



MATHS

BOOKS - SAI MATHS (TELUGU ENGLISH)

TRIGONOMETRIC AND INVERSE TRIGONOMETRIC EQUATIONS

Problems

1. The number of solutions of $\sec x \cos 5x + 1 = 0$ in the interval $[0, 2\pi]$ is

- A. 5
- B. 8
- C. 10
- D. 12

Answer: B



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2. If $\cos\left(\cot^{-1}\left(\frac{1}{2}\right)\right) = \cos(\cos^{-1}x)$ then a value of x is

A. $\frac{1}{\sqrt{6}}$

B. $\frac{-1}{\sqrt{12}}$

C. $\frac{2}{\sqrt{6}}$

D. $\frac{-2}{\sqrt{6}}$

Answer: A



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3. If $\tan\theta \tan(120^\circ - \theta) \tan(120^\circ + \theta) = 1/\sqrt{3}$, then $\theta =$

A. $\frac{n\pi}{3} + \frac{\pi}{18}, n \in \mathbb{Z}$

B. $\frac{n\pi}{3} + \frac{\pi}{12}, n \in \mathbb{Z}$

C. $\frac{n\pi}{12} + \frac{\pi}{12}, n \in \mathbb{Z}$

D. $\frac{n\pi}{3} + \frac{\pi}{6}, n \in \mathbb{Z}$

Answer: A



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4.

If

$$\sin^{-1}\left(x - \frac{x^2}{2} + \frac{x^3}{4} - \dots \infty\right) + \cos^{-1}\left(x^2 - \frac{x^4}{2} + \frac{x^6}{4} - \dots \infty\right) = \frac{\pi}{2}$$

and $0 < x < \sqrt{2}$ then $x =$

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

B. 1

C. $-\frac{1}{2}$

D. -1

Answer: B



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5. The sum of the solutions in $(0, 2\pi)$ for the equation $\cos x \cos$

$$\left(\frac{\pi}{3} - x\right) \cos\left(\frac{\pi}{3} + x\right) = \frac{1}{4} \text{ is}$$

A. 4π

B. π

C. 2π

D. 3π

Answer: C



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6. If $x > 0$, $y > 0$, $z > 0$, $xy+yz+zx < 1$ and if

$\tan^{-1} x + \tan^{-1} y + \tan^{-1} z = \pi$, then $x+y+z$ equals to

A. 0

B. xyz

C. $3xyz$

D. \sqrt{xyz}

Answer: B



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7. The set of solutions of the system of equations $x + y = \frac{2\pi}{3}$ and $\cos x + \cos y = \frac{3}{2}$ where x, y are real, is

A. $\left\{ (x, y) : \cos\left(\frac{x - y}{2}\right) = \frac{1}{2} \right\}$

B. $\left\{ (x, y) : \sin\left(\frac{x - y}{2}\right) = \frac{1}{2} \right\}$

C. $\left\{ (x, y) : \cos(x - y) = \frac{1}{2} \right\}$

D. Empty set

Answer: D



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8. If $\cos^{-1}\left(\frac{5}{13}\right) + \cos^{-1}\left(\frac{3}{5}\right) = \cos^{-1}x$, then x is equal to

A. $\frac{3}{65}$

B. $\frac{-36}{65}$

C. $\frac{-33}{65}$

D. -1

Answer: C



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9. If $\tan x + \tan\left(x + \frac{\pi}{3}\right) + \tan\left(x + \frac{2\pi}{3}\right) = 3$, then $\tan 3x$ is equal to

A. 3

B. 1

C. 2

D. 0

Answer: C



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10. If $\frac{1}{2} \leq x \leq 1$, then $\cos^{-1} x + \cos^{-1} \left(\frac{x}{2} + \frac{1}{2} \sqrt{3 - 3x^2} \right)$ is equal to

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

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

C. π

D. 0

Answer: B



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11. The most general value of θ which satisfies both the equations

$$\tan \theta = -1 \text{ and } \cos \theta = \frac{1}{\sqrt{2}} \text{ is}$$

A. $n\pi + \frac{7\pi}{4}$

B. $2n\pi + \frac{7\pi}{4}$

C. $n\pi + (-1)\frac{7\pi}{4}$

D. $\frac{7n\pi}{4}$

Answer: B

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12. $(\tan^{-1} x)^2 + (\cot^{-1} x)^2 = \frac{5\pi^2}{8} \Rightarrow x =$

A. -1

B. 1

C. 0

D. $\pi\sqrt{\frac{5}{8}}$

Answer: A

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13. The set of solutions of the equation,

$$(\sqrt{3} - 1)\sin \theta + (\sqrt{3} + 1)\cos \theta = 2 \text{ is}$$

- A. $\left\{2n\pi \pm \frac{\pi}{4} + \frac{\pi}{12} : n \in \mathbb{Z}\right\}$
- B. $\left\{2n\pi \pm \frac{\pi}{4} - \frac{\pi}{12} : n \in \mathbb{Z}\right\}$
- C. $\left\{n\pi + (-1)^n \frac{\pi}{4} + \frac{\pi}{12} : n \in \mathbb{Z}\right\}$
- D. $\left\{n\pi + (-1)^n \frac{\pi}{4} - \frac{\pi}{12} : n \in \mathbb{Z}\right\}$

Answer: A



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14. If $\tan^{-1} x + \tan^{-1} y + \tan^{-1} z = \frac{\pi}{2}$, then $1-xy-yz-zx$ is equal to

- A. 1
- B. 0
- C. -1

D. 2

Answer: B



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15. If $3 \cos x \neq 2 \sin x$, then the general solution of $\sin^2 x - \cos 2x = 2 - \sin 2x$ is

A. $n\pi + (-1)^n \frac{\pi}{2}, n \in Z$

B. $\frac{n\pi}{2}, n \in Z$

C. $(4n \pm 1) \frac{\pi}{2}, n \in Z$

D. $(2n - 1)\pi, n \in Z$

Answer: C



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16. $\cos^{-1}\left(\frac{-1}{2}\right) - 2\sin^{-1}\left(\frac{1}{2}\right) + 3\cos^{-1}\left(\frac{-1}{\sqrt{2}}\right) - 4\tan^{-1}(-1)$

equals

A. $\frac{19\pi}{12}$

B. $\frac{35\pi}{12}$

C. $\frac{47\pi}{12}$

D. $\frac{43\pi}{12}$

Answer: D



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17. $\{x \in R : \cos 2x + 2\cos^2 x = 2\}$ is equal to

A. $\left\{2n\pi + \frac{\pi}{3} : n \in I\right\}$

B. $\left\{n\pi \pm \frac{\pi}{6} : n \in I\right\}$

C. $\left\{n\pi + \frac{\pi}{3} : n \in I\right\}$

D. $\left\{2n\pi - \frac{\pi}{3} : n \in I\right\}$

Answer: B



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18. If $\sin^{-1}\left(\frac{3}{x}\right) + \sin^{-1}\left(\frac{4}{x}\right) = \frac{\pi}{2}$, then x is equal to

A. 3

B. 5

C. 7

D. 11

Answer: B



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19. The value of x , where $x > 0$ and $\tan\left(\sec^{-1}\left(\frac{1}{x}\right)\right) = \sin(\tan^{-1}(2))$ is

A. $\sqrt{5}$

B. $\frac{\sqrt{5}}{3}$

C. 1

D. $\frac{2}{3}$

Answer: B



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20. If $\cos 2x = (\sqrt{2} + 1)\left(\cos x - \frac{1}{\sqrt{2}}\right)$, $\cos x \neq \frac{1}{2}$, then x belong to

A. $\left\{2n\pi \pm \frac{\pi}{3} : n \in I\right\}$

B. $\left\{2n\pi \pm \frac{\pi}{6} : n \in I\right\}$

C. $\left\{2n\pi \pm \frac{\pi}{2} : n \in I\right\}$

D. $\left\{ 2n\pi \pm \frac{\pi}{4} : n \in I \right\}$

Answer: D



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21. $\sin^{-1}\left(\frac{4}{5}\right) + 2 \tan^{-1}\left(\frac{1}{3}\right)$ is equal to

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

B. $\frac{\pi}{4}$

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

D. 0

Answer: C



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22. If $\sin^{-1}(x) + \sin^{-1}(1-x) = \cos^{-1}(x)$, then x belong to

A. $\{1, 0\}$

B. $\{-1, 1\}$

C. $\left\{0, \frac{1}{2}\right\}$

D. $\{2, 0\}$

Answer: C



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23. The solution set of $(5 + 4 \cos \theta)(2 \cos \theta + 1) = 0$ in the interval $[0, 2\pi]$

A. $\left\{\frac{\pi}{3}, \frac{2\pi}{3}\right\}$

B. $\left\{\frac{\pi}{3}, \pi\right\}$

C. $\left\{\frac{2\pi}{3}, \frac{4\pi}{3}\right\}$

D. $\left\{\frac{2\pi}{3}, \frac{5\pi}{3}\right\}$

Answer: C

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24. $\cos \left[\cos^{-1} \left(-\frac{1}{7} \right) + \sin^{-1} \left(-\frac{1}{7} \right) \right]$ is equal to

A. $-\frac{1}{3}$

B. 0

C. $\frac{1}{3}$

D. $\frac{4}{9}$

Answer: B

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25. If $\sin^{-1}(x) - \cos^{-1}(x) = \frac{\pi}{6}$, then x is equal to

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

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

C. $-\frac{1}{2}$

D. $-\frac{\sqrt{3}}{2}$

Answer: B



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26. The equation $\sqrt{3}\sin x + \cos x = 4$, has

- A. Only one solution
- B. Two solutions
- C. Infinitely many solutions
- D. No solution

Answer: D



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27. $\sec^2(\tan^{-1}(2)) + \operatorname{cosec}^2(\cos^{-1}(3))$ is equal to

A. 3

B. 10

C. 15

D. 20

Answer: C



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