MATHS

BOOKS - PATHFINDER MATHS (BENGALI ENGLISH)

TRIGONOMETRIC EQUATION

Question Bank

1. Solve the equation :$\sin\theta + \sin 3\theta + \sin 5\theta = 0$

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2. Solve:$\sin m\theta + \sin n\theta = 0$

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3. Solve : $2\cos^2\theta + 3\sin\theta = 0$

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4. Solve : $4\cos\theta - 3\sec\theta = \tan\theta$

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5. Solve : $\tan\theta + \tan 2\theta + \tan 3\theta = \tan\theta\tan 2\theta\tan 3\theta$

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6. Solve : $2\sin^2 x + \sin^2 2x = 2$

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7. Solve : $\sqrt{3}\cos\theta + \sin\theta = \sqrt{2}$

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8. Solve :$\cot\theta + \cos ec\theta = \sqrt{3}$

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9. Solve :$\sin 2\theta \tan\theta + 1 = \sin 2\theta + \tan\theta$

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10. Solve:$(1 - \tan\theta)(1 + \sin 2\theta) = (1 + \tan\theta)$

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11. Solve :$\cot\theta + \cot\left(\frac{\pi}{4} + \theta\right) = 2$

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12. If $\cos x + \sin x = \cos \alpha - \sin \alpha$, prove that : $\left(x - \frac{\pi}{4}\right) = 2n\pi \pm \left(\alpha + \frac{\pi}{4}\right)$

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13. Show that the equations,$\sin^2 \theta = \sin^2 \alpha$, $\cos^2 \theta = \cos^2 \alpha$and $\tan^2 \theta = \tan^2 \alpha$ are same and the solution of each of them are $n\pi \pm \alpha$

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14. Find θ, if $1 + 2\sin\theta\cos\theta - 2\sin\theta - \cos\theta = 0 (0^\circ \leq \theta \leq 360^\circ)$

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15. Solve $\theta : 1 - 2\sin\theta - 2\cos\theta + \cot\theta = 0 (0 < \theta < 2\pi)$

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16. prove :$\cos^3\theta\sin 3\theta+\sin^3\theta\cos 3\theta=\frac{3}{4}\sin 4\theta$

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17. Solve :$\tan\theta+\sec\theta=\sqrt{3}$

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18. Solve :$\sqrt{3}\sec 2\theta=2$

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19. Solve :$\tan^2\left(\frac{2}{3}\theta\right)=3$

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20. Solve :$\cos ec2\theta=-1$

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21. Solve : $\cot\frac{\theta}{2} = -\sqrt{3}$

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22. Find the solution of sin x =$-\frac{\sqrt{3}}{2}$.

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23. Solve sin 2x - sin 4x + sin 6x = 0.

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24. Solve $2\cos^2 x + 3\sin x = 0$

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25. Find the set of values of x for which $\frac{\tan 3x - \tan 2x}{1 + \tan 3x \cdot \tan 2x} = 1$

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26. Solve $\tan\theta + \tan 2\theta + \tan\theta . \tan 2\theta = 1$

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27. Find number of solurions of tan x + sec x = 2 cosx in $[0, 2\pi]$

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28. Find the solution set for , $4\sin^2 x - 8\sin x + 3 \leq 0$ when $x \in [0, 2\pi]$

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29. Find the number of distinct solutions of sec x + tan x $=\sqrt{3}$, where $0 \leq x \leq 3\pi$.

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30. Prove that the equation p cos x - q sin x = r admits solution for x if and only if $-\sqrt{p^2+q^2} < r < \sqrt{p^2+q^2}$

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31. let [] denotes the greatest integer less than or equal to x and f(x) = sin x + cos x . Then find the most general solution of $f(x) = \left[f\left(\frac{\pi}{10}\right)\right]$.

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32. sin x = 0 and $\frac{\sin x}{\frac{\cos x}{2}\frac{\cos(3x)}{2}} = 0$ and show their solution are different.

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33. Solve the equation $(\sin x + \cos x)^{1+\sin 2x} = 2$, when $-\pi \leq x \leq \pi$.

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34. Find the most general solutions for $2^{\sin x} + 2^{\cos x} = 2^{1-\frac{1}{\sqrt{2}}}$.

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35. Solve $3\cos^2\theta - 2\sqrt{3}\sin\theta\cos\theta - 3\sin^2\theta = 0$

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36. Find the number of solution for $\sin 5\theta \cdot \cos 3\theta = \sin 9\theta \cos 7\theta$ in $\left[0, \frac{\pi}{2}\right]$

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37. Find the general solution of the equation $\sin 3\alpha = 4\sin\alpha\sin(x+\alpha)\sin(x-\alpha)$, given $\sin\alpha \neq 0$.

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38. A triangle ABC is such that sin (2A + B) = 1/2 . If A,B,C are in A.P., then find the value of A,B and C.

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39. If $\frac{\cos^{-1}x}{a} + \frac{\cos^{-1}y}{b} = \alpha$, then show $\frac{x^2}{a^2} + \frac{y^2}{b^2} - \frac{2xy}{a}b\cos\alpha = \sin^2\alpha$

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

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41. If $\sum_{i=1}^{2n} \sin^{-1} x_i = n\pi$ then find the value of $\sum_{i=1}^{2n} x_i$

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42. If $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z = \pi$, prove that $x^4 + y^4 + z^4 + 4x^2y^2z^2 = 2\left(x^2y^2 + y^2z^2 + z^2x^2\right)$

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43. Find the value of $\tan\left\{\frac{1}{2}\sin^{-1}\left(\frac{2x}{1+x^2}\right) + \frac{1}{2}\cos^{-1}\left(\frac{1-y^2}{1+y^2}\right)\right\}$

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44. If $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z = \frac{3\pi}{2}$, then find the value of $\sum \frac{\left(x^{101} + y^{101}\right)\left(x^{202} + y^{202}\right)}{\left(x^{303} + y^{303}\right)\left(x^{404} + y^{404}\right)}$

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45. Solve for x :

If $[\sin^{-1}(\cos^{-1}(\sin^{-1}(\tan^{-1}x)))] = 1$, where $[\cdot]$ denotes the greatest integer function.

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46. If x_γ is given by, $x_{\gamma+1} = \sqrt{\frac{1}{2}(1+x_\gamma)}$

Then show : $\cos^{-1}x_0 = \frac{\sqrt{1-x_0^2}}{x_1x_2x_3.....x_n}$

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47. Solve $\sin x + \sqrt{3}\cos x = \sqrt{2}$

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48. Solve $\tan\theta + \tan 2\theta + \tan 3\theta = 0$

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49. The number of all possible triplets (a_1, a_2, a_3) such that : $a_1 + a_2 \cos 2x + a_3 \sin^2 x = 0$ for all x is :

A. 0

B. 1

C. 2

D. infinite

Answer:

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50. Find the general solutions of:

$2^{1+|\cos x|+|\cos x|^2+|\cos x|^3+\ldots\ldots\to\infty} = 4$

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51. $\tan\left(\frac{\pi p}{4}\right) = \cot\left(\frac{q\pi}{4}\right)$ if :

A. p + q = 0

B. p + q = 2n + 1

C. p + q = 2n

D. p + q = 2(2n + 1)

Answer:

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52. The general solution of the equation :

$\cos x \cdot \cos 6x = -1$ is :

A. $x = (2n+1)\pi$

B. $x = 2n\pi$

C. $x = (2n - 1)\pi$

D. none of these

Answer:

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53. Find the interval in which , $\cos^{-1} x > \sin^{-1} x$.

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54. Solve the equation $\sin^{-1} 6x + \sin^{-1} 6\sqrt{3}x = -\frac{\pi}{2}$

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55. Evaluate : $\sum_{n=1}^{\infty} \tan^{-1}\left(\frac{1}{n^2 + n + 1}\right)$

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56. If $\tan^{-1} x + \tan^{-1} 2x + \tan^{-1} 3x = \pi$, then:

A. x = 0

B. x = -1

C. x = 1

D. $x \in \phi$

Answer:

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57. The number of value of 'x' in the interval $[0, 3\pi]$ satisfying the equation $2\sin^2 x + 5\sin x - 3 = 0$ is

A. 1

B. 2

C. 4

D. 6

Answer: C

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58. The most general solution , satisfying the equation $\cos\theta = \frac{1}{\sqrt{2}}, \tan\theta = -1$ is

A. $n\pi + \frac{\pi}{4}, n \in Z$

B. $2n\pi + \frac{\pi}{4}, n \in Z$

C. $2n\pi - \frac{\pi}{4}, n \in Z$

D. $n\pi - \frac{\pi}{4}, n \in Z$

Answer: C

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59. The number of solution of $16^{\sin^2 x} + 16^{\cos^2 x} = 10 : 0 \leq x \leq 2\pi$, is

A. 8

B. 6

C. 4

D. 2

Answer: A

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60. The equation $\sin^6 x + \cos^6 x = k$ possesses solution if

A. $k \geq 1$

B. $\frac{1}{4} < k < 1$

C. $\frac{1}{4} \leq k < 1$

D. $\frac{1}{4} \leq k \leq 1$

Answer: D

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61. If $3^{\sin 2x + 2\cos^2 x} + 3^{1 - \sin 2x + 2\sin^2 x} = 28$, then tan x is

A. -1

B. -0.5

C. 1

D. 44198

Answer: A

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62. If $\sin^{-1} x - \cos^{-1} x = \frac{\pi}{6}$ then x is

A. 44198

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

C. -0.5

D. none of these

Answer: B

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63. The value of 'a' for which $ax^2 + \sin^{-1}(x^2 - 2x + 2) + \cos^{-1}(x^2 - 2x + 2) = 0$ has a real solution is

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

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

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

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

Answer: C

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64. The value of $\tan\left(\frac{\pi}{4}+\frac{1}{2}\cos^{-1}\left(\frac{2}{3}\right)\right)+\tan\left(\frac{\pi}{4}-\frac{1}{2}\cos^{-1}\left(\frac{2}{3}\right)\right)$ is

A. 0

B. 1

C. 44202

D. none of these

Answer: A

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65. The principal value of

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

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

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

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

D. none of these

Answer: B

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66. The value of $\tan\left(\frac{\pi}{4}+\frac{1}{2}\cos^{-1}\left(\frac{2}{3}\right)\right)+\tan\left(\frac{\pi}{4}-\frac{1}{2}\cos^{-1}\left(\frac{2}{3}\right)\right)$ is

A. 1

B. 2

C. 3

D. none of these

Answer: C

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67. The value of $\cos^{-1} x + \cos^{-1}\left\{\frac{x}{2} + \frac{\sqrt{3}}{2} \cdot \sqrt{1-x^2}\right\}, x > \frac{1}{2}$ is

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

B. $2\cos^{-1} x$

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

D. $-2\cos^{-1} x$

Answer: C

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68. Value of $\cos^{-1}\sqrt{\frac{1+\sqrt{1+x^2}}{2\sqrt{1+x^2}}}, x \geq 0$ is

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

B. $\frac{1}{2}\tan^{-1} x$

C. $\cot^{-1} x$

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

Answer: B

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69. The value of $\tan^2\left(\sec^{-1}2\right)+\cot^2\left(\cos ec^{-1}3\right)$ is

A. 13

B. 15

C. 11

D. none of these

Answer: C

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70. $2\cos^{-1}x=\sin^{-1}\left(2x\sqrt{1-x^2}\right)$ is valid for

A. $-1\leq x\leq 1$

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

C. $-1 \leq x \leq 1$

D. $\frac{1}{\sqrt{2}} \leq x \leq 1$

Answer: D

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71. If $0 \leq x \leq 3\pi, 0 \leq y \leq 3\pi$ and $\cos x \cdot \sin y = 1$, then the possible number of ordered pairs (x , y) is

A. 6

B. 12

C. 8

D. 15

Answer: A

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72. The number of solution of the equation $x^3 + x^2 + 4x + 2\sin x = 0, 0 \leq x \leq 2\pi$, is

A. zero

B. one

C. two

D. four

Answer: B

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73. The number of values of $x \in [0, 4\pi]$ satisfying $\left|\sqrt{3}\cos x - \sin x\right| \geq 2$, is

A. 2

B. 0

C. 4

D. 8

Answer: C

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74. The number of solution (s) of the equation $\sin^4 x + \cos^4 x = \sin x \cos x$ in $[0, 2\pi]$

A. 2

B. 3

C. 0

D. 4

Answer: D

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75. Number of solution of $\frac{\sin 4\theta}{\sin 2\theta} = \frac{y+1}{y-1}$ if $\frac{1}{3} < y < 3$

A. no solution

B. one solution

C. two solution

D. none of these

Answer: A

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76. The number of values of x satisfying the equation $\sqrt{\sin x} - \frac{1}{\sqrt{\sin x}} = \cos x$ is

A. 0

B. 1

C. 2

D. Infinite solutions.

Answer: D

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77. The equation $e^{\sin x} - e^{-\sin x} - 4 = 0$ has

A. 1

B. 2

C. 0

D. none of these

Answer: C

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78. The number of solution of 2 sin x = $5x^2 + 2x + 3$ is

A. 0

B. 2

C. 16

D. none of these

Answer: A

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79. In $0 < x < 2\pi$, the no of solution (s) of the equation $\sin^3 x + \cos^3 x = 0$ is

A. 0

B. 1

C. 2

D. 3

Answer: C

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80. The no. of solution(s) of the equation $\log_{\cos x} \sin x + \log_{\sin x} \cos x = 2$ in $[0, 2\pi]$ is

A. 0

B. 1

C. 2

D. infinite

Answer: B

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

A. ϕ

B. (-2,2)

C. R

D. none of these

Answer: A

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82. If $'\alpha'$ satisfies the equation $x^2 - x - 2 > 0$, then which of the following does exist ?

A. $\sin^{-1}\alpha$

B. $\sec^{-1}\alpha$

C. $\cos^{-1}\alpha$

D. none of these

Answer: B

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83. The general solution of the equation :

$$\sum_{r=1}^{n} \cos\left(r^2 x\right) \sin(rx) = \frac{1}{2} \text{ is}$$

A. $2m\pi + \frac{\pi}{6}, m \in I$

B. $\frac{4m+1}{n(n+1)} \frac{\pi}{2}, m \in I$

C. $\frac{4m-1}{n(n+1)} \frac{\pi}{2}, m \in I$

D. none of these

Answer: B

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84. The value of x between 0 and 2π which satisfy the equation $\sin x \sqrt{8\cos^2 x} = 1$ are in AP with common difference

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

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

C. $\frac{3\pi}{8}$

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

Answer: B

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85. The solution set of inequality $\log_{\frac{1}{2}} \sin^{-1} x > \log_{\frac{1}{2}} \cos^{-1} x$

A. (0 , 1)

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

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

D. [0 , 1)

Answer: C

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86. Evaluate

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

where {.} denotes the fractional part function

A. 44260

B. 14/15

C. 16/15

D. -1

Answer: B

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87. The number of real solutions of $\sin e^x \cdot \cos e^x = 2^{x-2} + 2^{-x-2}$ is

A. zero

B. one

C. two

D. infinite

Answer: A

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88. If $\theta \in [0, 5\pi]$ and $r \in R$ such that $2\sin\theta = r^4 - 2r^2 + 3$, then the number of pairs(r, θ) is

A. 8

B. 10

C. 6

D. none of these

Answer: C

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89. The integer k for which the equation 7cosx+5sinx=2k+1 has a solution is

A. 4

B. 10

C. 7

D. 12

Answer: C

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90. If 1/6 sin x , cos x , tan x are in G.P. then x is equal to

A. $n\pi \pm \frac{\pi}{3}, n \in Z$

B. $2n\pi \pm \frac{\pi}{3}, n \in Z$

C. $n\pi + (-1)^n \frac{\pi}{3}, n \in Z$

D. none of these

Answer:

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91. The equation $\sin x = x^2 + x + 1$ has

A. one solution

B. infinite solutions

C. more than one but finite solutions

D. no solution

Answer: D

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92. In a triangle ABC, angle A is greater than angle B. If the measures of angles A and B satisfy the equation $3\sin x - 4\sin^3 x - k = 0, 0 < k < 1$, then thje measure of angle C is

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

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

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

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

Answer: C

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93. If $k_1 \leq \sin^{-1} x + \cos^{-1} x + \tan^{-1} x \leq k_2$ then

A. $k_1 = 0, k_2 = \pi$

B. $k_1 = 0, k_2 = \frac{\pi}{2}$

C. $k_1 = \frac{\pi}{4}, k_2 = \frac{3\pi}{4}$

D. none of these

Answer: D

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94. If $\sin^{-1}\left(x - \frac{x^2}{2} + \frac{x^3}{4} - \ldots..\infty\right) + \cos^{-1}\left(x^2 - \frac{x^4}{2} + \frac{x^6}{4} - \ldots.....\infty\right) = 0 < |x| < \frac{\pi}{2}$, then x is

A. 44198

B. 1

C. -0.5

D. -1

Answer: B

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95. $\cot^{-1}\left(\frac{9}{2}\right) + \cot^{-1}\left(\frac{25}{2}\right) + \cot^{-1}\left(\frac{49}{2}\right) + \ldots.....$ to n terms is equal to

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

B. $\cot^{-1}\left(2\frac{n}{4n+5}\right)$

C. $\tan^{-1}\left(2\frac{n}{4n+3}\right)$

D. $\cot^{-1}\left(2\frac{n}{4n+3}\right)$

Answer: A

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96. The interval on which $\cos^{-1}x > \sin^{-1}x > \tan^{-1}x$ is

A. $\left(0, \frac{1}{\sqrt{2}}\right)$

B. [-1 , 1]

C. (0 , 1]

D. None of these

Answer: A

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97. If $\left(\cos^2 x + \frac{1}{\cos^2 x}\right)(1 + \tan^2 2y)(3 + \sin 3z) = 4$,then

A. x may be a multiple of π

B. x cannot be an even multiple of π

C. z can be a multiple of π

D. y can be a multiple of $\frac{\pi}{2}$

Answer: A::D

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98. $2\sin^2\left(\frac{\pi}{2}\cos^2 x\right) = 1 - \cos(\pi \sin 2x)$. if

A. $x = (2n+1)\frac{\pi}{2}, n \in I$

B. tan x = 1/2

C. tan x = -1/2

D. $x = \frac{n\pi}{2}, n \in I$

Answer: A::B::C

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99. $\sqrt{\cos 2x} + \sqrt{1 + \sin 2x} = 2\sqrt{\sin x + \cos x}$ if

A. sin x + cos x = 0

B. $x = 2n\pi, n \in I$

C. $x = n\pi - \frac{\pi}{4}, n \in I$

D. $x = 2n\pi \pm \cos^{-1}\left(-\frac{1}{5}\right), n \in I$

Answer: A::B::C

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100. If $\tan^{-1} y = 4\tan^{-1} x$, then y is infinite , if

A. $x^2 = 3 + 2\sqrt{2}$

B. $x^2 = 3 - 2\sqrt{2}$

C. $x^4 = 6x - 1$

D. $x^4 = 6x^2 + 1$

Answer: A::B

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101. The solution of the equation $\sin\left[2\cos^{-1}\left\{\cot\left(2\tan^{-1}x\right)\right\}\right] = 0$ are

A. ± 1

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

C. $-1 \pm \sqrt{2}$

D. 0

Answer: A::B::C

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102. If the numerical value of $\tan\left\{\cos^{-1}\left(\frac{4}{5}\right)+\tan^{-1}\left(\frac{2}{3}\right)\right\}$ is $\frac{a}{b}$, then

A. a + b = 23

B. a - b = 11

C. 3b = a + 1

D. 2a = 3b

Answer: A::B::C

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103. If $x>0$, then $\tan^{-1}x=$

A. $\cot^{-1}x$

B. $\cot^{-1}\left(\frac{1}{x}\right)$

C. $-\cot^{-1}x$

D. $\frac{\pi}{2}-\cot^{-1}x$

Answer: B::D

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104. α, β and γ are the angles gives by $\alpha = 2\tan^{-1}(\sqrt{2}-1), \beta = 3\sin^{-1}\left(\frac{1}{\sqrt{2}}\right) + \sin^{-1}\left(-\frac{1}{2}\right)$ and $\gamma = \cos^{-1}\left(\frac{1}{3}\right)$, then

A. $\alpha > \beta$

B. $\beta > \gamma$

C. $\gamma > \alpha$

D. none of these

Answer: B::C

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105. $x = n\pi - \tan^{-1} 3$ is a solution of the equation $12 \tan 2x + \frac{\sqrt{10}}{\cos x} + 1 = 0$ if

A. n is any integer

B. n is an even integer

C. n is a positive integer

D. n is an odd integer

Answer: D

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106. Let A be the area of an n-sided regular convex polygon of each side a, n being a positive integer.

Radius of the circumcircle of the polygon is

A. a cosec pi/n

B. a cosec (2pi)/n

C. $\frac{a}{2}\cos ec\frac{\pi}{n}$

D. $\frac{a}{2}\cos ec\frac{2\pi}{n}$

Answer: C

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107. Let A be the area of an n-sided regular convex polygon of each side a, n being a positive integer.

The radius of the circle that can be inscribed in the polygon is

A. $\frac{a}{2}\cot\left(\frac{\pi}{n}\right)$

B. $\frac{a}{2}\tan\left(\frac{\pi}{n}\right)$

C. $\frac{a}{2}\frac{\tan(2\pi)}{n}$

D. $\frac{a}{2}\frac{\cot(2\pi)}{n}$

Answer: A

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108. Let x , y , z be non - zero real numbers lying in the interval [-1,1] such that

$\cos^{-1} x + \cos^{-1} y + \cos^{-1} z = \pi$

The value of $x\sqrt{1-x^2} + y\sqrt{1-y^2} + z\sqrt{1-z^2}$ is equal to

A. $4\sqrt{1-x^2}\sqrt{1-y^2}\sqrt{1-z^2}$

B. $2\sqrt{1-x^2}\sqrt{1-y^2}\sqrt{1-z^2}$

C. $\sqrt{1-x^2}\sqrt{1-y^2}\sqrt{1-z^2}$

D. none of these

Answer: B

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109. Let x , y , z be non - zero real numbers lying in the interval [-1,1] such that

$\cos^{-1} x + \cos^{-1} y + \cos^{-1} z = \pi$

The value of $x^2 + y^2 + z^2$ is equal to

A. 1 + 2xyz

B. -1 + 2xyz

C. 1 - 2xyz

D. none of these

Answer: C

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110. Two balls are drawn at random with replacement from a box containing 10 black and 8 red balls. Find the probability that

(i) both balls are red.

(ii) first ball is black and second is red.

(iii) one of them is black and other is red.

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111. Match Column-I with Column- II

	Column-I		Column-II
(A)	Colemanite	(P)	$B_3N_3H_6$
(B)	Bauxite	(Q)	$Ca_2B_6O_{11}.5H_2O$
(C)	Borax	(R)	$Al_2O_3.2H_2O$
(D)	Inorganic Benzene	(S)	$Na_2B_4O_7.10H_2O$

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112. Distinguish between mitotic and meiotic cell divisions in animals on the basis of following feature: -

Number of cells produced

list the changes in sence organs and bones ocurred during the senescence phase of human development.

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113. Determine the smallest positive value of n for which x $=\frac{\pi}{n}$ is a solution of $\tan(x+100^\circ)=\tan(x+50^\circ)\tan x.\tan(x-50^\circ)$

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114. Find the number of real solutions of the equation $\sqrt{1+\cos 2x}=\sqrt{2}\cos^{-1}(\cos x)$, where $x \in \left[\frac{\pi}{2}, \pi\right]$

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115. Find the values of θ in the interval $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ satisfying the equation, $(1-\tan\theta)(1+\tan\theta)\sec^2\theta+2^{\tan^2\theta}=0$

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116. Find the number of solution of the equation $|\sin x|=\sin x+3$ if $x \in [0, 2\pi]$

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

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118. Find the solution set of x satisfying the in equation $\cos x \geq -\frac{1}{2}$

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119. Solve for x, y and z :

$\sin^2 x+\cos^2 y=2\sec^2 z$

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120. Show that $\tan^{-1}\left(\frac{\cos x}{1+\sin x}\right)=\frac{\pi}{4}-\frac{x}{2}$, where $x \in \left(-\frac{\pi}{2},\frac{\pi}{2}\right)$

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121. Determine all possible values of 'a' for which the equation $\cos^4 x - (a+2)\cos^2 x - (a+3) = 0$ will have real solution

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122. Find the coordinates of the points of intersection of the curves y = cos x , y = sin 3x : if $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$

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123. Solve : $3\tan^2\theta - 4\sqrt{3}\tan\theta + 3 = 0$, find the acute angle

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124. Solve for x : $8^{1+|\cos x|+|\cos^2 x|+|\cos^3 x|+\ldots\ldots\infty} = 4^3$, where `x in (-pi , pi)

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125. Solve the equation, $(\tan x)^{\cos^2 x} = (\cot x)^{\sin x}$

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126. Find the sum of infinite series :

$$S = \sin^{-1}\left(\frac{1}{\sqrt{2}}\right) + \sin^{-1}\left(\frac{\sqrt{2}-1}{\sqrt{6}}\right) + \sin^{-1}\left(\frac{\sqrt{3}-\sqrt{2}}{\sqrt{12}}\right) + ...\infty$$

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127. Find the number of solutions of (x , y),which satisfy $|y|$ = sin x and y = $\cos^{-1}(\cos x)$, where $-2\pi \leq x \leq 2\pi$

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128. If $0 < \theta < 2\pi$, then the intervals of values of θ for which $2\sin^2\theta - 5\sin\theta + 2 > 0$ is

A. $\left(0, \frac{\pi}{6}\right) \cup \left(\frac{5\pi}{6}, 2\pi\right)$

B. $\left(\frac{\pi}{8}, \frac{5\pi}{6}\right)$

C. $\left(0, \frac{\pi}{8}\right) \cup \left(\frac{\pi}{6}, \frac{5\pi}{6}\right)$

D. $\left(\frac{41\pi}{48}, \pi\right)$

Answer: A

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129. The no. of solution(s) of the equation $3(\sin x + \cos x) - 2\left(\sin^3 x + \cos^3 x\right) = 8$ is

A. 0

B. 1

C. 2

D. none of these

Answer: A

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130. The number of all possible ordered pairs $(x, y), x, y \in R$ satisfying the system of equations $x + y = \frac{2\pi}{3}, \cos x + \cos y = \frac{3}{2}$ is

A. 2

B. 1

C. infinite

D. none of these

Answer: A

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131. Find the general solution of the equation $\sin 3\alpha = 4\sin\alpha\sin(x+\alpha)\sin(x-\alpha)$, given $\sin\alpha \neq 0$.

A. $n\pi \pm \frac{\pi}{6}, n \in Z$

B. $n\pi \pm \frac{\pi}{3}, n \in Z$

C. $n\pi \pm \frac{\pi}{4}, n \in Z$

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

Answer: B

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132. The general solution of the equation $7\cos^2 x + \sin x \cos x - 3 = 0$ is given by

A. $n\pi + \frac{\pi}{2}, n \in I$

B. $n\pi - \frac{\pi}{4}, n \in I$

C. $n\pi + \tan^{-1}\left(\frac{4}{3}\right), n \in I$

D. $n\pi + \frac{3\pi}{4}, k\pi + \tan^{-1}\left(\frac{4}{3}\right), n, k \in I$

Answer: D

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133. The value of $\tan^{-1} 1 + \tan^{-1} 2 + \tan^{-1} 3$ is

A. 0

B. 1

C. π

D. $-\pi$

Answer: C

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134. If $\sin^{-1} x + \sin^{-1} y = \frac{2\pi}{3}$, then $\cos^{-1} x + \cos^{-1} y$=

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

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

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

D. π

Answer: B

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135. $\sin\cot^{-1}\cos\tan^{-1}2=$

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

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

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

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

Answer: B

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

A. 0

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

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

D. π

Answer: B

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137. If $\sin^{-1}(\sin 5)>x^2-4x$, then find number of all possible integer values of x

A. 1

B. 2

C. 3

D. 4

Answer: C

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138. If $\tan\left(\frac{\alpha\pi}{4}\right) = \cot\left(\frac{\beta\pi}{4}\right)$ then

A. $\alpha + \beta = 0$

B. $\alpha + \beta = 2n$

C. $\alpha + \beta = 2n + 1$

D. $\alpha + \beta = 2(2n + 1)$, $\forall n \in Z$ is an integer

Answer: D

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139. The general solution of the equation $\sin^{100} x - \cos^{100} x = 1$

A. $2n\pi + \frac{\pi}{3}, n \in I$

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

C. $n\pi + \frac{\pi}{4}, n \in I$

D. $2n\pi - \frac{\pi}{3}, n \in I$

Answer: B

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140. The number of roots of the equation $x + 2\tan x = \frac{\pi}{2}$ in the interval $[0, 2\pi]$ is

A. 1

B. 2

C. 3

D. infinite

Answer: C

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141. The number of solutions of the equation $\sin\left(\frac{\pi x}{2\sqrt{3}}\right) = x^2 - 2\sqrt{3}x + 4$ is

A. 0

B. 2

C. 1

D. > 2

Answer: C

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142. One root of the equation cosx-x+1/2=0 lies in the interval

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

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

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

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

Answer: A

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143. The nunmber of solution of `2cos^2(x/2)sin^2x=x^2+1/x^2, 0 le x le pi/2, is

A. 0

B. 1

C. infinite

D. none of these

Answer: A

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144. The general solution of $\sin^2\theta\sec\theta+\sqrt{3}\tan\theta=0$ is

A. $\theta=n\pi+(-1)^{n+1}\frac{\pi}{3},\theta=n\pi,n\in I$

B. $\theta=n\pi,n\in I$

C. $\theta=\frac{n\pi}{2},n\in I$

D. $\theta=n\pi+(-1)^{n+1}\frac{\pi}{3},n\in I$

Answer: B

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145. The number of solutions of the equation $\sin^3 x\cos x+\sin^2 x\cos^2 x+\sin x\cos^3 x+1=0$ in the interval $[0,2\pi]$ is

A. 0

B. 2

C. 3

D. infinite

Answer: A

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146. Number of values of $x \in R$ which satisfy the equation $\cos\left(\pi\sqrt{x-4}\right)\cos\left(\pi\sqrt{x}\right) = 1$ is

A. 1

B. 0

C. 2

D. none of these

Answer: A

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147. The number of real values of θ lying in the interval $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ and satisfying the equation $\left(\sqrt{3}\right)^{\sec^2\theta} = \tan^4\theta + 2\tan^2\theta$ is

A. 1

B. 2

C. 3

D. none of these

Answer: B

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148. 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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149. The value of x for which $\sin\left(\cot^{-1}(1+x)\right) = \cos\left(\tan^{-1}x\right)$ is

A. 44198

B. 1

C. 0

D. -0.5

Answer: D

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150. The sum of the infinite series $\cot^{-1} 2 + \cot^{-1} 8 + \cot^{-1} 18 + \cot^{-1} 32 + \ldots\ldots$ is equal to

A. π

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

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

D. none of these

Answer: C

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151. If $\sin^{-1}\sqrt{(x^2+2x+1)} + \sec^{-1}\sqrt{(x^2+2x+1)} = \frac{\pi}{2}, \quad x \neq 0,$ then the value of $2\sec^{-1}\left(\frac{x}{2}\right) + \sin^{-1}\left(\frac{x}{2}\right)$ is equal to

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

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

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

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

Answer: B

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152. The number of real solutions of the equation $2\sin^{-1}\sqrt{(x^2-x+1)}+\cos^{-1}\sqrt{(x^2-x)}=\frac{3\pi}{2}$

A. 1

B. 2

C. 3

D. infinite

Answer: B

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153. The most general solution of the equation $\tan^{-1}\left(\frac{1}{2}\sec x\right) + \cot^{-1}(2\cos x) = \frac{\pi}{3}$ is

A. $n\pi + \frac{\pi}{6}, n \in Z$

B. $n\pi \pm \frac{\pi}{3}, n \in Z$

C. $2n\pi \pm \frac{\pi}{3}, n \in Z$

D. none of these

Answer: C

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154. The greatest of $\tan 1, \tan^{-1} 1, \sin^{-1} 1, \sin 1, \cos 1$, is

A. $\sin^{-1} 1$

B. tan1

C. $\tan^{-1} 1$

D. none of these

Answer: A

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155. If $0 < x < 1$, then $\sqrt{1+x^2}\left[\left\{x\cos\left(\cos^{-1}x\right)+\sin\left(\cot^{-1}x\right)\right\}^2-1\right]^{1/2}$ =

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

B. x

C. $x\sqrt{1+x^2}$

D. $\sqrt{1+x^2}$

Answer: C

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156. The range of values of a for which the equation $\sin^2 x - \sqrt{3}\sin x \cos x = 2a - 1$ has real solution(s).

A. $1 \leq a \leq 2$

B. $\frac{1}{4} < a < \frac{5}{4}$

C. $\frac{1}{4} \leq a \leq \frac{5}{4}$

D. none of these

Answer: C

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157. The number of points inside or on the circle $x^2 + y^2 = 4$ satisfying $\tan^4 x + \cot^4 x + 1 = 3\sin^2 y$ is

A. one

B. two

C. four

D. infinite

Answer: C

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158. The least difference between the roots in the first quadrant in $\left[0, \frac{\pi}{2}\right]$ of the equation sin7x+cos2x=-2 is

A. 0

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

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

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

Answer: C

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159. The general solution of the equation sinx-3sin2x+sin3x=cosx-3cos2x+cos3x is

A. $n\pi + \frac{\pi}{8}, n \in I$

B. $\frac{n\pi}{2} + \frac{\pi}{8}, n \in I$

C. $(-1)^n\left(\frac{n\pi}{2}\right) + \frac{\pi}{8}, n \in I$

D. $2n\pi + \cos^{-1}\left(\frac{3}{2}\right), n \in I$

Answer: B

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160. General solution of θ satisfying the equation $\tan^2\theta + \sec 2\theta = 1$ is

A. $2n\pi, n \in I$

B. $n\pi \pm \frac{\pi}{4}, n \in I$

C. $n\pi \pm \frac{\pi}{3}, n \in I$

D. none of these

Answer: C

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161. The solution of the inequality $\log_{1/2} \sin x > \log_{1/2} \cos x$ in $[0, 2\pi]$ is

A. $x \in \left(0, \frac{\pi}{2}\right)$

B. $x \in \left(0, \frac{\pi}{8}\right)$

C. $x \in \left(0, \frac{\pi}{4}\right)$

D. none of these

Answer: C

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162. If $\left[\cot^{-1} x\right] + \left[\cos^{-1} x\right] = 0$, where x is a non-negative real number and [ ] denotes the greatest integer function, then complete set of value of x is

A. (cos1, 1)

B. (cot1, 1)

C. (cos1, cot1)

D. none of these

Answer: B

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163. The set of values of x satisfying $\left|\sin^{-1} x\right| < \left|\cos^{-1} x\right|$, is

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

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

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

D. none of these

Answer: A

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164. The number of real solutions of $\tan(5\pi\cos\alpha) = \cot(5\pi\sin\alpha), \alpha \in (0, 2\pi)$, is

A. 7

B. 14

C. 21

D. 28

Answer: B

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165. If $x + y = \frac{\pi}{4}$ and tanx+tany=1, then

A. $x = \frac{\pi}{2} - n\pi$ and $y = n\pi, n \in Z$

B. $x = \frac{\pi}{4} - n\pi$ and $y = n\pi, n \in Z$

C. $x = \frac{\pi}{4} - n\pi$ and $y = 2n\pi, n \in Z$

D. none of these

Answer: B

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166. The number of solution of the equation $2\tan x + x = \frac{12\pi}{5}$ in the interval $[0, 2\pi]$ is

A. 1

B. 2

C. 3

D. infinite

Answer: B

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167. The value of $\cos^{-1}(\cos 5)$ is

A. 5

B. $5 - 2\pi$

C. $2\pi - 5$

D. none of these

Answer: C

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168. If x_1, x_2, x_3, x_4 are roots of the equation $x^4 - x^3 \sin 2\beta + x^2 \cos 2\beta - x \cos \beta - \sin \beta = 0$, then $\sum_{i=1}^{4} \tan^{-1} x_i$ is equal to

A. β

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

C. $\pi - \beta$

D. $-\beta$

Answer: B

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169. If x+1/x=2, the principle value ot $\sin^{-1} x$ is

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

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

C. π

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

Answer: B

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170. If $\cos^{-1} x + \cos^{-1} y + \cos^{-1} z = 3\pi$, then xy+yz+zx is equal to

A. -3

B. 0

C. 3

D. -1

Answer: C

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171. If 1-tanx/1+tanx=tany and $x - y = \frac{\pi}{6}$, then x, y are respectively

A. $\frac{5\pi}{24}, \frac{\pi}{24}$

B. $-\frac{7\pi}{24}, -\frac{11\pi}{24}$

C. $-\frac{115\pi}{24}, -\frac{119\pi}{24}$

D. none of these

Answer: A::B::C

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172. If $\cos^4 x + 4\sin^4 x = 1$, then general value of x equals to

A. $n\pi, n \in I$

B. $n\pi \pm \sin^{-1}\sqrt{\frac{2}{5}}, n \in I$

C. $\frac{2n\pi}{3}, n \in I$

D. $2n\pi \pm \frac{\pi}{4}, n \in I$

Answer: A::B

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173. The equation sinx=[1+sinx]+[1-cosx] has [where [.] is greatest integer function]

A. no solution in $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

B. no solution in $\left[\frac{\pi}{2}, \pi\right]$

C. no solution in $\left[\pi, \frac{3\pi}{2}\right]$

D. no solution for $x \in -\left[\frac{\pi}{2}, \frac{3\pi}{2}\right]$

Answer: A::B::C::D

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174. The equation $8x^3 - 6x + \sqrt{3} = 0$ is satisfied by

A. $\cos\left(\frac{5\pi}{18}\right)$

B. $\cos\left(\frac{7\pi}{18}\right)$

C. $\cos\left(\frac{11\pi}{18}\right)$

D. $\cos\left(\frac{17\pi}{18}\right)$

Answer: A::B::D

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175. Number of values of θ which satisfy $\sin^2\theta - 2\sin^2\theta - 1 = 0$ is

A. 0

B. infinite

C. equal to the number of values of θ satisfying

$$8\sec^2\theta - 6\sec\theta + 1 = 0$$

D. none of these

Answer: A::C

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176. Which of the following is true?

A. $\sin^2\left(2\tan^{-1}\sqrt{\frac{1+x}{1-x}}\right) = 1 - x^2,\ -1 \leq x < 1$

B. $\sin\left(2\tan^{-1}\sqrt{\frac{1+x}{1-x}}\right) = 1 - x^2,\ -1 \leq x < 1$

C. $\sin^2\left(2\tan^{-1}\sqrt{\frac{1+x}{1-x}}\right) = \frac{1+x}{2},\ -1 \leq x < 1$

D. none of these

Answer: A::B::C

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177. $\theta = \tan^{-1}(2\tan^2\theta) - \tan^{-1}\left\{\left(\frac{1}{3}\right)\tan\theta\right\}$, if

A. $\tan\theta = -2$

B. $\tan\theta = 0$

C. $\tan\theta = 1$

D. $\tan\theta = 2$

Answer: A::B::C

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178. $\sec\left(\cos ec^{-1}x\right)$ is equal to

A. $\cos ec\left(\sec^{-1}x\right)$ for all $x \in R$

B. $\cos ec\left(\sec^{-1}x\right)$ for $|x| > 1$

C. $\frac{|x|}{\sqrt{x^2-1}}$ for $|x|>1$

D. cotx

Answer: B::C

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179. The solution of the equation $\sin\left[2\cos^{-1}\left\{\cot\left(2\tan^{-1}x\right)\right\}\right]=0$ are

A. ± 1

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

C. $-1\pm\sqrt{2}$

D. none of these

Answer: A::B::C

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180. Let $f(x) = e^{\cos^{-1}\sin\left(x+\frac{\pi}{3}\right)}$, then

A. $f\left(\frac{8\pi}{9}\right) = e^{\frac{5\pi}{18}}$

B. $f\left(\frac{8\pi}{9}\right) = e^{\frac{13\pi}{18}}$

C. $f\left(-\frac{7\pi}{4}\right) = e^{\frac{\pi}{12}}$

D. $f\left(-\frac{7\pi}{4}\right) = e^{\frac{11\pi}{12}}$

Answer: B::C

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181. The greatest and least values of $\left(\sin^{-1}x\right)^3 + \left(\cos^{-1}x\right)^3$ are

A. $\frac{\pi^3}{32}$

B. $-\frac{\pi^3}{8}$

C. $\frac{7\pi^3}{8}$

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

Answer: A::C

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182. α is a root of the equation $(2\sin x - \cos x)(1 + \cos x) = \sin^2 x$

β is a root of the equation $3\cos^2 x - 10\cos x + 3 = 0$ and γ is a root of the equation 1-sin2x=cosx-sinx where $0 \leq \alpha, \beta, \gamma \leq \pi/2$

Answer the following question on above passage:

$\sin(\alpha - \beta)$

A. 1

B. 0

C. $\frac{1 - 2\sqrt{6}}{6}$

D. $\frac{\sqrt{3} - 2\sqrt{2}}{6}$

Answer: C

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183. α is a root of the equation $(2\sin x - \cos x)(1 + \cos x) = \sin^2 x$

β is a root of the equation $3\cos^2 x - 10\cos x + 3 = 0$ and γ is a root of the equation 1-sin2x=cosx-sinx where $0 \leq \alpha, \beta, \gamma \leq \pi/2$

Answer the following question on above passage:

$\sin\alpha + \sin\beta + \sin\gamma$ can be equal

A. $\frac{14 + 3\sqrt{2}}{6\sqrt{2}}$

B. 44322

C. $\frac{3 + 4\sqrt{2}}{6}$

D. $\frac{1 + \sqrt{2}}{6}$

Answer: A

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

$a = \cos\tan^{-1}\sin\cot^{-1}x$

$b = \cos(2\cos^{-1} x + \sin^{-1} x)$

Answer the following question on above passage:

The value of x for which f(x)=0 is

A. -0.5

B. 0

C. 44198

D. 1

Answer: A

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185. $f(x) = \sin\{\cot^{-1}(x+1)\} - \cos\left(\tan^{-1}x\right)$

$a = \cos\tan^{-1}\sin\cot^{-1}x$

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

Answer the following question on above passage:

The value of x for which f(x)=0 is

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

B. $\frac{5}{9}$

C. 44325

D. None of these

Answer: C

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186.

$$\sum_{r=1}^{n} \tan^{-1}\left(\frac{x_r - x_{r-1}}{1 + x_{r-1}x_r}\right) = \sum_{r=1}^{n} \left(\tan^{-1} x_r - \tan^{-1} x_{r-1}\right) = \tan^{-1} x_n -$$

Answer the following question on above passage:

The sum to infinite terms of the series $\cot^{-1}\left(2^2 + \frac{1}{2}\right) + \cot^{-1}\left(2^3 + \frac{1}{2^2}\right) + \cot^{-1}\left(2^4 + \frac{1}{2^3}\right) +$ ..... is

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

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

C. π

D. none of these

Answer: A

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187.

$$\sum_{r=1}^{n} \tan^{-1}\left(\frac{x_r - x_{r-1}}{1 + x_{r-1}x_r}\right) = \sum_{r=1}^{n} \left(\tan^{-1} x_r - \tan^{-1} x_{r-1}\right) = \tan^{-1} x_n -$$

Answer the following question on above passage:

The sum to infinite terms of the series $\cot^{-1}\left(2^2 + \frac{1}{2}\right) + \cot^{-1}\left(2^3 + \frac{1}{2^2}\right) + \cot^{-1}\left(2^4 + \frac{1}{2^3}\right) + \ldots\ldots$ is

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

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

C. $\cot^{-1} 2$

D. $-\cot^{-1} 2$

Answer: C

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188. Arrange the followig radicals in increasing order of -I effect. 1,Br,Cl,F

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189. Match Column-I with Column-II

	Column-I		Column-II
(A)	Sheet silicate	(P)	$(SiO_3)_n^{2n-}$
(B)	Pyroxene chain	(Q)	$(Si_4O_{11})_n^{6n-}$
(C)	Pyrosilicate	(R)	3 – corner oxygen atom are shared
(D)	Amphibole chain	(S)	Non-plannar

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190. The number of values of θ in the interval $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ such that $\theta \neq \frac{n\pi}{5}$ for $n \neq 0, \pm 1, \pm 2$ and $\tan\theta = \cot 5\theta$ as well as $\sin 2\theta = \cos 4\theta$ is

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191. If $a, b, c, d \in (0, \pi)$ and $b + c \neq \frac{\pi}{2}$ such that 2cosa+6cosb+7cosc+9cosd=0 and 2sina-6sinb+7sinc-9sind=0, then the value of $\frac{3\cos(a+d)}{\cos(b+c)}$ is

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192. The value of $\frac{1}{2}\left\{\sec^2\left(\tan^{-1}2\right) + \cos ec^2\left(\cot^{-1}3\right) + \tan^2\left(\frac{\pi}{3}\right)\right\}$ is equal to

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193. If $x > 0$, then the value of $\sin\left\{\tan^{-1}\left(\frac{1-x^2}{2x}\right) + \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)\right\}$ is equal to

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194. If $\cos^{-1}\left(\frac{x}{2}\right) + \sin^{-1}\left(\frac{x}{4}\right) = \frac{\pi}{6}$, then the value of x is

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195. Solve: $\cos^4\left(\frac{x}{5}\right) + \sin^2\left(\frac{x}{5}\right) = 1$

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196. Solve: $\left|\cot\left(2x - \frac{\pi}{2}\right)\right| = \frac{1}{\cos^2 2x} - 1$

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197. Solve: $2\cos^2 x + 5\cos x + 2 \geq 0$

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198. Find the points of intersection of the curves y=cosx and y=sin3x if $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$

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199. Solve for x and y : $2^{\frac{1}{\cos^2 x}} \sqrt{y^2 - y + 1/2} \leq 1$

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200. Find the value of $\tan^{-1}\left(\frac{1}{2}\tan 2A\right) + \tan^{-1}(\cot A) + \tan^{-1}\left(\cot^3 A\right)$, for $0 < A < \pi/4$

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201. Solve: $\sin^{-1} x + \sin^{-1}(1 - x) = \cos^{-1} x$

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202. Prove that:

$$\tan^{-1}\left(\frac{c_1x-y}{c_1y+x}\right)+\tan^{-1}\left(\frac{c_2-c_1}{1+c_2c_1}\right)+\tan^{-1}\left(\frac{c_3-c_2}{1+c_3c_2}\right)+$$
$$\ldots\ldots+\tan^{-1}\left(\frac{c_n-c_{n-1}}{1+c_nc_{n-1}}\right)+\tan^{-1}\left(\frac{1}{c_n}\right)=\tan^{-1}\left(\frac{x}{y}\right)$$

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203. The value of 'a' for which $ax^2+\sin^{-1}\left(x^2-2x+2\right)+\cos^{-1}\left(x^2-2x+2\right)=0$ has a real solution is

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204. The number of distinct solutions of the equation $\frac{5}{4}\cos^2 2x+\cos^4 x+\sin^4 x+\cos^6 x+\sin^6 x=2$ in the interval $[0,2\pi]$ is

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205. If $\alpha = 3\sin^{-1}\left(\frac{6}{11}\right)$ and $\beta = 3\cos^{-1}\left(\frac{4}{9}\right)$, where the inverse trigonometric functions take only the principal values, then the correct option(s) is(are)

A. $\cos\beta > 0$

B. $\sin\beta < 0$

C. $\cos(\alpha+\beta) > 0$

D. $\cos\alpha < 0$

Answer: B::C::D

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206. 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: D

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207. The number of real solutions of the equation $(\sin x - x)\left(\cos x - x^2\right) = 0$ is

A. 1

B. 2

C. 3

D. 4

Answer: C

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208. The values of $2\cot^{-1}\left(\frac{1}{2}\right) - \cot^{-1}\left(\frac{4}{3}\right)$ is

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

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

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

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

Answer: D

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209. The number of distinct roots of $\begin{vmatrix} \sin x & \cos x & \cos x \\ \cos x & \sin x & \cos x \\ \cos x & \cos x & \sin x \end{vmatrix} = 0$ in the interval $-\frac{\pi}{4} \leq x \leq \frac{\pi}{4}$ is

A. 0(zero)

B. 2

C. 1

D. > 2

Answer: C

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210. The trigonometric equation $\sin^{-1} x = 2\sin^{-1} 2a$ has a real solution if

A. $|a| \leq \frac{1}{\sqrt{2}}$

B. $\frac{1}{2\sqrt{2}} < |a| < \frac{1}{\sqrt{2}}$

C. $|a| > \frac{1}{2\sqrt{2}}$

D. $|a| \leq \frac{1}{2\sqrt{2}}$

Answer: D

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211. Let α, β be two distinct roots of $a\cos\theta + b\sin\theta = c$, where a, b and c are three real constants and $\theta \in$ [0, 2pi]. $Then$alpha+beta` is also a root of the same equation if

A. a+b=c

B. b+c=a

C. c+a=b

D. c=a

Answer: D

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212. If $\sin^{-1}\left(\frac{x}{13}\right) + \cos ec^{-1}\left(\frac{13}{12}\right) = \frac{\pi}{2}$, then the value of x is

A. 5

B. 4

C. 12

D. 11

Answer: A

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213. The value of $\cot\left(\sum_{n=1}^{23}\cot^{-1}\left(1+\sum_{k=1}^{n}2k\right)\right)$ is

A. 23/25

B. 25/23

C. 23/24

D. 24/23

Answer: B

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214. If $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z = \frac{3\pi}{2}$, then the value of $x^9 + y^9 + z^9 - \frac{1}{x^9 y^9 z^9}$ is equal to

A. 0

B. 1

C. 2

D. 3

Answer: C

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215. Number of solutions of the equation $\tan x + \sec x = 2\cos x, x \in [0, \pi]$ is

A. 0

B. 1

C. 2

D. 3

Answer: C

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216. The solutions set of inequation $\cos^{-1} x < \sin^{-1} x$ is

A. [-1, 1]

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

C. [0, 1]

D. $\left(\frac{1}{\sqrt{2}}, 1\right]$

Answer: D

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