doubtnut
India's Number 1 Education App

MATHS

BOOKS - DISHA PUBLICATION MATHS (HINGLISH)

INVERSE TRIGONOMETIC FUNCTIONS

Jee Main 5 Year At A Glance

1. 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. -1

C. 0

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

Answer: A

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2. 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

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3. If $\tan^{-1}y = \tan^{-1}x + \tan^{-1}\left(\frac{2x}{1-x^2}\right)$, where$|x| < \frac{1}{\sqrt{3}}$.

Then, the value of y is

A. $\frac{3x - x^3}{1 + 3x^2}$

B. $\frac{3x + x^3}{1 \mid 3x^2}$

C. $\frac{3x - x^3}{1 - 3x^2}$

D. $\frac{3x + x^3}{1 - 3x^2}$

Answer: C

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4. $If f(x) = 2\tan^{-1} x + \sin^{-1}\left(\frac{2x}{1 + x^2}\right), x > 1$.T h e n , f(5) is equal to

A. $\tan^{-1}\left(\frac{65}{156}\right)$

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

C. π

D. $4\tan^{-1}(5)$

Answer: C

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

A. $-\frac{3\pi}{4}$

B. $\frac{3\pi}{4}$

C. $-\frac{\pi}{4}$

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

Answer: C

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6. Statement I: The equation $\left(\sin^{-1}x\right)^3+\left(\cos^{-1}x\right)^3-a\pi^3=0$ has a solution for all a> $\frac{1}{32}$

Statement II: for any X εR ,$\sin^{-1}x+\cos^{-1}x=\frac{\pi}{2}$ and $0<\left(\sin x-\frac{\pi}{4}\right)^2<\frac{9\pi^2}{16}$

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 true and statement II is true.

Answer: A

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Exercise 1 Concept Builder

1. The value of $\sec^2\left(\tan^{-1}3\right) + \operatorname{cosec}^2\left(\cot^{-1}2\right)$ is equal to

A. 5

B. 13

C. 15

D. 23

Answer: C

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2. Range of $\tan^{-1}\left(\frac{2x}{1+x^2}\right)$ is $\left[-\frac{\pi}{4}, \frac{\pi}{4}\right]$ (b) $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ $\left(-\frac{\pi}{2}, \frac{\pi}{4}\right)$ (d) $\left[\frac{\pi}{4}, \frac{\pi}{2}\right]$

A. $\left[-\frac{\pi}{4}, \frac{\pi}{4}\right]$

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

C. $\left(-\frac{\pi}{2}, \frac{\pi}{4}\right]$

D. $\left[-\frac{\pi}{4}, \frac{\pi}{2}\right]$

Answer: A

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3. Let $f(x) = \cot^{-1} x + \operatorname{cosec}^{-1} x$.Then f(x) is real for

A. $x\varepsilon[-1, 1]$

B. $x\varepsilon(-\infty, -1] \cup [1, \infty)$

C. $x\varepsilon(-\infty, \infty)$

D. None of these

Answer: B

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

A. $\frac{3+\sqrt{5}}{2}$

B. $\frac{3-\sqrt{5}}{2}$

C. $\frac{\sqrt{5}}{6}$

D. None of these

Answer: B

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5. Find the domain and range of

$$f(x) = \sin^{-1} x + \tan^{-1} x + \sec^{-1} x.$$

A. $\left(\frac{\pi}{4}, \frac{3\pi}{4}\right)$

B. $\left[\frac{\pi}{4}, \frac{3\pi}{4}\right]$

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

D. None of these

Answer: D

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6. If $\sin^{-1} x = \tan^{-1} y$m what is the value of $\frac{1}{x^2} - \frac{1}{y^2}$?

A. 1

B. -1

C. 0

D. 2

Answer: A

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7. If $\sin^{-1}\left(x^2 - 7x + 12\right) = n\pi, \forall n\varepsilon I$, then x=

A. -2

B. 4

C. -3

D. 5

Answer: B

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8. The domain of the function $f(x) = \dfrac{\sin^{-1}(x-3)}{\sqrt{9-x^2}}$, is

A. [1,2]

B. [2,3)

C. [1,2]

D. [2,3]

Answer: B

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9. $\cos^{-1}\left(\cos\left(2\cot^{-1}\left(\sqrt{2}-1\right)\right)\right)$ is equal to

A. $\sqrt{2}-1$

B. $1-\sqrt{2}$

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

D. $\frac{3\pi}{4}$

Answer: D

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10. $\sec^{-1}(\sin^2 x)$ is well- defined if and only if

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

B. $x\varepsilon R$

C. $x\varepsilon\{(2n+1)\pi/2 : n\varepsilon I\}$

D. None of these

Answer: C

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11. Find the value of $\cot^{-1}\left[\frac{\sqrt{1-\sin x}+\sqrt{1+\sin x}}{\sqrt{1-\sin x}-\sqrt{1+\sin x}}\right]$

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

B. $2\pi - x$

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

D. $\frac{x}{2} - \pi$

Answer: A

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12. Find domain for, $f(x) = \cos^{-1}[x]$.

A. [-1,2]

B. [-1,2)

C. (-1,2]

D. None of these

Answer: B

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13. The domain of the function $\cos^{-1}\{\log_2(x^2 + 5x + 8)\}$ is

A. [2,3]

B. [-3,-2]

C. [-2,2]

D. [-3,1]

Answer: B

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14. Let x_1 and x_2 be solutions of the equation $\sin^{-1}\left(x^2 - 3x + \frac{5}{2}\right) = \frac{\pi}{6}$. Then, the value of $x_1^2 + x_2^2$ is

A. 4

B. 5

C. $5/2$

D. 6

Answer: B

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15. The Range of the function $y = \left(\frac{\cos^{-1}(3x-1)}{\pi} + 1\right)^2$ (1) $[1, 4]$ (2) $[0, \pi]$ (3) $[1, \pi]$ (4) $[0, \pi^2]$

A. [1,4]

B. $[0, \pi]$

C. $[1, \pi]$

D. $[0, \pi^2]$

Answer: A

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16. Find the principal value of $\cos ec^{-1}\left(-\frac{2}{\sqrt{3}}\right)$.

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

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

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

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

Answer: A

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17. Find the principal value of $\sec^{-1}(2)$

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

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

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

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

Answer: B

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18. Principal value of $\tan^{-1}1 + \cos^{-1}\left(\frac{-1}{2}\right) + \sin^{-1}\left(\frac{-1}{2}\right)$ is

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

B. $\frac{3\pi}{4}$

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

D. 6π

Answer: B

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19. If $\cos^{-1}x > \sin^{-1}x$, then the set of all values of x is

A. [0,1]

B. $\left[0, \frac{1}{\sqrt{2}}\right)$

C. $\left[-1, \frac{1}{\sqrt{2}}\right)$

D. None of these

Answer: C

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20. $\sin^{-1}(\sin 5) > x^2 - 4x$ holds if

A. $x = 2 - \sqrt{9 - 2\pi}$

B. $x = 2 + \sqrt{9 - 2\pi}$

C. $x > 2 + \sqrt{9 - 2\pi}$

D. $x \varepsilon \left(2 - \sqrt{9 - 2\pi}, 2 + \sqrt{9 - 2\pi}\right)$

Answer: D

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21. If $x \varepsilon (7\pi, 8\pi)$, then $\tan^{-1}\sqrt{\frac{1 - \cos x}{1 + \cos x}} =$

A. $-\frac{x}{2}$

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

C. $4\pi - \frac{x}{2}$

D. None of these

Answer: C

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22. If $\tan^{-1}(-x) + \cos^{-1}\left(\frac{-1}{2}\right) = \frac{\pi}{2}$, then the value of x is equal to

A. $\sqrt{3}$

B. $\frac{-1}{\sqrt{3}}$

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

D. $-\sqrt{31}$

Answer: C

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23. $\cos^{-1}\left(\cos\left(\frac{7\pi}{5}\right)\right) =$

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

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

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

D. $\frac{7\pi}{5}$

Answer: A

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24. $\sin\left[\cot^{-1}\left(\cot\frac{17\pi}{3}\right)\right]$

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

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

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

D. None of these

Answer: A

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25. The principal values of $\cos t^{-1}\left(-\frac{\sin(7\pi)}{6}\right)$ is

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

B. $\frac{7\pi}{3}$

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

D. None of these

Answer: C

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26. The value of $\lim_{x \to \frac{\pi}{2}} \sqrt{\frac{\tan x - \sin\left(\tan^{-1}(\tan x)\right)}{\tan x + \cos^2(\tan x)}}$ is

A. -1

B. 0

C. 1

D. None of these

Answer: C

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27. Find the value of $\cos^{-1}\left(\frac{x}{2}+\frac{\sqrt{3-3x^2}}{2}\right)$

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

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

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

D. $-\frac{3}{\pi}$

Answer: B

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28. If $\frac{\cot^{-1} n}{\pi} > \frac{\pi}{6}, n \in N,$ then the maximum value of n is 6 (b) 7 (c) 5 (d) none of these

A. 1

B. 5

C. 9

D. None of these

Answer: B

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29. The value of $\cos\left(\frac{1}{2}\cos^{-1}.\frac{1}{8}\right)$ is equal to

A. $\frac{3}{4}$

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

C. $\frac{4}{3}$

D. $-\frac{3}{4}$

Answer: A

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

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

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

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

D. $\frac{4\pi}{3}$

Answer: C

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31. Given that $\sin^{-1}\left(\sin\frac{3\pi}{4}\right) = \frac{2\pi}{k}$,then k=

A. 3

B. 8

C. 6

D. 9

Answer: B

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32. If $\sum_{i=1}^{n} \cos^{-1} \alpha_i = 0, \quad \text{then} \quad \sum_{i=1}^{n} \alpha_i =$

A. n

B. 2n

C. $\frac{n(n+1)}{2}$

D. None of these

Answer: B

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33. Complete solution set of $\tan^2(\sin^{-1}x) > 1$ is $\left(-1, -\frac{1}{\sqrt{2}}\right) \cup \left(\frac{1}{\sqrt{2}}, 1\right)$ (b) $\left(-\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$~$\{0\}$ $(-1, 1)$~$\{0\}$ (d) none of these

A. $\left(-1, -\frac{1}{\sqrt{2}}\right) \cup \left(\frac{1}{\sqrt{2}}, 1\right)$

B. $\left(-\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$~$\{0\}$

C. $(-1, 1)$~$\{0\}$

D. None of these

Answer: A

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34. $-\frac{2\pi}{5}$ is the principal value of

A. $\cos^{-1}\left(\cos\frac{7\pi}{5}\right)$

B. $\sin^{-1}\left(\sin\frac{7\pi}{5}\right)$

C. $\sec^{-1}\left(\sec\frac{7\pi}{5}\right)$

D. None of these

Answer: B

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35. Find the value of $\sin\left[arc\cos\left(-\frac{1}{2}\right)\right]$

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

B. 1

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

D. None of these

Answer: C

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36. The positive integral solution of

$$\tan^{-1}x + \cos^{-1}\frac{y}{\sqrt{1+y^2}} = \sin^{-1}\frac{3}{\sqrt{10}}$$ is

A. $x = 1, y = 2, x = 2, y = 7$

B. $x = 1, y = 3, x = 2, y = 4$

C. $x = 0, y = 0, x = 3, y = 4$

D. None of these

Answer: A

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37. If $\tan^{-1}(x+1) + \cot^{-1}(x-1) = \sin^{-1}\left(\frac{4}{5}\right) + \cos^{-1}\left(\frac{3}{5}\right)$, then x has the value:

A. $4\sqrt{\frac{3}{7}}$

B. $4\sqrt{\frac{7}{3}}$

C. $14\sqrt{3}$

D. $6\sqrt{7}$

Answer: A

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38. If $\sin\left(\cot^{-1}(x+1)\right) = \cos\tan^{-1}x$, then x=

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

B. 1

C. 0

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

Answer: D

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39. $\sin\left(\sin^{-1}\left(\frac{1}{3}\right) + \sec^{-1}(3)\right) + \cos\left(\frac{\tan^{-1}(1)}{2}\right) + \tan^{-1}2\Bigg)=$

A. 1

B. 2

C. 3

D. 4

Answer: A

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40. Indicate the relation which can hold in their respective domain for infinite values of x.

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

B. $\cot\left|\cot^{-1}x\right| = |x|$

C. $\tan^{-1}|\tan x| = |x|$

D. $\sin\left|\sin^{-1}x\right| = |x|$

Answer: C

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41. If $\sin^{-1}\left(x-\frac{x^2}{2}+\frac{x^3}{4}.....\infty\right)+\cos^{-1}\left(x^2-\frac{x^4}{2}+\frac{x^6}{4}-.....\infty\right)=\frac{\pi}{2}$ there $0<1\times 1<\sqrt{2}$, then x equals

A. $1/2$

B. 1

C. $-1/2$

D. -1

Answer: B

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42. If $\cos ec^{-1}x=2\cot^{-1}7+\cos^{-1}\left(\frac{3}{5}\right)$, then x=

A. $\frac{44}{117}$

B. $\frac{125}{117}$

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

D. $\frac{5}{3}$

Answer: B

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43. $\sin\left(2\sin^{-1}0.8\right) =$

A. $\sin 1.2^{\circ}$

B. $\sin 1.6^{\circ}$

C. 0.48

D. 0.96

Answer: D

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44. The value of $\cos\left[2\tan^{-1}(-7)\right]$ is

A. $\frac{49}{50}$

B. $-\frac{49}{50}$

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

D. $-\frac{24}{25}$

Answer: D

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45. If $2\sin^{-1}x - \cos^{-1}x = \frac{\pi}{2}$, then x is equal to

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

B. $-\frac{1}{\sqrt{2}}$

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

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

Answer: D

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46. If $x + y + z = xyz$, then $\tan^{-1} x + \tan^{-1} y + \tan^{-1} z =$

A. π

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

C. 1

D. $\tan^{-1}(xyz)$

Answer: A

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47. If $\left(\tan^{-1} x\right)^2 + \left(\cot^{-1} x\right)^2 = \frac{5\pi^2}{8}$ then x equals

A. -1

B. 1

C. 0

D. None of these

Answer: A

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48. Prove that $\frac{\tan^{-1}(3a^2x - x^3)}{a^3 - 3ax^2} = 3\frac{\tan^{-1}x}{a}$.

A. $3\tan^{-1}\left(\frac{x}{a}\right)$

B. $-3\tan^{-1}\left(\frac{x}{a}\right)$

C. $3\tan^{-1}\left(\frac{a}{x}\right)$

D. None of these

Answer: A

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49. If $4\sin^{-1}x + \cos^{-1}x = \pi$, then x is equal to

A. 0

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

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

D. 1

Answer: B

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50. If $\sin^{-1}\left(\frac{6x}{1+9x^2}\right) = 2\tan^{-1}(ax)$, then a=

A. 3

B. 8

C. 6

D. 9

Answer: A

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51.

$$\tan\left(\tan^{-1}x+\tan^{-1}y+\tan^{-1}z\right)-\cot\left(\cot^{-1}x+\cot^{-1}y+\cot^{-1}z\right)$$

is equal to

A. 0

B. 2(x+y+z)

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

D. $\frac{3\pi}{2}+x+y+z$

Answer: A

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52. The value of

$$\frac{\tan^{-1}1}{3}+\frac{\tan^{-1}1}{5}+\frac{\tan^{-1}1}{7}+\frac{\tan^{-1}1}{8}$$ is .....

A. π

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

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

D. $3\frac{\pi}{4}$

Answer: C

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53. The solution of $\sin^{-1}x-\sin^{-1}2x=\pm\frac{\pi}{3}$ is

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

B. $\pm\frac{1}{4}$

C. $\pm\frac{\sqrt{3}}{3}$

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

Answer: D

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54. Prove that: $\frac{\sin^{-1}(12)}{13} + \frac{\cos^{-1} 4}{5} + \frac{\tan^{-1}(63)}{16} = \pi$

A. $\frac{3\pi}{4}$

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

C. π

D. 0

Answer: C

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55. The number of solution of the equation $\tan^{-1}(1+x)+\tan^{-1}(1-x)=\frac{\pi}{2}$ is

A. 3

B. 2

C. 1

D. 0

Answer: C

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56. If $a \leq \sin^{-1} x + \cos^{-1} x + \tan^{-1} x \leq b$, then:

A. $k = -\pi, K = \pi$

B. $k = 0, K = \frac{\pi}{2}$

C. $k = \frac{\pi}{4}, K = \frac{3\pi}{4}$

D. $k = 0, K = \pi$

Answer: C

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57. If $a_1, a_2, a_3, \ldots . a_n$ is a.p with common difference d then

$\tan\left\{\frac{\tan^{-1}(d)}{(1+a_1a_2)+\frac{\tan^{-1}(d)}{1+a_2a_3+\ldots+\frac{\tan^{-1}(1)}{1+a_{n-1}a_n}}}\right.$ is equal to

A. $\frac{(n-1)d}{a_1+a_n}$

B. $\frac{(n-1)d}{1+a_1a_n}$

C. $\frac{nd}{a_1+a_n}$

D. $\frac{a_n-a_1}{a_n+a_1}$

Answer: B

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58. $\sum_{r=1}^{\infty} \tan^{-1}\left(\frac{1}{1+r+r^2}\right)$=.....

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

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

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

D. None of these

Answer: B

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59. Prove that $2\tan^{-1}\left(\sqrt{\frac{a-b}{a+b}}\frac{\tan\theta}{2}\right) = \cos^{-1}\left(\frac{a\cos\theta+b}{a+b\cos\theta}\right)$

A. $\cos^{-1}\left(\frac{a\cos\theta+b}{a+b\cos\theta}\right)$

B. $\cos^{-1}\left(\frac{a+bco\theta}{a\cos\theta+b}\right)$

C. $\cos^{-1}\left(\frac{a\cos\theta}{a+b\cos\theta}\right)$

D. $\cos^{-1}\left(\frac{b\cos\theta}{a\cos\theta+b}\right)$

Answer: A

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60. If $\tan^{-1}x + \tan^{-1}\frac{1}{x} = \begin{cases} \pi/k & \text{if } , \ x \geq 0 \\ -\pi/k & \text{if } , \ x < 0 \end{cases}$, then the value of K is

A. 3

B. 4

C. 2

D. 1

Answer: C

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Exercise 2 Concept Applicator

1. If $\cos^{-1}\lambda\cos^{-1}\mu+\cos^{-1}\gamma=3\pi,$ then find the value of $\lambda\mu+\mu\lambda.$

A. 0

B. 1

C. 3

D. 6

Answer: C

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2. Find the domain and range of $f(x)=\sin^{-1}(\log[x])+\log\left(\sin^{-1}[x]\right),$ where [.] denotes the greatest integer function.

A. R

B. [1,2]

C. $\left\{\log\frac{\pi}{2}\right\}$

D. $\{-\sin 1\}$

Answer: C

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3. If $\sin^{-1}x + \sin^{-1}y + \sin^{-1}z = \frac{3\pi}{2}p$ then the value of $x^{100} + y^{100} + z^{100} - \frac{3}{x^{101} + y^{101} + z^{101}}$

A. 0

B. 1

C. 2

D. 3

Answer: C

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4. If $u = \cot^{-1}\sqrt{\tan\alpha} - \tan^{-1}\sqrt{\tan\alpha}$, then $\tan\left(\frac{\pi}{4} - \frac{u}{2}\right)$ is equal to

(a) $\sqrt{\tan\alpha}$ (b) $\sqrt{\cos\alpha}$ (c) $\tan\alpha$ (d) $\cot\alpha$

A. $\sqrt{\tan\alpha}$

B. $\sqrt{\cot\alpha}$

C. $\tan\alpha$

D. $\cot\alpha$

Answer: A

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5. Find the real solutions of the eqution $\tan^{-1}\sqrt{x(x+1)}+\sin^{-1}\sqrt{x^2+x+1}=\frac{\pi}{2}$

A. infinite

B. exactly one

C. exactly two

D. None of these

Answer: C

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6. The domain set of the function

$f(x) = \tan^{-1} x - \cot^{-1} x + \cos^{-1}(2 - x)$ is

A. [0,1]

B. [-1,1]

C. [1,3]

D. None of these

Answer: C

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7. The sum of the infinite series

$$\sin^{-1}\left(\frac{1}{\sqrt{2}}\right) + \sin^{-1}\left(\frac{\sqrt{2}-1}{\sqrt{6}}\right) + \sin^{-1}\left(\frac{\sqrt{3}-\sqrt{2}}{\sqrt{12}}\right) + \ldots + \ldots + \sin$$

is

A. $\frac{\pi}{8}$

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

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

D. π

Answer: C

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8. 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

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9.

$$5\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)+7\sin^{-1}\left(\frac{2x}{1+x^2}\right)-4\tan^{-1}\left(\frac{2x}{1-x^2}\right)-\tan^{-1}x=$$

, then x is equal to

A. 3

B. $-\sqrt{3}$

C. $\sqrt{3}$

D. 2

Answer: C

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10. If $\alpha=\sin^{-1}\left(\cos\left(\sin^{-1}x\right)\right)$ and $\beta=\cos^{-1}\left(\sin\left(\cos^{-1}x\right)\right)$, then

A. $\tan\alpha=\tan\beta$

B. $\tan\alpha=-\cot\beta$

C. $\tan\alpha = \cot\beta$

D. $\tan\alpha = -\tan\beta$

Answer: c

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11. If x, y, z are in A.P. and $\tan^{-1}x, \tan^{-1}y$ and $\tan^{-1}z$ are also in A.P. then

A. x=y=z

B. 2x=3y=6z

C. 6x=3y=2z

D. 6x=4y=3z

Answer: A

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12. If $\cos^{-1} x + \cos^{-1} y + \cos^{-1} z = \pi$, then

A. 0

B. 1

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

D. 2

Answer: B

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13. Q. the value of $\tan^{-1}\left(\frac{a}{b+c}\right) + \tan^{-1}\left(\frac{b}{c+a}\right)$, if $\angle = 90^\circ$ in triangle ABC, is

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

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

C. $\frac{3\pi}{4}$

D. None of these

Answer: A

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14. If $\frac{1}{2}\sin^{-1}\frac{2x}{1+x^2}+\frac{1}{2}\cos^{-1}\frac{1-y^2}{1+y^2}+\frac{1}{3}\tan^{-1}\frac{3z-z^3}{1-3z^2}=5\pi$ then x+y+z=

A. xyz

B. xy+yz+zx

C. 1=xyz

D. none of these

Answer: A

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15. If $\cos^{-1}\sqrt{p}+\cos^{-1}\sqrt{1-p}+\cos^{-1}\sqrt{1-q}=\frac{3\pi}{4}\text{than}:q=$

A. 1

B. $\frac{1}{\sqrt{2}}$

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

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

Answer: D

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16. If $A = \tan^{-1}\left(\frac{x\sqrt{3}}{2K - x}\right)$ and $B = \tan^{-1}\left(\frac{2x - K}{K\sqrt{3}}\right)$, then the value of $A - B$ is

A. 0°

B. 45°

C. 60°

D. 30°

Answer: D

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17. If $f(x) = \cot^{-1}\left(\frac{3x - x^3}{1 - 3x^2}\right)$ and $g(x) = \cos^{-1}\left(\frac{1 - x^2}{1 + x^2}\right)$ then $\lim_{x \to a} \frac{f(x) - f(a)}{g(x) - g(a)}$

A. $\frac{3}{2(1 + a^2)}$

B. $\frac{3}{2(1 + x^2)}$

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

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

Answer: D

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18. Find x satisfying $[\tan^{-1} x] + [\cos^{-1} x] = 2,$ where [] represents the greatest integer function.

A. (cot 3,cot 2)

B. (cot 3,-"tan" 1)

C. (cot 3,0)

D. None of these

Answer: D

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19. Evaluate $\lim_{x \to -1^+} \frac{\sqrt{\pi} - \sqrt{\cos^{-1} x}}{\sqrt{1+x}}$.

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

B. $\frac{1}{\sqrt{\pi}}$

C. 1

D. $\sqrt{2}$

Answer: A

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20. The value of $\sin^{-1}\left\{\cot\left(\sin^{-1}\left(\sqrt{\frac{2-\sqrt{3}}{4}}+\cos^{-1}\left(\frac{\sqrt{12}}{4}\right)+\sec^{-1}\sqrt{2}\right)\right)\right\}$ is

A. 0

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

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

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

Answer: A

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21. The minimum integral value of α for which the quadratic equation $(\cot^{-1}\alpha)x^2-(\tan^{-1}\alpha)^{3/2}x+2(\cot^{-1}\alpha)^2=0$ has both positive roots

A. 1

B. 2

C. 3

D. 4

Answer: B

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22. If the equation `x^3+b x^2+c x+1=0,(b

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

B. $-\pi$

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

D. π

Answer: B

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23. Total number of ordered pairs (x, y) satisfying $|y| = \cos x$ and $y = \sin^{-1}(\sin x)$ where $|x| \leq 3\pi,$ is equal to :

A. 2

B. 4

C. 6

D. 8

Answer: C

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24. The set of values of k for which $x^2 - kx + \sin^{-1}(\sin 4) > 0$ for all real x is

A. ϕ

B. (-2,2)

C. R

D. $(-\infty, -2) \cup (2, \infty)$

Answer: A

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25. If $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z = \pi$ then $x^4 + y^4 + z^4 + 4x^2y^2z^2$=

A. 1

B. 2

C. 4

D. None of these

Answer: B

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26. Find the value of $\tan^{-1}\left(\frac{1}{2}\tan 2A\right) + \tan^{-1}(\cot A) + \tan^{-1}(\cot^3 A)$

A. $\tan^{-1}2$

B. $\tan^{-1}(\cot A)$

C. $4\tan^{-1}(1)$

D. $2\tan^{-1}(2)$

Answer: C

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27. Find the number of positive integral solution of the equation $\tan^{-1}x + \frac{\cos^{-1}(y)}{\sqrt{1+y^2}} = \sin^{-1}\left(\frac{3}{\sqrt{10}}\right)$.

A. x=1.y=2, x=2,y=7

B. x=1, y=3, x=2,y=4

C. x=0,y=0, x=3,y=4

D. None of these

Answer: A

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28. If

$\cos^{-1} x/2 + \cos^{-1} y/3 = \theta, \quad \text{prove that} \quad 9x^2 - 12xy\cos\theta + 4y^2 = 36\sin$

A. $\sin^2\theta$

B. $9\sin^2\theta$

C. $16\sin^2\theta$

D. $36\sin^2\theta$

Answer: D

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29. If $\sin^{-1}x + \sin^{-1}y = \frac{\pi}{2}$, then $(1 + x^4 + y^4)/(x^2 - x^2y^2 + y^2)$ is equal to

A. 1

B. 2

C. $1/2$

D. None of these

Answer: B

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30. If $\sin^{-1}\left(a - \frac{a^2}{3} + \frac{a^3}{9} - \ldots\right) + \cos^{-1}(1 + b + b^2 + \ldots) = \frac{\pi}{2}$ then find a and b

A. a=-3 and b=1

B. a=1 and $b = -\frac{1}{3}$

C. $a = \frac{1}{6}$ and $b = \frac{1}{2}$

D. None of these

Answer: B

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