



MATHS

BOOKS - NCERT MATHS (ENGLISH)

INVERSE TRIGONOMETRIC FUNCTIONS

Short Answer Type

1. Evaluate: $\tan^{-1}\left(\frac{\tan(5\pi)}{6}\right) + \cos^{-1}\left\{\cos\left(\frac{13\pi}{6}\right)\right\}$

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2. $\cos\left\{\cos^{-1}\left(\frac{-\sqrt{3}}{2}\right) + \frac{\pi}{6}\right\}$

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3. Prove that $\cot\left(\frac{\pi}{4} - 2 \cot^{-1} 3\right) = 7$

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4. Find the value of

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

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

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6. Show that $2 \tan^{-1}(-3) = -\frac{\pi}{2} + \tan^{-1}\left(-\frac{4}{3}\right)$

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7. The number of real solutions of

$$\tan^{-1} \sqrt{x(x+1)} + \sin^{-1} \sqrt{x^2 + x + 1} = \frac{\pi}{2} \text{ is}$$

a. zero

b. one

c. two

d. infinite



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8. Find the value of expression: $\sin\left(2 \tan^{-1}\left(\frac{1}{3}\right)\right) + \cos(\tan^{-1} 2\sqrt{2})$



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9. If $2 \tan^{-1}(\cos \theta) = \tan^{-1}(2 \cos n\theta)$, then show that $\theta = \frac{\pi}{4}$, when n is an integer.



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10. Show that: $\cos\left(2 \tan^{-1}\left(\frac{1}{7}\right)\right) = \sin\left(4 \tan^{-1}\left(\frac{1}{3}\right)\right)$

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11. Solve the equation $\cos(\tan^{-1} x) = \sin\left(\cot^{-1}\left(\frac{3}{4}\right)\right)$.

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12. Prove that $\tan^{-1}\left[\frac{\sqrt{1+x^2} + \sqrt{1-x^2}}{\sqrt{1+x^2} - \sqrt{1-x^2}}\right] = \frac{\pi}{4} + \frac{1}{2}\cos^{-1}x^2$

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13. Simplify each of the following: $\cos^{-1}\left(\frac{3}{5}\cos x + \frac{4}{5}\sin x\right)$, where $-\frac{3\pi}{4} \leq x \leq \frac{\pi}{4}$ $\sin^{-1}\left(\frac{5}{13}\cos x + \frac{12}{13}\sin x\right)$

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14. Prove that $\sin^{-1}\left(\frac{8}{17}\right) + \sin^{-1}\left(\frac{3}{5}\right) = \sin^{-1}\left(\frac{77}{85}\right)$

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15. Show that $\sin^{-1}\left(\frac{5}{13}\right) + \cos^{-1}\left(\frac{3}{5}\right) = \tan^{-1}\left(\frac{63}{16}\right)$.

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16. Prove: $\tan^{-1}\left(\frac{1}{4}\right) + \tan^{-1}\left(\frac{2}{9}\right) = \sin^{-1}\left(\frac{1}{\sqrt{5}}\right)$

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17. Find the value of $4 \tan^{-1}\left(\frac{1}{5}\right) - \tan^{-1}\left(\frac{1}{239}\right)$

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18. Show that: $\tan\left(\frac{1}{2}\sin^{-1}\left(\frac{3}{4}\right)\right) = \frac{4 - \sqrt{7}}{3}$

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19. If $a_1, a_2, a_3, \dots, a_n$ is an A.P. with common difference d , then prove that

$$\tan\left[\tan^{-1}\left(\frac{d}{1 + a_1a_2}\right) + \tan^{-1}\left(\frac{d}{1 + a_2a_3}\right) + \tan^{-1}\left(\frac{d}{1 + a_{n-1}a_n}\right)\right] =$$

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Objective Type Qns

1. Which of the following is the principal value branch of $\cos^{-1} x$?

A. $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

B. $(0, \pi)$

C. $[0, \pi]$

D. $(0, \pi) - \left\{\frac{\pi}{2}\right\}$

Answer: C



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2. Which of the following is the principal value branch of $\cos^{-1}x$?

A. $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

B. $[0, \pi] - \left\{\frac{\pi}{2}\right\}$

C. $\left[\frac{\pi}{2}, \frac{\pi}{2}\right]$

D. $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right] - [0]$

Answer: D



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3. If $3 \tan^{-1}x + \cot^{-1}x = \pi$, then x equals to

A. 0

B. 1

C. -1

D. $\frac{1}{2}$

Answer: B



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4. The value of $\sin^{-1}\left(\frac{\cos(33\pi)}{5}\right)$ is

(a) $\frac{3\pi}{5}$

(b) $-\frac{\pi}{10}$

(c) $\frac{\pi}{10}$

(d) $\frac{7\pi}{5}$

A. $\frac{3\pi}{5}$

B. $\frac{-7\pi}{5}$

C. $\frac{\pi}{10}$

D. $\frac{-\pi}{10}$

Answer: D



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5. The domain of the function $\cos^{-1}(2x - 1)$ is

- A. $[0, 1]$
- B. $[-1, 1]$
- C. $(-1, 1)$
- D. $[0, \pi]$

Answer: A



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6. The domain of the function defined by $f(x) = \sin^{-1} \sqrt{x - 1}$ is

- A. $[1, 2]$

B. $[-1, 1]$

C. $[0, 1]$

D. None of these

Answer: A

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7. If $\cos\left(\sin^{-1}\frac{2}{5} + \cos^{-1}x\right) = 0$, then x is equal to

A. $\frac{1}{5}$

B. $\frac{2}{5}$

C. 0

D. 1

Answer: B

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8. The value of $\sin[2 \tan^{-1}(0.75)]$ is

A. 0.75

B. 1.5

C. 0.96

D. $\sin 1.5$

Answer: C



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9. The value of $\cos^{-1}\left(\cos, \frac{3\pi}{2}\right)$ is

A. $\frac{\pi}{2}$

B. $\frac{3\pi}{2}$

C. $\frac{5\pi}{2}$

D. $\frac{7\pi}{2}$

Answer: A



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10. The value of $2 \sec^{-1} 2 + 2 \sin^{-1} \left(\frac{1}{2} \right)$ is

A. $\frac{\pi}{6}$

B. $\frac{5\pi}{6}$

C. $\frac{7\pi}{6}$

D. 1

Answer: B



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11. If $\tan^{-1} x + \tan^{-1} y = \frac{4\pi}{5}$, then $\cot^{-1} x + \cot^{-1} y$ equal to

A. $\frac{\pi}{5}$

B. $\frac{2\pi}{5}$

C. $\frac{3\pi}{5}$

D. π

Answer: A



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12. If $\sin^{-1}\left(\frac{2a}{1+a^2}\right) + \cos^{-1}\left(\frac{1-a^2}{1+a^2}\right) = \tan^{-1}\left(\frac{2x}{1-x^2}\right)$, where $a, x \in]0, 1[$, then the value of x is

A. 0

B. $\frac{a}{2}$

C. a

D. $\frac{2a}{1-a^2}$

Answer: D



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13. The value of $\cot \left[\cos^{-1} \left(\frac{7}{25} \right) \right]$ is

A. $\frac{25}{24}$

B. $\frac{25}{7}$

C. $\frac{24}{25}$

D. $\frac{7}{24}$

Answer: D



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14. The value of $\tan \left(\frac{1}{2} \cos^{-1} \left(\frac{2}{\sqrt{5}} \right) \right)$ is

A. $2 + \sqrt{5}$

B. $\sqrt{5} - 2$

C. $\frac{\sqrt{5} + 2}{2}$

D. $5 + \sqrt{2}$

Answer: B



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15. If $|x| \leq 1$, then $2 \tan^{-1} x + \sin^{-1} \left(\frac{2x}{1+x^2} \right)$ is equal to

A. $4 \tan^{-1} x$

B. 0

C. $\frac{\pi}{2}$

D. π

Answer: A



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16. If $\cos^{-1} \alpha + \cos^{-1} \beta + \cos^{-1} \gamma = 3\pi$, then $\alpha(\beta + \gamma) + \beta(\gamma + \alpha) + \gamma(\alpha + \beta)$ equal to

A. 0

B. 1

C. 6

D. 12

Answer: C



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17. The number of real solutions of the equation

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

A. 0

B. 1

C. 2

D. ∞

Answer: A



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18. If $\cos^{-1} x > \sin^{-1} x$, then

A. $\frac{1}{\sqrt{2}} < x \leq 1$

B. $0 \leq x \leq \frac{1}{\sqrt{2}}$

C. $-1 \leq x < \frac{1}{\sqrt{2}}$

D. $x > 0$

Answer: C



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1. The principal value of $\cos^{-1}\left(-\frac{1}{2}\right)$ is

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2. The value of $\sin^{-1}\left(\sin\frac{3\pi}{5}\right)$ is

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3. If $\cos(\tan^{-1}x + \cot^{-1}\sqrt{3}) = 0$, find the value of x .

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4. The set of values of $\sec^{-1}\left(\frac{1}{2}\right)$ is

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5. The principal value of $\tan^{-1}\sqrt{3}$ is

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6. The value of $\cos^{-1}\left(\cos, \frac{14\pi}{3}\right)$ is

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7. The value of $\cos(\sin^{-1} x + \cos^{-1} x)$, where $|x| \leq 1$, is

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8. The value of $\tan\left(\frac{\sin^{-1} x + \cos^{-1} x}{2}\right)$, when $x = \frac{\sqrt{3}}{2}$, is

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9. If $y = 2 \tan^{-1} x + \sin^{-1}\left(\frac{2x}{1+x^2}\right)$, then $< y <$

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10. The result $\tan^{-1} x - \tan^{-1} y = \tan^{-1} \left(\frac{x - y}{1 + xy} \right)$ is true when the value of xy is

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11. The value of $\cot^{-1}(-x) x \in R$ in terms of $\cot^{-1} x$ is

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12. All trigonometric functions have inverse over their respective domains.

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13. The value of the expression $(\cos^{-1} x)^2$ is equal to $\sec^2 x$.

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14. The domain of trigonometric functions can be restricted to any one of their branch (not necessary principal value) in order to obtain their inverse function s.



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15. The least numerical value, either positive or negative of angle θ is called principal value of the inverse trigonometric function.



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16. The graph of inverse trigonometric function can be obtained from the graph of their corresponding function by interchanging X and Y-axes.



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17. The minimum value of n for which $\tan^{-1} \frac{n}{\pi} > \frac{\pi}{4}$, $n \in N$, is valid is 5.



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18. The principal value of $\sin^{-1} \left[\cos \left(\sin^{-1} \frac{1}{2} \right) \right]$ is $\frac{\pi}{3}$.



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