frac{4a}{\pi}\right)$
(D) $\sin\left(\frac{4a}{\pi}\right)$

Answer: (B) $\sin\left(\frac{2a}{\pi}\right)$ · Key from source paper

Q61 JEE Main 2021 · 27 Aug · Shift 2 MCQ

If $y(x)=\cot^{-1}\left(\frac{\sqrt{1+\sin x}+\sqrt{1-\sin x}}{\sqrt{1+\sin x}-\sqrt{1-\sin x}}\right)$, $x\in\left(\frac{\pi}{2},\pi\right)$, then $\frac{dy}{dx}$ at $x=\frac{5\pi}{6}$ is:

(A) 0
(B) -1
(C) $\frac{-1}{2}$
(D) $\frac{1}{2}$

Answer: (C) $\frac{-1}{2}$ · Key from source paper

Q62 JEE Main 2021 · 27 Aug · Shift 2 MCQ

Let M and m respectively be the maximum and minimum values of the function $f(x)=\tan^{-1}(\sin x+\cos x)$ in $\left[0,\frac{\pi}{2}\right]$. Then the value of $\tan(M-m)$ is equal to:

(A) $2-\sqrt{3}$
(B) $3-2\sqrt{2}$
(C) $3+2\sqrt{2}$
(D) $2+\sqrt{3}$

Answer: (B) $3-2\sqrt{2}$ · Key from source paper

Q63 JEE Main 2021 · 26 Aug · Shift 1 MCQ

Let $f(x)=\cos\left(2\tan^{-1}\sin\left(\cot^{-1}\sqrt{\frac{1-x}{x}}\right)\right)$, $0<x<1$. Then:

(A) $(1-x)^2f'(x)+2(f(x))^2=0$
(B) $(1+x)^2f'(x)+2(f(x))^2=0$
(C) $(1-x)^2f'(x)-2(f(x))^2=0$
(D) $(1+x)^2f'(x)-2(f(x))^2=0$

Answer: (A) $(1-x)^2f'(x)+2(f(x))^2=0$ · Key from source paper

Q64 JEE Main 2021 · 26 Aug · Shift 2 MCQ

If $\sum_{r=1}^{50}\tan^{-1}\frac{1}{2r^2}=p$, then the value of $\tan p$ is :

(A) 100
(B) $\frac{51}{50}$
(C) $\frac{50}{51}$
(D) $\frac{101}{102}$

Answer: (C) $\frac{50}{51}$ · Key from source paper

Q65 JEE Main 2021 · 26 Aug · Shift 2 MCQ

The domain of the function $\operatorname{cosec}^{-1}\left(\frac{1+x}{x}\right)$ is :

(A) $\left[-\frac{1}{2}, \infty\right) - \{0\}$
(B) $\left(-1, -\frac{1}{2}\right] \cup (0, \infty)$
(C) $\left[-\frac{1}{2}, 0\right) \cup [1, \infty)$
(D) $\left(-\frac{1}{2}, \infty\right) - \{0\}$

Answer: (A) $\left[-\frac{1}{2}, \infty\right) - \{0\}$ · Key from source paper

Q66 JEE Main 2021 · 22 Jul · Shift 1 MCQ

If the domain of the function $f(x) = \frac{\cos^{-1}\sqrt{x^2-x+1}}{\sqrt{\sin^{-1}\left(\frac{2x-1}{2}\right)}}$ is the interval $(\alpha, \beta]$, then $\alpha + \beta$ is equal to:

(A) $\frac{3}{2}$
(B) 2
(C) $\frac{1}{2}$
(D) 1

Answer: (A) $\frac{3}{2}$ · Key from source paper

Q67 JEE Main 2021 · 20 Jul · Shift 1 MCQ

The number of real roots of the equation $\tan^{-1}\sqrt{x(x+1)} + \sin^{-1}\sqrt{x^2+x+1} = \frac{\pi}{4}$ is:

(A) 1
(B) 2
(C) 4
(D) 0

Answer: (D) 0 · Key from source paper

Q68 JEE Main 2021 · 20 Jul · Shift 2 MCQ

The value of $\tan\left(2\tan^{-1}\left(\frac{3}{5}\right) + \sin^{-1}\left(\frac{5}{13}\right)\right)$ is equal to:

(A) $\frac{-181}{69}$
(B) $\frac{220}{21}$
(C) $\frac{-291}{76}$
(D) $\frac{151}{63}$

Answer: (B) $\frac{220}{21}$ · Key from source paper

Q69 JEE Main 2021 · 17 Mar · Shift 1 MCQ

If $\cot^{-1}(\alpha) = \cot^{-1} 2 + \cot^{-1} 8 + \cot^{-1} 18 + \cot^{-1} 32 + \ldots$. upto 100 terms, then α is:

(A) 1.01
(B) 1.00
(C) 1.02
(D) 1.03

Answer: (A) 1.01 · Key from source paper

Q70 JEE Main 2021 · 17 Mar · Shift 1 MCQ

The sum of possible values of x for $\tan^{-1}(x+1) + \cot^{-1}\left(\frac{1}{x-1}\right) = \tan^{-1}\left(\frac{8}{31}\right)$ is:

(A) $-\frac{32}{4}$
(B) $-\frac{31}{4}$
(C) $-\frac{30}{4}$
(D) $-\frac{33}{4}$

Answer: (A) $-\frac{32}{4}$ · Key from source paper

Q71 JEE Main 2021 · 17 Mar · Shift 2 MCQ

The number of solutions of the equation $\sin^{-1}\left[x^2 + \frac{1}{3}\right] + \cos^{-1}\left[x^2 - \frac{2}{3}\right] = x^2$ for $x \in [-1, 1]$, and $[x]$ denotes the greatest integer less than or equal to x, is :

(A) 2
(B) 0
(C) 4
(D) Infinite

Answer: (B) 0 · Key from source paper

Q72 JEE Main 2021 · 16 Mar · Shift 1 MCQ

Let $S_k = \sum_{r=1}^{k} \tan^{-1}\left(\frac{6^r}{2^{2r+1}+3^{2r+1}}\right)$, then $\lim_{k\to\infty} S_k$ is equal to :

(A) $\tan^{-1}\left(\frac{3}{2}\right)$
(B) $\frac{\pi}{2}$
(C) $\cot^{-1}\left(\frac{3}{2}\right)$
(D) $\tan^{-1}(3)$

Answer: (C) $\cot^{-1}\left(\frac{3}{2}\right)$ · Key from source paper

Q73 JEE Main 2021 · 16 Mar · Shift 2 MCQ

Given that the inverse trigonometric functions take principal values only. Then, the number of real values of x which satisfy $\sin^{-1}\left(\frac{3x}{5}\right)+\sin^{-1}\left(\frac{4x}{5}\right)=\sin^{-1}x$ is equal to:

(A) 2
(B) 1
(C) 3
(D) 0

Answer: (C) 3 · Key from source paper

Q74 JEE Main 2021 · 26 Feb · Shift 1 MCQ

If $\frac{\sin^{-1}x}{a}=\frac{\cos^{-1}x}{b}=\frac{\tan^{-1}y}{c}$; $0<x<1$, then the value of $\cos\left(\frac{\pi c}{a+b}\right)$ is:

(A) $\frac{1-y^2}{1+y^2}$
(B) $1-y^2$
(C) $\frac{1-y^2}{y\sqrt{y}}$
(D) $\frac{1-y^2}{2y}$

Answer: (A) $\frac{1-y^2}{1+y^2}$ · Key from source paper

Q75 JEE Main 2021 · 26 Feb · Shift 2 MCQ

Let $f(x)=\sin^{-1}x$ and $g(x)=\frac{x^2-x-2}{2x^2-x-6}$. If $g(2)=\lim_{x\to 2}g(x)$, then the domain of the function $f\circ g$ is

(A) $(-\infty,-1]\cup[2,\infty)$
(B) $(-\infty,-2]\cup\left[-\frac{3}{2},\infty\right)$
(C) $(-\infty,-2]\cup\left[-\frac{4}{3},\infty\right)$
(D) $(-\infty,-2]\cup[-1,\infty)$

Answer: (C) $(-\infty,-2]\cup\left[-\frac{4}{3},\infty\right)$ · Key from source paper

Q76 JEE Main 2021 · 25 Feb · Shift 2 MCQ

$\operatorname{cosec}\left[2\cot^{-1}(5)+\cos^{-1}\left(\frac{4}{5}\right)\right]$ is equal to:

(A) $\frac{65}{56}$
(B) $\frac{75}{56}$
(C) $\frac{65}{33}$
(D) $\frac{56}{33}$

Answer: (A) $\frac{65}{56}$ · Key from source paper

Q77 JEE Main 2021 · 24 Feb · Shift 1 Numerical

$\lim_{n\to\infty} \tan \sum_{r=1}^{n} \tan^{-1} \frac{1}{1+r+r^2}$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q78 JEE Main 2020 · 5 Sep · Shift 1 MCQ

If S is the sum of the first 10 terms of the series, $\tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{1}{7}\right) + \tan^{-1}\left(\frac{1}{13}\right) + \tan^{-1}\left(\frac{1}{21}\right) +$ ..... then $\tan(S)$ is equal to :

(A) $\frac{5}{6}$
(B) $\frac{5}{11}$
(C) $-\frac{5}{6}$
(D) $\frac{10}{11}$

Answer: (A) $\frac{5}{6}$ · Key from source paper

Q79 JEE Main 2020 · 3 Sep · Shift 1 MCQ

$2\pi - \left(\sin^{-1}\frac{4}{5} + \sin^{-1}\frac{5}{13} + \sin^{-1}\frac{16}{65}\right)$ is equal to :

(A) $\frac{\pi}{2}$
(B) $\frac{5\pi}{4}$
(C) $\frac{3\pi}{2}$
(D) $\frac{7\pi}{4}$

Answer: (C) $\frac{3\pi}{2}$ · Key from source paper

Q80 JEE Main 2020 · 2 Sep · Shift 1 MCQ

The domain of the function $f(x) = \sin^{-1}\left(\frac{|x|+5}{x^2+1}\right)$ is $(-\infty, -a] \cup [a, \infty)$, then a is equal to

(A) $\frac{\sqrt{17}}{2}$
(B) $\frac{\sqrt{17}-1}{2}$
(C) $\frac{1+\sqrt{17}}{2}$
(D) $\frac{\sqrt{17}}{2} + 1$

Answer: (C) $\frac{1+\sqrt{17}}{2}$ · Key from source paper

EdLoop JEE

Q81 JEE Main 2020 · 9 Jan · Shift 1 MCQ

If $f'(x) = \tan^{-1}(\sec x + \tan x), -\frac{\pi}{2} < x < \frac{\pi}{2}$ and $f(0) = 0$, then $f(1)$ is equal to:

(A) $\frac{\pi+1}{4}$
(B) $\frac{1}{4}$
(C) $\frac{\pi-1}{4}$
(D) $\frac{\pi+2}{4}$

Answer: (A) $\frac{\pi+1}{4}$ · Key from source paper

Q82 JEE Main 2020 · 8 Jan · Shift 1 MCQ

Let $f(x) = \left(\sin(\tan^{-1} x) + \sin(\cot^{-1} x)\right)^2 - 1$, $|x| > 1$. If $\frac{dy}{dx} = \frac{1}{2}\frac{d}{dx}\left(\sin^{-1}(f(x))\right)$ and $y(\sqrt{3}) = \frac{\pi}{6}$, then $y(-\sqrt{3})$ is equal to:

(A) $\frac{2\pi}{3}$
(B) $-\frac{\pi}{6}$
(C) $\frac{5\pi}{6}$
(D) $\frac{\pi}{3}$

Answer: (C) $\frac{5\pi}{6}$ · Key from source paper

Q83 JEE Main 2019 · 12 Apr · Shift 1 MCQ

The value of $\sin^{-1}\frac{12}{13} - \sin^{-1}\frac{3}{5}$ is equal to:

(A) $\pi - \cos^{-1}\frac{33}{65}$
(B) $\frac{\pi}{2} - \cos^{-1}\frac{9}{65}$
(C) $\pi - \sin^{-1}\frac{63}{65}$
(D) $\frac{\pi}{2} - \sin^{-1}\frac{56}{65}$

Answer: (D) $\frac{\pi}{2} - \sin^{-1}\frac{56}{65}$ · Key from source paper

Q84 JEE Main 2019 · 10 Apr · Shift 2 MCQ

If $\cos^{-1} x - \cos^{-1}\frac{y}{2} = \alpha$, where $-1 \le x \le 1$, $-2 \le y \le 2$, $x \le \frac{y}{2}$, then for all x, y, $4x^2 - 4xy\cos\alpha + y^2$ is equal to :

(A) $4\cos^2\alpha + 2x^2y^2$
(B) $4\sin^2\alpha - 2x^2y^2$
(C) $2\sin^2\alpha$
(D) $4\sin^2\alpha$

Answer: (D) $4\sin^2\alpha$ · Key from source paper

Q85 JEE Main 2019 · 8 Apr · Shift 1 MCQ

If $\alpha = \cos^{-1}\frac{3}{5}$, $\beta = \tan^{-1}\frac{1}{3}$, where $0 < \alpha, \beta < \frac{\pi}{2}$, then $\alpha - \beta$ is equal to

(A) $\tan^{-1}\frac{9}{14}$

(B) $\cos^{-1}\frac{9}{5\sqrt{10}}$

(C) $\sin^{-1}\frac{9}{5\sqrt{10}}$

(D) $\tan^{-1}\frac{9}{5\sqrt{10}}$

Answer: (C) $\sin^{-1}\frac{9}{5\sqrt{10}}$ · Key from source paper

Q86 JEE Main 2019 · 12 Jan · Shift 1 MCQ

Considering only the principal values of inverse functions, the set $A = \{x \geq 0 : \tan^{-1}(2x) + \tan^{-1}(3x) = \frac{\pi}{4}\}$

(A) Is an empty set

(B) Contains more than two elements

(C) Contains two elements

(D) Is a singleton

Answer: (D) Is a singleton · Key from source paper

Q87 JEE Main 2019 · 11 Jan · Shift 2 MCQ

All x satisfying the inequality $\left(\cot^{-1}x\right)^2 - 7\left(\cot^{-1}x\right) + 10 > 0$, lie in the interval :

(A) $(-\infty, \cot 5) \cup (\cot 4, \cot 2)$

(B) $(\cot 2, \infty)$

(C) $(-\infty, \cot 5) \cup (\cot 2, \infty)$

(D) $(\cot 5, \cot 4)$

Answer: (B) $(\cot 2, \infty)$ · Key from source paper

Q88 JEE Main 2019 · 10 Jan · Shift 2 MCQ

The value of $\cot\left(\sum_{n=1}^{19}\cot^{-1}\left(1+\sum_{p=1}^{n}2p\right)\right)$ is:

EdLoop JEE

(A) $\frac{21}{19}$
(B) $\frac{19}{21}$
(C) $\frac{23}{22}$
(D) $\frac{22}{23}$

Answer: (A) $\frac{21}{19}$ · Key from source paper

Q89 JEE Main 2019 · 9 Jan · Shift 1 MCQ

If $\cos^{-1}\frac{2}{3x}+\cos^{-1}\frac{3}{4x}=\frac{\pi}{2}$ $x>\frac{3}{4}$, then x is equal to :

(A) $\frac{\sqrt{145}}{10}$
(B) $\frac{\sqrt{145}}{11}$
(C) $\frac{\sqrt{146}}{12}$
(D) $\frac{\sqrt{145}}{12}$

Answer: (D) $\frac{\sqrt{145}}{12}$ · Key from source paper

Q90 JEE Main 2019 · 9 Jan · Shift 2 MCQ

If $x=\sin^{-1}(\sin 10)$ and $y=\cos^{-1}(\cos 10)$, then $y-x$ is equal to:

(A) 10
(B) π
(C) 0
(D) 7π

Answer: (B) π · Key from source paper

Q91 JEE Main 2017 · 9 Apr · Online MCQ

A value of x satisfying the equation $\sin\left[\cot^{-1}(1+x)\right]=\cos\left[\tan^{-1}x\right]$, is:

(A) $-\frac{1}{2}$
(B) 0
(C) -1
(D) $\frac{1}{2}$

Answer: (A) $-\frac{1}{2}$ · Key from source paper

Q92 JEE Main 2017 · 8 Apr · Online · MCQ

The value of $\tan^{-1}\left[\frac{\sqrt{1+x^2}+\sqrt{1-x^2}}{\sqrt{1+x^2}-\sqrt{1-x^2}}\right]$, $|x| < \frac{1}{2}$, $x \neq 0$, is equal to:

(A) $\frac{\pi}{4} + \frac{1}{2}\cos^{-1} x^2$
(B) $\frac{\pi}{4} - \cos^{-1} x^2$
(C) $\frac{\pi}{4} - \frac{1}{2}\cos^{-1} x^2$
(D) $\frac{\pi}{4} + \cos^{-1} x^2$

Answer: (A) $\frac{\pi}{4} + \frac{1}{2}\cos^{-1} x^2$ · Key from source paper

Q93 JEE Main 2015 · 10 Apr · Online · MCQ

If $f(x) = 2\tan^{-1} x + \sin^{-1}\left(\frac{2x}{1+x^2}\right)$, $x > 1$, then $f(5)$ is equal to

(A) $\frac{\pi}{2}$
(B) $\tan^{-1}\left(\frac{65}{156}\right)$
(C) π
(D) $4\tan^{-1}(5)$

Answer: (C) π · Key from source paper

Q94 JEE Main 2015 · 4 Apr · Offline · MCQ

Let $\tan^{-1} y = \tan^{-1} x + \tan^{-1}\left(\frac{2x}{1-x^2}\right)$, where $|x| < \frac{1}{\sqrt{3}}$,Then a value of y is

(A) $\frac{3x+x^3}{1+3x^2}$
(B) $\frac{3x-x^3}{1-3x^2}$
(C) $\frac{3x+x^3}{1-3x^2}$
(D) $\frac{3x-x^3}{1+3x^2}$

Answer: (B) $\frac{3x-x^3}{1-3x^2}$ · Key from source paper

Q95 JEE Main 2014 · 19 Apr · Online · MCQ

The principal value of $\tan^{-1}\left(cot\ \frac{43\pi}{4}\right)$ is

(A) $\frac{\pi}{4}$
(B) $-\frac{\pi}{4}$
(C) $\frac{3\pi}{4}$
(D) $-\frac{3\pi}{4}$

Answer: (B) $-\frac{\pi}{4}$ · Key from source paper

EdLoop JEE

Q96 JEE Main 2014 · 12 Apr · Online MCQ

Statement I: The equation $(\sin^{-1}\mathrm{x})^3+(\cos^{-1}\mathrm{x})^3-a\pi^3=0$ has a solution for all $\mathrm{a}\geq\frac{1}{32}$. Statement II: For any $\mathrm{x}\in\mathrm{R}$, $\sin^{-1}x+\cos^{-1}x=\frac{\pi}{2}$ and $0\leq\left(\sin^{-1}x-\frac{\pi}{4}\right)^2\leq\frac{9\pi^2}{16}$

(A) Both statements I and II are true.
(B) Both statements I and II are false.
(C) Statement I is true and statement II is false.
(D) Statement I is false and statement II is true.

Answer: (D) Statement I is false and statement II is true. · Checked by our team

Q97 JEE Main 2013 · 25 Apr · Online MCQ

Let $x\in(0,1)$. The set of all x such that $\sin^{-1}x>\cos^{-1}x$, is the interval:

(A) $\left(\frac{1}{2},\frac{1}{\sqrt{2}}\right)$
(B) $\left(\frac{1}{\sqrt{2}},1\right)$
(C) $(0,1)$
(D) $\left(0,\frac{\sqrt{3}}{2}\right)$

Answer: (B) $\left(\frac{1}{\sqrt{2}},1\right)$ · Key from source paper

Q98 JEE Main 2013 · 23 Apr · Online MCQ

$S=\tan^{-1}\left(\frac{1}{n^2+n+1}\right)+\tan^{-1}\left(\frac{1}{n^2+3n+3}\right)+\ldots+\tan^{-1}\left(\frac{1}{1+(n+19)(n+20)}\right)$, then $\tan S$ is equal to :

(A) $\frac{20}{401+20n}$
(B) $\frac{n}{n^2+20n+1}$
(C) $\frac{20}{n^2+20n+1}$
(D) $\frac{n}{401+20n}$

Answer: (C) $\frac{20}{n^2+20n+1}$ · Key from source paper

Q99 JEE Main 2013 · 22 Apr · Online MCQ

The number of solutions of the equation, $\sin^{-1}x=2\tan^{-1}x$ (in principal values) is :

(A) 1
(B) 4
(C) 2
(D) 3

Answer: (D) 3 · Checked by our team

Q100 JEE Main 2013 · 9 Apr · Online MCQ

A value of x for which $\sin\left(\cot^{-1}(1+x)\right) = \cos\left(\tan^{-1}x\right)$, is :

(A) $-\frac{1}{2}$

(B) 1

(C) 0

(D) $\frac{1}{2}$

Answer: (A) $-\frac{1}{2}$ · Key from source paper

Q101 JEE Main 2013 · 7 Apr · Offline MCQ

x, y, z are positive numbers in A. P. and $\tan^{-1}x$, $\tan^{-1}y$ and $\tan^{-1}z$ are also in A. P., then which of the following is correct.

(A) $6x = 3y = 2z$

(B) $6x = 4y = 3z$

(C) $x = y = z$

(D) $2x = 3y = 6z$

Answer: (C) $x = y = z$ · Key from source paper

Q102 AIEEE 2012 · 19 May · Online MCQ

A value of $\tan^{-1}\left(\sin\left(\cos^{-1}\left(\sqrt{\frac{2}{3}}\right)\right)\right)$ is

(A) $\frac{\pi}{4}$

(B) $\frac{\pi}{2}$

(C) $\frac{\pi}{3}$

(D) $\frac{\pi}{6}$

Answer: (D) $\frac{\pi}{6}$ · Key from source paper

Q103 AIEEE 2008 MCQ

The value of $\cot\left(\operatorname{cosec}^{-1}\frac{5}{3} + \tan^{-1}\frac{2}{3}\right)$ is

(A) $\frac{6}{17}$

(B) $\frac{3}{17}$

(C) $\frac{4}{17}$

(D) $\frac{5}{17}$

Answer: (A) $\frac{6}{17}$ · Key from source paper

Q104 AIEEE 2007 MCQ

If $\sin^{-1}\left(\frac{x}{5}\right)+\operatorname{cosec}^{-1}\left(\frac{5}{4}\right)=\frac{\pi}{2}$ then a value of x is

(A) 1
(B) 3
(C) 4
(D) 5

Answer: (B) 3 · Key from source paper

Q105 AIEEE 2007 MCQ

The largest interval lying in $\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$ for which the function $\left[f(x)=4^{-x^2}+\cos^{-1}\left(\frac{x}{2}-1\right)+\log(\cos x)\right]$ is defined, is

(A) $[0,\pi]$
(B) $\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$
(C) $\left[-\frac{\pi}{4},\frac{\pi}{2}\right)$
(D) $\left[0,\frac{\pi}{2}\right)$

Answer: (D) $\left[0,\frac{\pi}{2}\right)$ · Key from source paper

Q106 AIEEE 2005 MCQ

If $\cos^{-1}x-\cos^{-1}\frac{y}{2}=\alpha$, then $4x^2-4xy\cos\alpha+y^2$ is equal to

(A) $2\sin 2\alpha$
(B) 4
(C) $4\sin^2\alpha$
(D) $-4\sin^2\alpha$

Answer: (C) $4\sin^2\alpha$ · Key from source paper

Q107 AIEEE 2005 MCQ

Let $f:(-1,1)\to B$, be a function defined by $f(x)=\tan^{-1}\frac{2x}{1-x^2}$, then f is both one-one and onto when B is the interval

(A) $\left(0,\frac{\pi}{2}\right)$
(B) $\left[0,\frac{\pi}{2}\right)$
(C) $\left[-\frac{\pi}{2},\frac{\pi}{2}\right]$
(D) $\left(\frac{\pi}{2},\frac{\pi}{2}\right)$

Answer: (D) $\left(\frac{\pi}{2},\frac{\pi}{2}\right)$ · Key from source paper

Q108 AIEEE 2002 MCQ

$\cot^{-1}(\sqrt{\cos\alpha}) - \tan^{-1}(\sqrt{\cos\alpha}) = x$, then $\sin x =$

(A) $\tan^2\left(\frac{\alpha}{2}\right)$

(B) $\cot^2\left(\frac{\alpha}{2}\right)$

(C) $\tan\alpha$

(D) $\cot\left(\frac{\alpha}{2}\right)$

Answer: (A) $\tan^2\left(\frac{\alpha}{2}\right)$ · Key from source paper

EdLoop JEE