PrepWiser.

MATHEMATICS · JEE MAIN

Inverse Trigonometric Functions

Chapter-wise previous year questions, with answer key

75	2020–2025	3
PYQS	PAPERS	TOPICS

Domain and Range · Properties and Identities · Inverse Trigonometric Equations

1. Attempt each question on paper first — they're grouped by topic, newest papers first.
2. Check yourself against the answer key at the end.
3. Got one wrong? Tap “Step-by-step solution” under it for the full working.

Stuck on a question?

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Domain and Range · 15 PYQs

Q1 JEE Main 2025 · 28 Jan · Shift 2

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) $(-\infty, \infty)$

(B) $(-\infty, \infty) - \{0\}$

(C) $(-\infty, -1] \cup [0, \infty)$

(D) $(-\infty, -1] \cup [1, \infty)$

Step-by-step solution ▸ prepwiser.in/questions/VleXttUenN

Q2 JEE Main 2024 · 4 Apr · Shift 1

If the domain of the function

$$\sin^{-1}\left(\frac{3x-22}{2x-19}\right) + \log_e\left(\frac{3x^2-8x+5}{x^2-3x-10}\right)$$

is $(\alpha, \beta]$, then $3\alpha + 10\beta$ is equal to:

(A) 95

(B) 100

(C) 97

(D) 98

Step-by-step solution ▸ prepwiser.in/questions/1g47ZwnRaN

Q3 JEE Main 2024 · 30 Jan · Shift 1

If the domain of the function $f(x) = \cos^{-1}\left(\frac{2-|x|}{4}\right) + \{\log_e(3-x)\}^{-1}$ is $[-\alpha, \beta) - \{\gamma\}$, then $\alpha + \beta + \gamma$ is equal to :

(A) 11

(B) 12

(C) 9

(D) 8

Step-by-step solution ▸ prepwiser.in/questions/ZCXJErZxHU

Q4 JEE Main 2023 · 13 Apr · Shift 2

The range of $f(x) = 4\sin^{-1}\left(\frac{x^2}{x^2+1}\right)$ is

(A) $[0, 2\pi]$

(B) $[0, 2\pi)$

(C) $[0, \pi)$

(D) $[0, \pi]$

Step-by-step solution ▸ prepwiser.in/questions/XLCLGKHnfF

Q5 JEE Main 2023 · 10 Apr · Shift 2

If the domain of the function $f(x) = \sec^{-1}\left(\frac{2x}{5x+3}\right)$ is $[\alpha, \beta)\mathrm{U}(\gamma, \delta]$, then $|3\alpha + 10(\beta + \gamma) + 21\delta|$ is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/AW8xb6B8_r

Q6 JEE Main 2023 · 8 Apr · Shift 2

If domain of the function

$$\log_e\left(\frac{6x^2+5x+1}{2x-1}\right)+\cos^{-1}\left(\frac{2x^2-3x+4}{3x-5}\right)$$

is $(\alpha,\beta)\cup(\gamma,\delta]$, then $18\left(\alpha^2+\beta^2+\gamma^2+\delta^2\right)$ is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/TBapLeB7UI

Q7 JEE Main 2022 · 29 Jul · Shift 2

The domain of the function $f(x)=\sin^{-1}\left(\frac{x^2-3x+2}{x^2+2x+7}\right)$ is :

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

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

Step-by-step solution ▸ prepwiser.in/questions/fzVbXfncQ4

Q8 JEE Main 2022 · 28 Jul · Shift 1

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

(A) $\left(-\infty,\frac{1}{4}\right]$ **(B)** $\left[-\frac{1}{4},\infty\right)$

(C) $(-1/3,\infty)$ **(D)** $\left(-\infty,\frac{1}{3}\right]$

Step-by-step solution ▸ prepwiser.in/questions/hKPlP66QTJ

Q9 JEE Main 2022 · 27 Jul · Shift 2

The domain of the function

$$f(x)=\sin^{-1}\left[2x^2-3\right]+\log_2\left(\log_{\frac{1}{2}}\left(x^2-5x+5\right)\right)$$

, where [t] is the greatest integer function, is :

(A) $\left(-\sqrt{\frac{5}{2}},\frac{5-\sqrt{5}}{2}\right)$

(B) $\left(\frac{5-\sqrt{5}}{2},\frac{5+\sqrt{5}}{2}\right)$

(C) $\left(1,\frac{5-\sqrt{5}}{2}\right)$

(D) $\left[1,\frac{5+\sqrt{5}}{2}\right)$

Step-by-step solution ▸ prepwiser.in/questions/wNMMAl3Z20

Q10 JEE Main 2022 · 29 Jun · Shift 1

The domain of the function

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

is :

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

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

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

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

Step-by-step solution ▸ prepwiser.in/questions/Q1LC0j6_aM

Q11 JEE Main 2022 · 26 Jun · Shift 1

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 f, then 4a − b is equal to :

(A) 11

(B) $11-\pi$

(C) $11+\pi$

(D) $15-\pi$

Step-by-step solution ▸ prepwiser.in/questions/m324ATevzA

Q12 JEE Main 2022 · 24 Jun · Shift 1

The domain of the function

$$f(x)=\frac{\cos^{-1}\left(\frac{x^2-5x+6}{x^2-9}\right)}{\log_e(x^2-3x+2)}$$

is :

(A) $(-\infty,1)\cup(2,\infty)$

(B) $(2,\infty)$

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

(D) $\left[-\frac{1}{2},1\right)\cup(2,\infty)-\left\{3,\frac{3+\sqrt{5}}{2},\frac{3-\sqrt{5}}{2}\right\}$

Step-by-step solution ▸ prepwiser.in/questions/4jsuB5jIRe

Q13 JEE Main 2021 · 31 Aug · Shift 2

The domain of the function

$$f(x)=\sin^{-1}\left(\frac{3x^2+x-1}{(x-1)^2}\right)+\cos^{-1}\left(\frac{x-1}{x+1}\right)$$

is :

(A) $\left[0,\frac{1}{4}\right]$

(B) $[-2,0]\cup\left[\frac{1}{4},\frac{1}{2}\right]$

(C) $\left[\frac{1}{4},\frac{1}{2}\right]\cup\{0\}$

(D) $\left[0,\frac{1}{2}\right]$

Step-by-step solution ▸ prepwiser.in/questions/KtXl0BeGnZ

Q14 JEE Main 2021 · 26 Aug · Shift 2

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

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

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

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

(D) $\left[-\frac{1}{2},\infty\right)-\{0\}$

Step-by-step solution ▸ prepwiser.in/questions/miR0m0qThB

Q15 JEE Main 2021 · 22 Jul · Shift 2

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

Step-by-step solution ▸ prepwiser.in/questions/eoN2qreq_C

Properties and Identities · 42 PYQs

Q16 JEE Main 2025 · 8 Apr · Shift 2

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) $\pi-\frac{3}{2}$

(B) $\pi+\frac{5}{2}$

(C) $\pi-\frac{5}{4}$

(D) $\pi+\frac{3}{2}$

Step-by-step solution ▸ prepwiser.in/questions/6zcvPqu4az

Q17 JEE Main 2025 · 4 Apr · Shift 1

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) $\frac{5\pi}{6}-\sin^{-1}x$

(C) $\frac{\pi}{6}+\sin^{-1}x$

(D) $\frac{\pi}{4}+\sin^{-1}x$

Step-by-step solution ▸ prepwiser.in/questions/BOzQOLBnqb

Q18 JEE Main 2025 · 4 Apr · Shift 2

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) $\frac{\pi}{2}+\cot^{-1}\left(\frac{1}{2}\right)$

(B) $\frac{\pi}{2}-\cot^{-1}\left(\frac{1}{2}\right)$

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

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

Step-by-step solution ▸ prepwiser.in/questions/7JA5AHjNgI

Q19 JEE Main 2025 · 2 Apr · Shift 2

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

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/a3FRCs5F3x

Q20 JEE Main 2025 · 28 Jan · Shift 1

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

(A) $\frac{33}{65}$

(B) 1

(C) $\frac{32}{65}$

(D) 0

Step-by-step solution ▸ prepwiser.in/questions/5EOdP9i3UH

Q21 JEE Main 2025 · 24 Jan · Shift 1

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

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/4navOGZdqf

Q22 JEE Main 2025 · 24 Jan · Shift 2

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) 3π

(B) $\frac{\pi}{2}-(\alpha+\beta+\gamma)$

(C) π

(D) 0

Step-by-step solution ▸ prepwiser.in/questions/qFgD-tzcd9

Q23 JEE Main 2025 · 23 Jan · Shift 1

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

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

Step-by-step solution ▸ prepwiser.in/questions/CKie68U8TY

Q24 JEE Main 2025 · 22 Jan · Shift 1

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)** $18\pi^2$

(C) $22\pi^2$ **(D)** $31\pi^2$

Step-by-step solution ▸ prepwiser.in/questions/0h1dQoq_-L

Q25 JEE Main 2024 · 4 Apr · Shift 2

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

(A) 0 **(B)** -1

(C) $\frac{1}{2}$ **(D)** $\frac{-1}{2}$

Step-by-step solution ▸ prepwiser.in/questions/3qSrds_kcC

Q26 JEE Main 2024 · 31 Jan · Shift 2

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

(A) 25 **(B)** $4\pi^2 + 25$

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

Step-by-step solution ▸ prepwiser.in/questions/2Ap-uDHWSm

Q27 JEE Main 2023 · 10 Apr · Shift 2

Let $g(x) = f(x) + f(1-x)$ and $f''(x) > 0, x \in (0, 1)$. If g is decreasing in the interval $(0, a)$ and increasing in the interval $(\alpha, 1)$, then

$$\tan^{-1}(2\alpha) + \tan^{-1}\left(\frac{1}{\alpha}\right) + \tan^{-1}\left(\frac{\alpha+1}{\alpha}\right)$$

is equal to :

(A) $\frac{3\pi}{4}$ **(B)** π

(C) $\frac{5\pi}{4}$ **(D)** $\frac{3\pi}{2}$

Step-by-step solution ▸ prepwiser.in/questions/IZHek3hPMC

Q28 JEE Main 2023 · 1 Feb · Shift 1

Let $f(x) = 2x + \tan^{-1}x$ and $g(x) = \log_e(\sqrt{1+x^2} + x), x \in [0, 3]$. Then

(A) there exists $\widehat{x} \in [0, 3]$ such that $f'(\widehat{x}) < g'(\widehat{x})$

(B) there exist $0 < x_1 < x_2 < 3$ such that $f(x) < g(x), \forall x \in (x_1, x_2)$

(C) $\min f'(x) = 1 + \max g'(x)$

(D) $\max f(x) > \max g(x)$

Step-by-step solution ▸ prepwiser.in/questions/IblGoQoBBW

Q29 JEE Main 2023 · 31 Jan · Shift 2

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 $\alpha x^2 + \beta x + \sin^{-1}\left(x^2 - 6x + 10\right) + \cos^{-1}\left(x^2 - 6x + 10\right) = 0$ and $\alpha - \beta = b - a$, then α is equal to :

(A) $\frac{\pi}{16}$ **(B)** $\frac{\pi}{48}$

(C) $\frac{\pi}{8}$ **(D)** $\frac{\pi}{12}$

Step-by-step solution ▸ prepwiser.in/questions/nGVqXymABy

Q30 JEE Main 2023 · 24 Jan · Shift 1

$$\tan^{-1}\left(\frac{1+\sqrt{3}}{3+\sqrt{3}}\right) + \sec^{-1}\left(\sqrt{\frac{8+4\sqrt{3}}{6+3\sqrt{3}}}\right)$$

is equal to :

(A) $\frac{\pi}{2}$ **(B)** $\frac{\pi}{3}$

(C) $\frac{\pi}{6}$ **(D)** $\frac{\pi}{4}$

Step-by-step solution ▸ prepwiser.in/questions/zm0EVA802s

Q31 JEE Main 2022 · 26 Jul · Shift 1

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

is equal to :

(A) 1 **(B)** 2

(C) $\frac{1}{4}$ **(D)** $\frac{5}{4}$

Step-by-step solution ▸ prepwiser.in/questions/Uiiva6mHfb

Q32 JEE Main 2022 · 25 Jul · Shift 2

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

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/URiJ33H88v

Q33 JEE Main 2022 · 30 Jun · Shift 1

Let

$$\alpha = \tan\left(\frac{5\pi}{16}\sin\left(2\cos^{-1}\left(\frac{1}{\sqrt{5}}\right)\right)\right)$$

and

$$\beta = \cos\left(\sin^{-1}\left(\frac{4}{5}\right) + \sec^{-1}\left(\frac{5}{3}\right)\right)$$

where the inverse trigonometric functions take principal values. Then, the equation whose roots are α and β is :

(A) $15x^2 - 8x - 7 = 0$

(B) $5x^2 - 12x + 7 = 0$

(C) $25x^2 - 18x - 7 = 0$

(D) $25x^2 - 32x + 7 = 0$

Step-by-step solution ▸ prepwiser.in/questions/NFsugS_eRW

Q34 JEE Main 2022 · 30 Jun · Shift 1

Let m and M respectively be the minimum and the maximum values of

$$f(x) = \sin^{-1}2x + \sin 2x + \cos^{-1}2x + \cos 2x,\ x \in \left[0, \frac{\pi}{8}\right]$$

. Then m + M is equal to :

(A) $1 + \sqrt{2} + \pi$

(B) $\left(1 + \sqrt{2}\right)\pi$

(C) $\pi + \sqrt{2}$

(D) $1 + \pi$

Step-by-step solution ▸ prepwiser.in/questions/2n5ePpKDs8

Q35 JEE Main 2022 · 29 Jun · Shift 1

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

is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/HRNfnhl1yc

Q36 JEE Main 2022 · 28 Jun · Shift 2

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

Step-by-step solution ▸ prepwiser.in/questions/UX94D_eJ-c

Q37 JEE Main 2022 · 27 Jun · Shift 1

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

is equal to :

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

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

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

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

Step-by-step solution ▸ prepwiser.in/questions/B_cPL9j8D8

Q38 JEE Main 2022 · 27 Jun · Shift 2

The value of

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

is :

(A) $\frac{26}{25}$

(B) $\frac{25}{26}$

(C) $\frac{50}{51}$

(D) $\frac{52}{51}$

Step-by-step solution ▸ prepwiser.in/questions/PcYduYJzvA

Q39 JEE Main 2022 · 26 Jun · Shift 2

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

Step-by-step solution ▸ prepwiser.in/questions/IfIeNabMvW

Q40 JEE Main 2022 · 25 Jun · Shift 2

The value of

$$\tan^{-1}\left(\frac{\cos\left(\frac{15\pi}{4}\right)-1}{\sin\left(\frac{\pi}{4}\right)}\right)$$

is equal to :

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

(B) $-\frac{\pi}{8}$

(C) $-\frac{5\pi}{12}$

(D) $-\frac{4\pi}{9}$

Step-by-step solution ▸ prepwiser.in/questions/FPpTXaxGdG

Q41 JEE Main 2022 · 24 Jun · Shift 2

If

$$y = \tan^{-1}\left(\sec x^3 - \tan x^3\right), \frac{\pi}{2} < x^3 < \frac{3\pi}{2}$$

, then

(A) $xy'' + 2y' = 0$

(B) $x^2y'' - 6y + \frac{3\pi}{2} = 0$

(C) $x^2y'' - 6y + 3\pi = 0$

(D) $xy'' - 4y' = 0$

Step-by-step solution ▸ prepwiser.in/questions/Bx-_We1ETj

Q42 JEE Main 2022 · 24 Jun · Shift 2

Let $x * y = x^2 + y^3$ and $(x * 1) * 1 = x * (1 * 1)$.

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

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

Step-by-step solution ▸ prepwiser.in/questions/emKq4HJdTt

Q43 JEE Main 2021 · 1 Sep · Shift 2

$$\cos^{-1}(\cos(-5)) + \sin^{-1}(\sin(6)) - \tan^{-1}(\tan(12))$$

is equal to :

(The inverse trigonometric functions take the principal values)

(A) $3\pi - 11$

(B) $4\pi - 9$

(C) $4\pi - 11$

(D) $3\pi + 1$

Step-by-step solution ▸ prepwiser.in/questions/qqD0thHbyR

Q44 JEE Main 2021 · 27 Aug · Shift 2

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) $2 - \sqrt{3}$

(C) $3 + 2\sqrt{2}$

(D) $3 - 2\sqrt{2}$

Step-by-step solution ▸ prepwiser.in/questions/76H0XMm9lg

Q45 JEE Main 2021 · 27 Aug · Shift 2

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

(B) -1

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

(D) 0

Step-by-step solution ▸ prepwiser.in/questions/ZQHjQYYvZh

Q46 JEE Main 2021 · 27 Aug · Shift 1

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) $\cos\left(\frac{4a}{\pi}\right)$

(B) $\sin\left(\frac{2a}{\pi}\right)$

(C) $\cos\left(\frac{2a}{\pi}\right)$

(D) $\sin\left(\frac{4a}{\pi}\right)$

Step-by-step solution ▸ prepwiser.in/questions/hofkRm3GE6

Q47 JEE Main 2021 · 26 Aug · Shift 1

Let

$$f(x) = \cos\left(2\tan^{-1}\sin\left(\cot^{-1}\sqrt{\frac{1-x}{x}}\right)\right)$$

, 0 < x < 1. Then :

(A) $(1-x)^2 f'(x) - 2(f(x))^2 = 0$

(B) $(1+x)^2 f'(x) + 2(f(x))^2 = 0$

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

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

Step-by-step solution ▸ prepwiser.in/questions/ifhjbLf46a

Q48 JEE Main 2021 · 26 Aug · Shift 2

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

(A) $\frac{101}{102}$

(B) $\frac{50}{51}$

(C) 100

(D) $\frac{51}{50}$

Step-by-step solution ▸ prepwiser.in/questions/xT0yEYiWvQ

Q49 JEE Main 2021 · 20 Jul · Shift 2

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) $\frac{151}{63}$

Step-by-step solution ▸ prepwiser.in/questions/lNhRvvrUGg

Q50 JEE Main 2021 · 17 Mar · Shift 1

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

(A) 1.02

(B) 1.03

(C) 1.01

(D) 1.00

Step-by-step solution ▸ prepwiser.in/questions/dy4uNvkEjE

Q51 JEE Main 2021 · 26 Feb · Shift 1

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) $\frac{1-y^2}{2y}$ **(B)** $\frac{1-y^2}{y\sqrt{y}}$

(C) $1-y^2$ **(D)** $\frac{1-y^2}{1+y^2}$

Step-by-step solution ▸ prepwiser.in/questions/eprDSqzF7g

Q52 JEE Main 2021 · 25 Feb · Shift 2

cosec

$$\left[2\cot^{-1}(5) + \cos^{-1}\left(\frac{4}{5}\right)\right]$$

is equal to :

(A) $\frac{75}{56}$ **(B)** $\frac{65}{56}$

(C) $\frac{56}{33}$ **(D)** $\frac{65}{33}$

Step-by-step solution ▸ prepwiser.in/questions/jUGT9_RSH9

Q53 JEE Main 2020 · 5 Sep · Shift 1

If S is the sum of the first 10 terms of the series

$$\tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{1}{7}\right) + \tan^{-1}\left(\frac{1}{13}\right) + \tan^{-1}\left(\frac{1}{21}\right) + \ldots.$$

then tan(S) is equal to :

(A) $\frac{10}{11}$ **(B)** $\frac{5}{11}$

(C) $-\frac{6}{5}$ **(D)** $\frac{5}{6}$

Step-by-step solution ▸ prepwiser.in/questions/7Ywvf0bBZw

Q54 JEE Main 2020 · 3 Sep · Shift 1

2π -

$$\left(\sin^{-1}\frac{4}{5} + \sin^{-1}\frac{5}{13} + \sin^{-1}\frac{16}{65}\right)$$

is equal to :

(A) $\frac{7\pi}{4}$ **(B)** $\frac{5\pi}{4}$

(C) $\frac{3\pi}{2}$ **(D)** $\frac{\pi}{2}$

Step-by-step solution ▸ prepwiser.in/questions/rG8xcn01NJ

Q55 JEE Main 2020 · 2 Sep · Shift 2

If y = $$\sum_{k=1}^{6} k\cos^{-1}\left\{\frac{3}{5}\cos kx - \frac{4}{5}\sin kx\right\}$$

,

then $\frac{dy}{dx}$ at x = 0 is _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/xi7Qh9t7Lx

Q56 JEE Main 2020 · 8 Jan · Shift 1

Let $f(x) = x\cos^{-1}(-\sin|x|)$, $x \in \left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$, then which of the following is true?

(A) f' is decreasing in $\left(-\frac{\pi}{2}, 0\right)$ and increasing in $\left(0, \frac{\pi}{2}\right)$

(B) $f'(0) = -\frac{\pi}{2}$

(C) f is not differentiable at x = 0

(D) f' is increasing in $\left(-\frac{\pi}{2}, 0\right)$ and decreasing in $\left(0, \frac{\pi}{2}\right)$

Step-by-step solution ▸ prepwiser.in/questions/gD0kIBnAz1

Q57 JEE Main 2020 · 8 Jan · Shift 1

Let $f(x) = (\sin(\tan^{-1}x) + \sin(\cot^{-1}x))^2 - 1$, $|x| > 1$.

If

$$\frac{dy}{dx} = \frac{1}{2}\frac{d}{dx}\left(\sin^{-1}\left(f\left(x\right)\right)\right)$$

and $y\left(\sqrt{3}\right) = \frac{\pi}{6}$, then $y(-\sqrt{3})$ is equal to :

(A) $\frac{5\pi}{6}$ **(B)** $-\frac{\pi}{6}$

(C) $\frac{\pi}{3}$ **(D)** $\frac{2\pi}{3}$

Step-by-step solution ▸ prepwiser.in/questions/zv2KilxHWm

Inverse Trigonometric Equations · 18 PYQs

Q58 JEE Main 2025 · 29 Jan · Shift 1

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 answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/PcWq44KAI9

Q59 JEE Main 2024 · 9 Apr · Shift 2

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 answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/qJb2IZSTBQ

Q60 JEE Main 2024 · 6 Apr · Shift 1

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

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/pi10Rd8Pi8

Q61 JEE Main 2024 · 31 Jan · Shift 1

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 equals

(A) $\sqrt{3}$ **(B)** $\frac{\sqrt{3}}{2}$

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

Step-by-step solution ▸ prepwiser.in/questions/AZ3x_ihMmO

Q62 JEE Main 2024 · 29 Jan · Shift 2

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)** $3x + 2y = 2$

(C) $5x + 8y = 9$ **(D)** $5x - 8y = -9$

Step-by-step solution ▸ prepwiser.in/questions/ZMS75tyagU

Q63 JEE Main 2024 · 27 Jan · Shift 2

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)** 2

(C) 0 **(D)** 1

Step-by-step solution ▸ prepwiser.in/questions/lFTyf2NmJA

Q64 JEE Main 2023 · 13 Apr · Shift 1

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

$$\sum_{x \in s}\left(\sin\left(\left(x^2+x+5\right)\frac{\pi}{2}\right) - \cos\left(\left(x^2+x+5\right)\pi\right)\right)$$

is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/BrBgRQCayc

Q65 JEE Main 2023 · 13 Apr · Shift 2

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

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/QLl_ow_06g

Q66 JEE Main 2023 · 1 Feb · Shift 1

Let S be the set of all solutions of the equation

$$\cos^{-1}(2x) - 2\cos^{-1}\left(\sqrt{1-x^2}\right) = \pi, x \in \left[-\frac{1}{2}, \frac{1}{2}\right]$$

. Then $\sum_{x \in S} 2\sin^{-1}\left(x^2 - 1\right)$ is equal to :

(A) $\pi - 2\sin^{-1}\left(\frac{\sqrt{3}}{4}\right)$

(B) $\pi - \sin^{-1}\left(\frac{\sqrt{3}}{4}\right)$

(C) $\frac{-2\pi}{3}$

(D) None

Step-by-step solution ▸ prepwiser.in/questions/2PddCTpjdX

Q67 JEE Main 2023 · 31 Jan · Shift 1

Let $\mathrm{y} = f(x)$ represent a parabola with focus $\left(-\frac{1}{2}, 0\right)$ and directrix $y = -\frac{1}{2}$. Then

$$S = \left\{x \in \mathbb{R} : \tan^{-1}(\sqrt{f(x)}) + \sin^{-1}(\sqrt{f(x)+1}) = \frac{\pi}{2}\right\}$$

:

(A) is an empty set

(B) contains exactly one element

(C) contains exactly two elements

(D) is an infinite set

Step-by-step solution ▸ prepwiser.in/questions/k-ccfP1MZq

Q68 JEE Main 2023 · 31 Jan · Shift 1

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) 16

(B) π

(C) $16 - 5\pi$

(D) 0

Step-by-step solution ▸ prepwiser.in/questions/WL_bALFXTj

Q69 JEE Main 2023 · 25 Jan · Shift 1

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 answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/LA0fIe9DFF

Q70 JEE Main 2022 · 28 Jul · Shift 1

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)** $-\frac{1}{2}$

Step-by-step solution ▸ prepwiser.in/questions/eaog3CQ_fq

Q71 JEE Main 2022 · 27 Jun · Shift 1

If

$$\cos^{-1}\left(\frac{y}{2}\right) = \log_e\left(\frac{x}{5}\right)^5,\ |y| < 2$$

, then :

(A) $x^2y'' + xy' - 25y = 0$ **(B)** $x^2y'' - xy' - 25y = 0$

(C) $x^2y'' - xy' + 25y = 0$ **(D)** $x^2y'' + xy' + 25y = 0$

Step-by-step solution ▸ prepwiser.in/questions/-lJSrXU6p4

Q72 JEE Main 2021 · 20 Jul · Shift 1

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

Step-by-step solution ▸ prepwiser.in/questions/UtLwePcR7h

Q73 JEE Main 2021 · 17 Mar · Shift 1

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) $-${{{32} \over 4}}$

(B) $-${{{33} \over 4}}$

(C) $-${{{31} \over 4}}$

(D) $-${{{30} \over 4}}$

Step-by-step solution ▸ prepwiser.in/questions/Hy7gvcK1aF

Q74 JEE Main 2021 · 17 Mar · Shift 2

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∈[−1, 1], and [x] denotes the greatest integer less than or equal to x, is :

(A) 0

(B) Infinite

(C) 2

(D) 4

Step-by-step solution ▸ prepwiser.in/questions/y7K5k3wYtE

Q75 JEE Main 2021 · 16 Mar · Shift 2

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) 0

(C) 3

(D) 1

Step-by-step solution ▸ prepwiser.in/questions/BPM9Bud2lb

Answer key — Inverse Trigonometric Functions

Numbers match the question numbers above. For full working, open the solution link under each question.

1 **A**	2 **C**	3 **A**	4 **B**	5 **24**	6 **20**	7 **C**	8 **B**
9 **C**	10 **D**	11 **B**	12 **D**	13 **C**	14 **D**	15 **A**	16 **C**
17 **C**	18 **C**	19 **3**	20 **D**	21 **14**	22 **C**	23 **D**	24 **C**
25 **A**	26 **C**	27 **B**	28 **D**	29 **D**	30 **B**	31 **B**	32 **130**
33 **C**	34 **A**	35 **29**	36 **C**	37 **A**	38 **A**	39 **C**	40 **B**
41 **B**	42 **B**	43 **C**	44 **D**	45 **A**	46 **B**	47 **C**	48 **B**
49 **B**	50 **C**	51 **D**	52 **B**	53 **D**	54 **C**	55 **91**	56 **A**
57 **B**	58 **5**	59 **0**	60 **47**	61 **B**	62 **C**	63 **D**	64 **4**
65 **2**	66 **D**	67 **C**	68 **B**	69 **2**	70 **A**	71 **D**	72 **D**
73 **A**	74 **A**	75 **C**					