MATHS

BOOKS - ML KHANNA

TRIGONOMETRICAL EQUATIONS

Problem Set 1 Multiple Choice Questions

1. Solve $\sin^2 x - \cos x = \frac{1}{4}, 0 \leq x \leq 2\pi$

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

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

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

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

Answer: B

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2. If $4\cos^2\theta + \sqrt{3} = 2\left[\sqrt{3}+1\right]\cos\theta,$ then θ =

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

B. $2n\pi \pm \frac{\pi}{6}$

C. $2n\pi \pm \frac{\pi}{4}$

D. $2n\pi$

Answer: A::B

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3. If $\cos 2\theta = \left(\sqrt{2}+1\right)\left(\cos\theta - \frac{1}{\sqrt{2}}\right)$, then the value of θ is

A. $2n\pi$

B. $2n\pi \pm \frac{\pi}{4}$

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

D. none

Answer: B::C

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4. $2\sin^2 a - 3\sin a - 2 = 0$ then $a =$

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

B. $n\pi + (-1)^n \pi/6$

C. $n\pi + (-1)^n \frac{7\pi}{6}$

D. $n\pi - (-1)^n \frac{\pi}{6}$

Answer: D

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5. If $2\sin^2\theta - 5\sin\theta + 2 > 0, \theta \in (0, 2\pi), \quad \text{then}\theta \in$:

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

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

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

D. $\left(\frac{\pi}{80}, \frac{\pi}{6}\right)$

Answer:

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6. Solve $\tan^2\theta - 2\sin\theta = 0$.

A. $n\pi$

B. $n\pi + (-1)^n \frac{\pi}{6}$

C. $n\pi - (-1)^n \frac{\pi}{6}$

D. $n\pi + \frac{\pi}{3}$

Answer: A::B

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7. If $\sin^2 x - 2\cos x + \frac{1}{4} = 0$, then x has value

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

B. $2n\pi \pm \frac{\pi}{4}$

C. $2n\pi \pm \frac{\pi}{6}$

D. none

Answer: A

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8. The number of solutions of the equation $\tan x + \sec x = 2\cos x$ lying in the interval $[0, 2\pi]$ is

A. 0

B. 1

C. 2

D. 3

Answer: C

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9. The number of solutions of the pair of equations $2s \in^2 \theta - \cos 2\theta = 0$ $2\cos^2\theta - 3\sin\theta = 0$ in the interval $[0, 2\pi]$ is 0 (b) 1 (c) 2 (d) 4

A. 0

B. 1

C. 2

D. 4

Answer: C

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10. The general solution of $\sin x - 3\sin 2x + \sin 3x = \cos x - 3\cos 2x + \cos 3x$ is.

A. $n\pi + \pi/8$

B. $n\pi/2 + \pi/8$

C. $(-1)^n(n\pi/2) + (\pi/8)$

D. $2n\pi + \cos^{-1}(3/2)$

Answer: B

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11. The general solution of the equation $\tan^2 x + 2\sqrt{3}\tan x = 1$is given by

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

B. $\left(n + \frac{1}{2}\right)\pi$

C. $(6n+1)\frac{\pi}{12}$

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

Answer: C

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12. If $\tan^2 x + \left(1 - \sqrt{3}\right)\tan x - \sqrt{3} = 0$ then `x=

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

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

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

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

Answer: A::D

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13. If $3\cos^2\theta - 2\sqrt{3}\sin\theta.\cos\theta - 3\sin^2\theta = 0$, then θ =

A. $\frac{n\pi}{2} + \frac{\pi}{6}$

B. $\frac{n\pi}{2} - \frac{\pi}{6}$

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

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

Answer: A

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14. If α and β are $+$ ive acute angle satisfying the equation $3\sin^2\alpha + 2\sin^2\beta = 1$ and $3\sin 2\alpha - 2\sin 2\beta = 0$, then $\alpha + 2\beta =$

A. 0

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

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

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

Answer: D

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15. Solve $\tan^2\theta + \cot^2\theta = 2$.

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

B. $n\pi - \frac{\pi}{6}$

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

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

Answer: C::D

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16. If $\tan\theta + \cot\theta = 2$ then the value of θ is.

यदि $\tan\theta + \cot\theta = 2$ तो θ का कान क्या होगा?

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

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

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

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

Answer: A

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17. Solve $\tan 5\theta = \cot 2\theta$.

A. $\frac{n\pi}{7} + \frac{\pi}{14}$

B. $\frac{n\pi}{7} + \frac{\pi}{5}$

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

D. $\frac{n\pi}{7} + \frac{\pi}{3}$

Answer: A

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18. The set of values of x for which $\frac{\tan 3x - \tan 2x}{1 + \tan 3x \tan 2x} = 1$, is

A. ϕ

B. $\pi/4$

C. $n\pi + \frac{\pi}{4}, n = 1, 2, 3\ldots$

D. $2n\pi + \frac{\pi}{4}, n = 1, 2, 3, \ldots$

Answer: C

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19. Solve $\sec\theta - 1 = \left(\sqrt{2} - 1\right)\tan\theta$.

A. $2n\pi$

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

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

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

Answer: A::B

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20. The general solution of equation

$\sin^2\theta\sec\theta+\sqrt{3}\tan\theta=0$ is

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

B. $\theta=n\pi$

C. $\theta=n\pi+(-1)^{n+1}\frac{\pi}{6}$

D. $\theta=\frac{n\pi}{2}$

Answer: B

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21. If $\sin 5x+\sin 3x+\sin x=0$, then the value of x other than zero between $0\le x\le\pi/2$ is

A. $\pi/6$

B. $\pi/12$

C. $\pi/3$

D. $\pi/4$

Answer: C

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22. If $K = \cos 20^\circ$ and $\cos x = 2K^2 - 1$, then the possible value of x between 0° and 360° are

A. -140°

B. 40° and 140°

C. 50° and 130°

D. 40° and 320°

Answer: D

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23. Number of values of x in the interval $[0, 3\pi]$ satisfying the equation $2\sin^2 x + 5\sin x - 3 = 0$ is

A. 6

B. 1

C. 2

D. 4

Answer: D

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24. $\alpha, \beta, \gamma and \delta$ are the smallest positive angle in ascending order of magnitude which have their sines equal to the positive quantity k. The value of $4\frac{\sin\alpha}{2} + 3\frac{\sin\beta}{2} + 2\frac{\sin\gamma}{2} + \frac{\sin\delta}{2}$ is equal to

A. $2\sqrt{1-\lambda}$

B. $2\sqrt{1+\lambda}$

C. $2\sqrt{\lambda}$

D. $2\sqrt{\lambda+2}$

Answer: B

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25. The number of points of intersection of $2y = 1$ and $y = \cos x$ in $-\pi/2 \leq x < \pi/2$ is

A. 1

B. 2

C. 3

D. 4

Answer: B

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26. $\cot\theta = \sin 2\theta, \theta \neq n\pi, n \in Z$, if$\theta$ equals

A. $\pi/4, \pi/2$

B. $\pi/4, \pi/3$

C. $\pi/4$ only

D. $\pi/2$ only

Answer: A

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27. If $2\sin^2\theta = 3\cos\theta, 0 \leq \theta \leq 2\pi, \theta =$

A. $\pi/6, 5\pi/6$

B. $\pi/3, 2\pi/3$

C. $\pi/3, 5\pi/3$

D. $\pi/2, \pi$

Answer: C

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28. If $4\cos\theta - 3\sec\theta = 2\tan\theta$, then θ is equal to

A. $n\pi + (-1)^n \pi/10$

B. $n\pi + (-1)^n \pi/6$

C. $n\pi - (-1)^n 3\pi/10$

D. $n\pi$

Answer: A::C

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29. If $4\cos^2 x \sin x - 2\sin^2 x = 3\sin x, \quad \text{then} \quad x=$

A. $n\pi$

B. $n\pi + (-1)^n \frac{\pi}{10}$

C. $n\pi + (-1)^n \frac{3\pi}{10}$

D. $n\pi - (-1)^n \frac{3\pi}{10}$

Answer: A::B::D

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30. $2\sin^2 x + \sin^2 2x = 2, \ -\pi < x < \pi$, then x =

A. $\pm\pi/2$

B. $\pm\pi/4$

C. $\pm 3\pi/4$

D. none

Answer: A::B::C

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31. $\sin^2\theta = 1/4$, then θ=

A. $n\pi \pm \pi/6$

B. $n\pi + \pi/3$

C. $n\pi \pm \pi/6$

D. $n\pi$

Answer: A

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32. If $r\sin\theta = 3, r = 4(1+\sin\theta), 0 \leq \theta \leq 2\pi$ then θ =

A. $\pi/6, \pi/3$

B. $\pi/6, 5\pi/6$

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

D. $\pi/2, \pi$

Answer: B

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33. The equation

$$2\sin\frac{x}{2}\cos^2 x - 2\sin\frac{x}{2}\sin^2 x = \cos^2 x - \sin^2 x$$

has a root for which

A. $\sin 2x = 1$

B. $\sin 2x = -1$

C. $\cos x = \frac{1}{2}$

D. $\cos 2x = -\frac{1}{2}$

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

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34. The solution of the equation

$\cos^2\theta + \sin\theta + 1 = 0$, lies in the interval

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

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

C. $\left(\frac{3\pi}{4}, \frac{5\pi}{4}\right)$

D. $\left(\frac{5\pi}{4}, \frac{7\pi}{4}\right)$

Answer: D

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35. If α is a root of $25\cos^2\theta + 5\cos\theta - 12 = 0$, $\frac{\pi}{2} < \alpha < \pi$, then $\sin 2\alpha$ is equal to

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

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

C. $\frac{13}{18}$

D. $-\frac{13}{18}$

Answer: B

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36. Solve $5\cos 2\theta + 2\cos^2\frac{\theta}{2} + 1 = 0, \ -\pi < \theta < \pi.$

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

B. $\frac{\pi}{3}, \cos^{-1}\left(\frac{3}{5}\right)$

C. $\cos^{-1}\left(\frac{3}{5}\right)$

D. $\pm\frac{\pi}{3}, \pi - \cos^{-1}\left(\frac{3}{5}\right)$

Answer: D

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37. The real roots of the equation $\cos^7 x + \sin^4 x = 1$ in the interval $(-\pi, \pi)$ are _____, _____, and _____

A. $-\pi/2, 0$

B. $-\pi/2, 0, \pi/2$

C. $\pi/2, 0$

D. $0, \pi/4, , \pi/2$

Answer: B

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38. Solve $\cos^{50} x - \sin^{50} x = 1$

A. $n\pi$

B. $2n\pi$

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

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

Answer: A

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39. The solution of $4\sin^4 x + \cos^4 x = 1$ is

A. $n\pi$

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

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

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

Answer: A::B

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40. The number of values of x in the interval $[0, 5\pi]$ satisfying the equation $3\sin^2 x - 7\sin x + 2 = 0$ is

A. 0

B. 5

C. 6

D. 10

Answer: C

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41. The number of solutions of the equation $2^{\cos x} = |\sin x| \text{in}[-2\pi, 2\pi]$

A. 1

B. 2

C. 3

D. 4

Answer: D

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42. The set of all x in $(-\pi, \pi)$ satisfying $|4\sin x - 1| < \sqrt{5}$ is given by

A. $\left(-\frac{9\pi}{10}, \frac{7\pi}{10}\right)$

B. $\left(\frac{\pi}{10}, \frac{3\pi}{10}\right)$

C. $\left(\frac{\pi}{10}, -\frac{3\pi}{10}\right)$

D. none of these

Answer: A

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43. Number of solutions of the equation

$|\cot x| = \cot x + \csc x$, where $0 \leq x \leq 2\pi$ is

A. 1

B. 2

C. 3

D. 4

Answer: B

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44. Find the number of solutions of $|\cos x| = \sin x, 0 \leq x \leq 4\pi$

A. 2

B. 4

C. 8

D. none

Answer: B

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45. If F(x) = sinx+cosx, then the most general solution of $F(x) = \left[F\left(\frac{\pi}{10}\right)\right]$ are: (where [x] is the greatest integer less than or equal to 'x')

A. $2n\pi$

B. $n\pi$

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

D. $2n\pi, 2n\pi + \frac{\pi}{2}$

Answer: D

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46. If $\sin^6\theta = 1 + \cos^4 3\theta$ then the most general value of $\theta$is

A. $\left(2n + \frac{1}{2}\right)\pi$

B. $(2n+1)\frac{\pi}{6}$

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

D. none of these

Answer: A

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47. The number of solution s of the equation $\tan x \tan 4x = 1 \quad \text{for} 0 < x < \pi$ is

A. 1

B. 2

C. 5

D. 8

Answer: C

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48. The number of solutions of $12\cos^3 x - 7\cos^2 x + 4\cos x = 9$ is

A. 0

B. 2

C. infinite

D. none

Answer: C

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49. If $\sin\theta, 1, \cos 2\theta$ are in G.P. , then θ =

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

B. $n\pi + (-1)^{n-1} \frac{\pi}{2}$

C. $2n\pi$

D. none

Answer: B

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50. If $\frac{1}{6}\sin\theta, \cos\theta, \tan\theta$ are in G.P. then θ=

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

B. $2n\pi \pm \frac{\pi}{6}$

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

D. $n\pi + \frac{\pi}{3}$

Answer: A

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51. The general value (s) of θ for which $\cos 2\theta, \frac{1}{2}$ and $\sin 2\theta$ are A. P. is/are

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

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

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

D. $n\pi$

Answer: A

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52. The sum of all the solution of the equation $\cos\theta\cos\left(\frac{\pi}{3}+\theta\right)\cos\left(\frac{\pi}{3}-\theta\right) = \frac{1}{4}\theta \in [0, 6\pi]$ 15π (b) 30π (c) $\frac{100\pi}{3}$ (d) none of these

A. 15π

B. 30π

C. $\frac{100\pi}{3}$

D. none

Answer: B

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

A. $\pi/4$

B. $\pi/2$

C. π

D. none

Answer: A

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54. Total number of solutions of $16^{\sin^2 x} + 16^{\cos^2 x} = 10 \ \text{in} \ [0, 2\pi]$ are

A. 2

B. 4

C. 6

D. 8

Answer: D

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

A. 10

B. 8

C. 6

D. none

Answer: C

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

A. 0

B. 2

C. 4

D. 8

Answer: C

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57. The solution of the equation

$9\cos^{12} x + \cos^2 2x + 1 = 6\cos^6 x \cos 2x. + 6\cos^6 x - 2\cos 2x$

are given by x =

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

B. $n\pi + \cos^{-1}\sqrt{\frac{2}{3}}$

C. $n\pi - \cos^{-1}\sqrt{\frac{2}{3}}$

D. none

Answer: A::B::C

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58. The smallest +ive x such that $\tan(x + 20^\circ) = \tan(x - 10^\circ)\tan x \tan(x + 10^\circ)$ is

A. 30°

B. 45°

C. 15°

D. 20°

Answer: C

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59. If $\Sigma n^2 = \lambda \Sigma n$, then $\sin^{-1}\left(\frac{9\lambda^2 - 4n^2}{6\lambda + 4n}\right)$ =

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

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

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

D. π

Answer: A

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Problem Set 1 True Or False

1. Number of solution of the equation

$\sin 2x + \cos 2x + \sin x + \cos x + 1 = 0$

In the interval, $(0, \pi/2)$ is

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Problem Set 1 Fill In The Blanks

1. If $\sin^2 x + \cos^2 y = 2\sec^2 z$, then x, y , z are .....

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Problem Set 2 Multipice Choice Questions

1. The general solution of the trigonometic equation $\sin x + \cos x = 1$ is given by

A. $x = 2n\pi$

B. $x = 2n\pi + \frac{1}{2}\pi$

C. $x = n\pi + (-1)^n(\pi/4) - \pi/4$

D. none

Answer: C

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2. The equation $\cos x + \sin x = 2$ has

A. only one solution

B. two solution

C. no solutions

D. infinite number of solutions

Answer: C

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3. The number of solutions of the equation $2\left(\sin^3 x + \cos^3 x\right) - 3(\sin x + \cos x) + 8 = 0$ in the interval $(0, 4\pi)$ is

A. 0

B. 1

C. 2

D. 4

Answer: A

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4. Maximum value of $\sin\left(x+\frac{\pi}{6}\right)+\cos\left(x+\frac{\pi}{6}\right)$ is

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

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

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

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

Answer: A

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5. The equaltion $a\sin x+b\cos x=c,$ where $|c|>\sqrt{a^2+b^2}$ has

A. one solution

B. two solution

C. no solutions

D. infinite number of solutions

Answer: C

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6. The number of integral value of k for which the equation $7\cos x + 5\sin x = 2k + 1$ has a solution is

A. 4

B. 8

C. 10

D. 12

Answer: B

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7. If $r\sin\theta = \sqrt{3}, r + 4\sin\theta = 2\left(\sqrt{3}+1\right), 0 \leq \theta \leq 2\pi$, then θ=

A. 30°

B. 60°

C. 120°

D. 150°

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

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8. If $r > 0, -\pi \leq \theta \leq \pi$ and r, θ satisfy $r\sin\theta = 3$ and $r = 4(1+\sin\theta)$, then find the possible solutions of the pair (r, θ)

A. 0

B. 2

C. 4

D. infinite

Answer: B

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9. Minimum value of $2^{\sin x} + 2^{\cos x}$ is

A. 1

B. $2^{1-1/\sqrt{2}}$

C. $2^{-1/\sqrt{2}}$

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

Answer: B

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10. If $\tan a\theta - \tan b\theta = 0$, then prove that the values of θ forms an A.P.

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: A

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11. If $\cos p\theta + \cos q\theta = 0$, then prove that the different values of θ are in A.P. with common difference $2\pi/(p \pm q)$.

A. $\frac{\pi}{p+q}$

B. $\frac{\pi}{p-q}$

C. $\frac{2\pi}{p \pm q}$

D. $\frac{3\pi}{p \pm q}$

Answer: C

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12. Find the most general value of θ which satisfies the equation $\sin\theta = -\frac{1}{2}$ and $\tan\theta = \frac{1}{\sqrt{3}}$

A. $2n\pi + \pi/6$

B. $2n\pi + 11\pi/6$

C. $2n\pi + 7\pi/6$

D. $2n\pi + \pi/4$

Answer: C

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13. The most general value of θ which satisfy both the equation $\cos\theta = -\frac{1}{\sqrt{2}}$ and $\tan\theta = 1$, is

A. $2n\pi + \pi/4$

B. $2n\pi + 5\pi/4$

C. $2n\pi + \pi/3$

D. $2n\pi + \pi/6$

Answer: B

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14. Find the most general value of θ which satisfies the equation $\sin\theta = -\frac{1}{2}$ and $\tan\theta = \frac{1}{\sqrt{3}}$

A. $2n\pi + 7\pi/6$

B. $2n\pi + \pi/4$

C. $2n\pi + \pi/3$

D. $2n\pi + \pi/2$

Answer: A

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15. Find the general values of θ which satisfies the equation $\tan\theta = -1$ and $\cos\theta = \frac{1}{\sqrt{2}}$

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

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

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

D. none

Answer: C

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16. The most general value of θ which satisfies both the equation in General solution of $(1 + 2\sin\theta)^2 + \left(\sqrt{3}\tan\theta - 1\right)^2 = 0$ is

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

B. $2n\pi + \frac{11\pi}{6}$

C. $2n\pi + \frac{7\pi}{6}$

D. none

Answer: C

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17. If $\cos 3x + \sin\left(2x - \frac{7\pi}{6}\right) = -2$, then x is equal to $(k \in Z)$

A. $\frac{\pi}{3}(6m - 1)$

B. $\frac{\pi}{3}(6m + 1)$

C. $\frac{\pi}{3}(2m + 1)$

D. none

Answer: D

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18. The most general value of θ which satisfies both the equation in If $\sin\theta = 1/2$ and $\cos\theta = \sqrt{3}/2$, then the general value of θ which satisfies both the equation is

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

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

C. $2n\pi + \frac{\pi}{6}$

D. none

Answer: C

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19. The most general value of θ which satisfies both the equation in If $\tan\theta = \sqrt{3}$ and $\cos ec\theta = -\frac{2}{\sqrt{3}}$, the most general value of θ satisfying both equation is

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

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

C. $2n\pi + \frac{4\pi}{3}$

D. none

Answer: C

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20. General solution of the equation

$\tan\theta + \tan 4\theta + \tan 7\theta = \tan\theta \cdot \tan 4\theta \cdot \tan 7\theta \text{is}\theta =$

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

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

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

D. $n\pi$

Answer: C

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21. If $\sin 3\alpha = 4\sin\alpha\sin(x+\alpha)\sin(x-\alpha)$, then

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

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

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

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

Answer: B

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22. If $\tan 3\theta = \cot\theta$, then general value of θ is :

A. $(2n+1)\frac{\pi}{8}$

B. $(2n+1)\frac{\pi}{4}$

C. $(n+2)\frac{\pi}{3}$

D. $n\pi$

Answer: A

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23. If $\tan 5\theta = \cot 3\theta$, then θ =

A. $(2n+1)\frac{\pi}{4}$

B. $(2n+1)\frac{\pi}{8}$

C. $(2n+1)\frac{\pi}{16}$

D. none

Answer: C

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24. If $\tan 2\theta \tan\theta = 1$, then $\theta =$

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

B. $(6n \pm 1)\frac{\pi}{6}$

C. $(4n \pm 1)\frac{\pi}{6}$

D. $2n\pi \pm \frac{\pi}{6}$

Answer: B

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25. If $\sqrt{3}\sin\theta - \cos\theta = \sqrt{2}$, then θ=

A. $2n\pi - \frac{\pi}{3} \pm \frac{3\pi}{4}$

B. $n\pi + (-1)^n \frac{\pi}{4} + \frac{\pi}{6}$

C. $2n\pi + \frac{\pi}{3} \pm \frac{3\pi}{4}$

D. $n\pi + (-1)^n \frac{\pi}{4} - \frac{\pi}{6}$

Answer: A::B

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26. If $\tan\theta + \sec\theta = \sqrt{3}, 0 < \theta \leq \pi$, then $\theta =$

A. $\pi/3$

B. $2\pi/3$

C. $\pi/6$

D. $5\pi/8$

Answer: A

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27. If $\tan\theta + \sec\theta = \sqrt{3}, 0 < \theta \leq \pi$, then $\theta =$

A. $\pi/3$

B. $2\pi/3$

C. $\pi/6$

D. $5\pi/8$

Answer: C

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28. If $\sin x + \cos x = 1$, then x =

A. $n\pi$

B. $2n\pi$

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

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

Answer: B::C

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29. If $\sin^3 x + \sin x \cos x + \cos^3 x = 1$, then x =

A. $2n\pi$

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

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

D. $n\pi$

Answer: A::B

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30. If $\csc x = 1 + \cot x$, then x =

A. $n\pi$

B. $2n\pi$

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

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

Answer: C

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31. If $\sqrt{3}\cos\theta + \sin\theta = 1$ for $-2\pi < \theta < 2\pi$, then $\theta =$

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

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

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

D. $\frac{11\pi}{6}$

Answer: A:B::C:D

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32. General solution of the equation

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

A. $2n\pi \pm \frac{\pi}{4} + \frac{\pi}{12}$

B. $n\pi + (-1)^n \frac{\pi}{4} + \frac{\pi}{12}$

C. $2n\pi \pm \frac{\pi}{4} - \frac{\pi}{12}$

D. $n\pi + (-1)^n \frac{\pi}{4} - \frac{5\pi}{12}$

Answer: A::D

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33. If $\max\{5\sin\theta + 3\sin(\theta - \alpha)\} = 7$, then the set of possible value of α is $(\theta \in R)$

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

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

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

D. none

Answer: A

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34. If $\tan\left(\frac{\pi}{2}\sin\theta\right) = \cot\left(\frac{\pi}{2}\cos\theta\right)$, then $\sin\theta + \cos\theta$ is equal to

A. $2n - 1$

B. $2n + 1$

C. $2n$

D. n

Answer: B

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35. If $: \sin\left(\frac{\pi}{4} \cdot \cot\theta\right) = \cos\left(\frac{\pi}{4} \cdot \tan\theta\right)$, then $: \theta =$

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

B. $2n\pi \pm \frac{\pi}{4}$

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

D. $2n\pi \pm \frac{\pi}{6}$

Answer: A

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36. If $\tan\theta + \tan\left(\theta + \frac{\pi}{3}\right) + \tan\left(\theta + \frac{2\pi}{3}\right) = 3$, then $\theta =$

A. $(2n+1)\frac{\pi}{12}$

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

C. $(4n+1)\frac{\pi}{12}$

D. none

Answer: C

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37. Solve $\cot(x/2) - \cos ec(x/2) = \cot x$.

A. $\left(2n\pi \pm \frac{\pi}{3}\right.$

B. $4n\pi \pm \frac{2\pi}{3}$

C. $2n\pi$

D. none

Answer: B

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38. If $\cot\theta - \tan\theta = \sec\theta$, then $\theta =$

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

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

C. $n\pi + (-1)^n \frac{\pi}{6}$

D. $n\pi$

Answer: C

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39. Solve $\tan\theta + \tan 2\theta + \sqrt{3}\tan\theta\tan 2\theta = \sqrt{3}$.

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

B. $\frac{n\pi}{2} + \frac{\pi}{6}$

C. $\frac{n\pi}{3} + \frac{\pi}{9}$

D. none

Answer: C

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40. Solve $\sin^3\theta\cos\theta - \cos^3\theta\sin\theta = \frac{1}{4}$.

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

B. $\frac{n\pi}{2} + \frac{3\pi}{8}$

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

D. none

Answer: B

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41. In a right angled triangle the hypotenuse is $2\sqrt{2}$ times the length of perpendicular drawn from the opposite vertex, on the hypertenuse, then the other two angles, are

A. $\pi/3, \pi/6$

B. $\pi/4, \pi/4$

C. $\pi/8, 3\pi/8$

D. $\pi/12, 5\pi/12$

Answer: C

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

A. $\pi/3$

B. $\pi/2$

C. $2\pi/3$

D. $5\pi/6$

Answer: C

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43. The values of θ satisfying $\sin 7\theta = \sin 4\theta - \sin\theta$ and $0 < \theta < \frac{\pi}{2}$ are

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

B. $\frac{\pi}{3}, \frac{\pi}{9}$

C. $\frac{\pi}{6}, \frac{\pi}{9}$

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

Answer: A

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44. If $\sin\theta + \sin 3\theta + \sin 5\theta = 0, 0 \leq \theta \leq \pi/2$, then $\theta =$

A. 0

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

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

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

Answer: A::C

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45. If $\sin 6x = \sin 4x - \sin 2x, then x =$

A. $n\pi$

B. $\left(n + \frac{1}{2}\right)\frac{\pi}{2}$

C. $\frac{n\pi}{3} + \frac{\pi}{6}$

D. none

Answer: D

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46. Solve $\cos\theta + \cos 7\theta + \cos 3\theta + \cos 5\theta = 0$,

A. $n\pi$

B. $n\pi/2$

C. $n\pi/4$

D. $n\pi/8$

Answer: D

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47. If $\sin 7\theta + \sin 4\theta + \sin\theta = 0, 0 \leq \theta \leq \pi/2$ then θ=

A. 0

B. 40°

C. 45°

D. 80°

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

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48. If $\tan(\pi\cos\theta) = \cot(\pi\sin\theta),$ then the value(s) of $\cos\left(\theta - \frac{\pi}{4}\right)$, is (are)

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

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

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

D. none of these

Answer: C

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49. Solve $\sec 4\theta - \sec 2\theta = 2$.

A. $n\pi$

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

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

D. $\left(n + \frac{1}{2}\right)\frac{\pi}{5}$

Answer: C::D

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50. If: $\tan\theta + \tan 2\theta = \tan 3\theta$, then: θ=

A. $n\pi$

B. $n\pi/2$

C. $n\pi/3$

D. $n\pi/4$

Answer: A::C

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51. General solution of the equation

$4\cot 2\theta = \cot^2\theta - \tan^2\theta$ is θ =

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

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

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

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

Answer: A::B

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52. If $3\tan(\theta - 15^\circ) = -\tan(\theta + 15^\circ)$, then θ=

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

B. $n\pi + \frac{\pi}{8}$

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

D. none

Answer: D

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53. If $\tan 3\theta + \tan\theta = 2\tan 2\theta$, then θ is equal to $(n \in Z)$

A. $n\pi$

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

C. $2n\pi$

D. none

Answer: A

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54. Solve $\sin x + \sin y = \sin(x + y) and |x| + |y| = 1$

A. 2

B. 4

C. 6

D. infinite

Answer: C

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55. If $\frac{1 - \tan x}{1 + \tan x} = \tan y \text{ and } x - y = \frac{\pi}{6}$, 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

Answer: A

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56. If $\sin A = \sin B, \cos A = \cos B,$ then the value of A im terms of B, is

A. $n\pi + B$

B. $n\pi + (-1)^n B$

C. $2n\pi + B$

D. $2n\pi - B$

Answer: C

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Problem Set 2 True And False

1. If $\tan p\theta = \cot q\theta$, then $\theta = \dfrac{2n+1}{2(p+q)}\pi$

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2. The solution set of equation $\sin 2x + \cos 2x = -1$is given by $\left[(-1)^{n+1} - 1\right](\pi/8) + \dfrac{1}{2}n\pi, n \in I$

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Problem Set 2 Fill In The Blanks

1. If $\tan mx + \cot nx = 0$, then$x$ = ...

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2. If $\sin 2x + \sin 4x = 2\sin 3x,$ then x = ...

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3. If $\sin x + \sqrt{3}\cos x = \sqrt{2}$, then x = ...

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4. Find the range of y such that the equation in x , $y + \cos x = \sin x$ has a real solutions . For $y = 1$, find x such that $0 < x < 2\pi$

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5. If : $\sin x + \cos x = \sin 2x + \cos 2x$, where$0 < x \leq \frac{\pi}{2}$, then x :=

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6. The number of values of x which satify the equation $\cos^2 x = 1$ and $x^2 \leq 20$ are _____

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7. If $2^{\sin x + \cos y} = 1, 16^{\sin^2 x + \cos^2 y} = 4$, then

$x = \ldots\ldots\ldots\ldots\ldots, y = \ldots\ldots\ldots\ldots\ldots$

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

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Problem Set 3 Multiple Choice Questions

1. If $1 + \sin\theta + \sin^2\theta + \ldots$ to $\infty = 4 + 2\sqrt{3}, 0 < \theta < \pi, \theta \neq \pi/2,$ then

A. $\theta = \pi/6$

B. $\theta = \pi/3$

C. $\theta = \pi/3$ or $\pi/6$

D. $\theta = \pi/3$ or $2\pi/3$

Answer: D

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2. Find the values of $x \in (-\pi, \pi)$ which satisfy the equation $8^{1+|\cos x|+|\cos^2 x|+|\cos^{2x}|+} = 4^3$

A. $\pi/3$

B. $2\pi/3$

C. $-\pi/3$

D. $-2\pi/3$

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

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3. Find the most general solution of $2^{1|\cos x|+\cos^2 x+|\cos x|^{3+\infty}}=4$

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

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

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

D. none

Answer: A::B

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4. If $e^{\{(\sin^2 x+\sin^4 x+\sin^6 x+\ldots\infty)\log_e 2\}}$ satisfies the equation $x^2-9x+8=0$, then value of $\frac{\cos x}{\cos x+\sin x}, 0\le x\le\frac{\pi}{2}$ is

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

B. $\frac{1}{2}(\sqrt{3}-1)$

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

D. 0

Answer: B

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5. If the the equation $a\sin x+\cos 2x=2a-7$ possesses a solution, then find the values of a.

A. $a>6$

B. $2\le a\le 6$

C. $a > 2$

D. none

Answer: B

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6. The value of θ lying between $\theta = 0$ and $\theta = \frac{\pi}{2}$ and satisfying the equation

$$\begin{bmatrix} 1+\cos^2\theta & \sin^2\theta & 4\sin 4\theta \\ \cos^2\theta & 1+\sin^2\theta & 4\sin 4\theta \\ \cos^2\theta & \sin^2\theta & 1+4\sin 4\theta \end{bmatrix} = 0 \text{ is}$$

A. $11\frac{\pi}{24}$

B. $7\frac{\pi}{24}$

C. $5\frac{\pi}{24}$

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

Answer: A::B

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7. The number of all 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) 3 (D) Infinite

A. zero

B. one

C. three

D. infinite

Answer: D

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8. The number of all possible 5-tuples $(a_1, a_2, a_3, a_4, a_5)$ such that $a_1 + a_2 \sin x + a_3 \cos x + a_4 \sin 2x + a_5 \cos 2x = 0$ hold for all x is

A. 0

B. 1

C. 2

D. infinite

Answer: B

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9. The equation $(\cos p - 1)x^2 + \cos p \cdot x + \sin p = 0$ where x is a variable, has real roots. Then the interval of possible values of p is

A. $(0, 2\pi)$

B. $(-\pi, 0)$

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

D. $(0, \pi)$

Answer: D

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10. If A,B,C the angles of a triangle be in A.P. and satisfy the relations

$$\sin(2A+B)=\sin(C-A)=-\sin(B+2C)=\frac{1}{2},$$

then the values of A,B,C are respectively

A. $45^\circ, 75^\circ, 60^\circ$

B. $75^\circ, 60^\circ, 45^\circ$

C. $60^\circ, 60^\circ, 60^\circ$

D. $45^\circ, 60^\circ, 75^\circ$

Answer: D

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11. The number of solution(s) of

$$2\cos^2\left(\frac{x}{2}\right)\sin^2 x = x^2+\frac{1}{x^2}, 0\le x\le \pi/2,$$ is/ are-

A. 0

B. 1

C. infinite

D. none of these

Answer: A

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12. The solution of the equation $e^{\sin x} - e^{-\sin x} - 4 = 0$ is :

A. 1

B. 2

C. 4

D. 0

Answer: D

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13. One value of θ which satisfies the equation $\sin^4\theta - 2\sin^2\theta - 1$ lies between 0 and 2π.

A. 0

B. 1

C. 2

D. 4

Answer: A

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

A. 1

B. 2

C. 3

D. 0

Answer: D

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15. The number of solutionsof the equation

$1 + \sin x \sin^2 \frac{x}{2} = 0$ in $[-\pi, \pi]$ is

A. zero

B. 1

C. 2

D. 3

Answer: A

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16. If $0 \leq x \leq \pi$ and $81^{\sin^2 x} + 81^{\cos^2 x} = 30$, then x is equal to

A. $\pi/6$

B. $\pi/3$

C. $5\pi/6$

D. $2\pi/3$

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

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17. If $3^{\sin 2x + 2\cos^2 x} + 3^{1 - \sin 2x + 2\sin^2 x} = 28$, then the values of x are given by

A. $\tan x = 1$

B. $\tan x = -1$

C. $\cos x = 0$

D. none of these

Answer: B::C

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18. Solve $2^{\cos 2x} + 1 = 3.2^{-\sin^2 x}$

A. $n\pi$

B. $\left(n + \frac{1}{2}\right)\pi$

C. $\left(n - \frac{1}{2}\right)\pi$

D. none

Answer: A::B::C

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19. The equation $\sin^4 x + \cos^4 x + \sin 2x + k = 0$ must have real solutions if :

A. $-\frac{1}{2} \leq \alpha \leq \frac{1}{2}$

B. $-3 \leq \alpha \leq 1$

C. $-\frac{3}{2} \leq \alpha \leq \frac{1}{2}$

D. $-1 \leq \alpha \leq 1$

Answer: C

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20. The equation $\sin^4 x - 2\cos^2 x + a^2 = 0$ is solveble if

A. $-\sqrt{3} \leq a \leq \sqrt{3}$

B. $-\sqrt{2} \leq a \leq \sqrt{2}$

C. $-1 \leq a \leq 1$

D. none of these

Answer: B

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21. Solve: $\log_{\cos x} \sin x + \log_{\sin x} \cos x = 2.$

A. $\pi/2$

B. $\pi/3$

C. $\pi/4$

D. $\pi/6$

Answer: C

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22. If $\log_{\cos x} \tan x + \log_{\sin x} \cot x = 0$, then the most general value of x is

A. $2n\pi - \frac{3\pi}{4}$

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

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

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

Answer: C

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23. If

$|\cos x|^{\sin^2 x - \frac{3}{2}\sin x + \frac{1}{2}} = 1,$

then possible values of x are

A. $n\pi \text{ or } n\pi + (-1)^n \pi/6, n \in I$

B. $n\pi \text{ or } 2n\pi + \pi/2 \text{ or } n\pi + (-1)^n \pi/6, n \in I$

C. $n\pi + (-1)^n \pi/6, n \in I.$

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

Answer: C::D

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

A. $\pi/4$

B. $-\pi/4$

C. $\pi/3$

D. $-\pi/3$

Answer: C::D

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25. The value of x between 0 and2π which satisfy the equation $\sin x.\sqrt{8\cos^2 x} = 1$ are in A.P. The common difference of the A.P is

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

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

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

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

Answer: B

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Problem Set 3 True And False

1. Show that $x = 0$ is the only solution satisfying the equation $1 + \sin^2 ax = \cos x$, where a is irrational.

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Problem Set 3 Fill In The Blanks

1. The set of all x in the interval $[0, \pi]$ for which $2\sin^2 x - 3\sin x + 1 \geq 0$ is

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2. The solution set of the inequation

$\log_{1/2}\sin x > \log_{1/2}\cos x \text{in}[0, 2\pi]$, is

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Miscellaneous Exercise Matching Entries

1.

List-A	List-B
(a) If $3\cos^2\theta - 2\sqrt{3}\sin\theta\cos\theta - 3\sin^2\theta = 0$, then $\theta = \ldots$	1. $\frac{\pi}{6}, \frac{5\pi}{6}$
(b) If $r\sin\theta = 3, r = 4(1+\sin\theta)$ where $0 \le \theta \le 2\pi$, then $\theta = \ldots$	2. $2n\pi + \frac{7\pi}{6}$
(c) If $\sin\theta = -\frac{1}{2}$ and $\tan\theta = \frac{1}{\sqrt{3}}$, then the general value of θ which satisfies both the equations is ...	3. $\frac{\pi}{6}, \frac{\pi}{3}, \frac{5\pi}{6}, \frac{2\pi}{3}$
(d) If $0 \le x \le \pi$ and $81^{\sin^2 x} + 81^{\cos^2 x} = 30$, then x is ...	4. $\frac{n\pi}{2} + \frac{\pi}{6}$

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2. A root of the equation on L.H.S. satisfies the relation in R.H.S. Match the entries on L.H.S. and R.H.S.

Column-I	Column-II
(a) $2\cos 2x - \sin 2x = 2\sin^2 x$	(p) $\tan x = -1$
(b) $2\sin^2\left(\frac{\pi}{2}\cos^2 x\right) = 1 - \cos(\pi \sin 2x)$	(q) $\tan x = \frac{1}{2}$
(c) $6\sec^2 x - 11\tan x - 2 = 0$	(r) $\tan x = 4/3$
(d) $7\cos^2 x + \sin x \cos x - 3 = 0$	(s) $\cos 2x = 3/5$

A root of the equation $(0 < \theta < \pi)$ is given by

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Self Assessment Test

1. If $\sin\theta = \sin\alpha$, then

A. $\theta = n\pi \pm \alpha$

B. $\theta = 2n\pi + (-1)^n\alpha$

C. $\theta = n\pi + (-1)^n\alpha$

D. $\theta = (2n+1)\pi + \alpha$

Answer: C

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2. The general solution of the trigonometic equation $\sin x + \cos x = 1$ is given by

A. $x = 2n\pi$

B. $x = 2n\pi + \frac{1}{2}\pi$

C. $x = n\pi + (-1)^n(\pi/4) - \pi/4$

D. None of these

Answer: C

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

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

B. $\theta = n\pi$

C. $\theta = n\pi + (-1)^{n+1}\frac{\pi}{6}$

D. $\theta = \frac{n\pi}{2}$

Answer: B

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4. The solution set of $(2\cos x - 1)(3 + 2\cos x) = 0$ in the interval $0 \leq x \leq 2\pi$, is

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

B. $\{\pi/3, 5\pi/3\}$

C. $\{\pi/3, 5\pi/3, \cos^{-1}.(-3/2)\}$

D. none of these

Answer: B

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5. If $\tan a\theta - \tan b\theta = 0$, then prove that the values of θ forms an A.P.

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: A

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6. If $\cos p\theta + \cos q\theta = 0$, then prove that the different values of θ are in A.P. with common difference $2\pi / (p \pm q)$.

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: A

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7. If $\sin 5x + \sin 3x + \sin x = 0$, then the value of x other than zero between $0 \leq x \leq \pi/2$ is

A. $\pi/6$

B. $\pi/12$

C. $\pi/3$

D. $\pi/4$

Answer: C

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8. The maximum value of $\sin\left(x + \frac{x}{6}\right) + \cos\left(x + \frac{\pi}{6}\right)$ int eh interval $\left(0, \frac{\pi}{2}\right)$ is attained when x =

A. $\pi/12$

B. $\pi/6$

C. $\pi/3$

D. $\pi/2$

Answer: A

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9. If

$x = X\cos\theta - Y\sin\theta, y = X\sin\theta + Y\cos\theta$ and $x^2 + 4xy + y^2 = AX^2 + B$

, then

A. $\theta = \dfrac{\pi}{6}$

B. $\theta = \pi/4$

C. $A = 3$

D. $B = 1$

Answer: A::C::D

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10. The general solution of the equation $\tan^2 x + 2\sqrt{3}\tan x = 1$is given by

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

B. $\left(n + \frac{1}{2}\right)\pi$

C. $(6n+1)\frac{\pi}{12}$

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

Answer: C

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11. Let P= $\{\theta : \sin\theta - \cos\theta = \sqrt{2}\cos\theta\}$ and Q = $\{\theta : \sin\theta + \cos\theta = \sqrt{2}\sin\theta\}$ be two sets. Then

A. $P \subset Q$ and $Q - P \neq \phi$

B. $Q \subset P$

C. $Pcencel \subset Q$

D. $P = Q$

Answer: D

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12. For $0 < \theta < \frac{\pi}{2}$, the solutions of $\sigma_{m-1}^{6} \text{cosec}\left(\theta + \frac{(m-1)\pi}{4}\right) \text{ cosec } \left(\theta + \frac{m\pi}{4}\right) = 4\sqrt{2}$ is (are):

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

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

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

D. $\frac{5\pi}{12}$

Answer: A::C::D

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13. The positive integer value of $n > 3$ satisfying the equation $\frac{1}{\sin\left(\frac{\pi}{n}\right)} = \frac{1}{\sin\left(\frac{2\pi}{n}\right)} + \frac{1}{\sin\left(\frac{3\pi}{n}\right)}$ is

A. 7

B. 3

C. $\frac{1}{7}$

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

Answer: A

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14. The number of all possible values of θ,where $0 < \theta < \pi$ for which the system of equations

$(y + z)\cos 3\theta = (xyz)\sin 3\theta$

$x \sin 3\theta = \frac{2\cos 3\theta}{y} + \frac{2\sin 3\theta}{z}$

and $(xyz)\sin 3\theta = (y+2z)\cos 3\theta + y\sin 3\theta$ have a solution (x_0, y_0, z_0) with $y_0 z_0 \neq 0$ is

A. 3

B. 2

C. 1

D. 4

Answer: A

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15. 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 $n = 0, \pm 1, \pm 2$ and $\tan\theta = \cot 5\theta$ as well as $\sin 2\theta = \cos 4\theta$, is

A. 3

B. 4

C. $\frac{1}{4}$

D. 0

Answer: A

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16. If $\sqrt{3}\cos\theta + \sin\theta = \sqrt{2}$ then general value of θ is

A. $n\pi + (-1)^4 \frac{\pi}{4}$

B. $(-1)^n \frac{\pi}{4}$

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

D. $n\pi + (-1)^n \frac{\pi}{4} - \frac{\pi}{3}$

Answer: D

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17. The general solution of $\sin x - \cos x = \sqrt{2}$, for any integer n is

A. $n\pi$

B. $2n\pi + \frac{3\pi}{4}$

C. $2n\pi$

D. $(2n+1)\pi$

Answer: B

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18. If $\tan 2\theta = 1$, then the general value of θ is

A. $(4n+1)\frac{\pi}{8}$

B. $\left(n + \frac{1}{2}\right)\pi$

C. $n\pi + \frac{1}{2}$

D. none of these

Answer: A

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19. The equation $a\cos x - \cos 2x = 2a - 7$ passesses a solution if

A. $k < 3$

B. $k < 2$

C. $k > 3$

D. $2 \leq k \leq 6$

Answer: D

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20. General value of θ obtained from the equation $\cos 2\theta = \sin \alpha$ is

A. $2\theta + \alpha = \frac{\pi}{2}$

B. $\theta = 2n\pi \pm \left(\frac{\pi}{2} - \alpha\right)$

C. $\theta = \frac{n\pi + (-1)^n \alpha}{2}$

D. $\theta = n\pi \pm \left(\frac{\pi}{4} - \frac{\alpha}{2}\right)$

Answer: D

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21. If $\sin 6\theta + \sin 4\theta + \sin 2\theta = 0$

Then the general value of θ is

A. $\frac{n\pi}{4}$ or $n\pi \pm \frac{\pi}{3}$

B. $\frac{n\pi}{4}$ or $n\pi \pm \frac{\pi}{6}$

C. $\frac{n\pi}{4}$ or $2n\pi \pm \frac{\pi}{6}$

D. none of these

Answer: A

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22. General solution of $\tan 5\theta$ =

A. $\theta = \frac{n\pi}{7} + \frac{\pi}{14}$

B. $\theta = \frac{n\pi}{7} + \frac{\pi}{5}$

C. $\theta = \frac{n\pi}{7}$

D. none of these

Answer: A

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23. The equation $\sin x \cos x = 2$ has:

A. one solution

B. two solutions

C. infinite solutions

D. no solution

Answer: D

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24. The value of θ lying between 0 and $\frac{\pi}{2}$ and satisfying the equation

$$\begin{vmatrix} 1+\sin^2\theta & \cos^2\theta & 4\sin 4\theta \\ \sin^2\theta & 1+\cos^2\theta & 4\sin 4\theta \\ \sin^2\theta & \cos^2\theta & 1+4\sin 4\theta \end{vmatrix} = 0 \text{ is}$$

A. $\frac{7\pi}{24}$ or $\frac{11\pi}{24}$

B. $\frac{5\pi}{24}$

C. $\frac{3\pi}{24}$

D. none of these

Answer: A

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25. The number of values of x in the interval $[0, 5\pi]$ satisfying the equation $3\sin^2 x - 7\sin x + 2 = 0$ is

A. 0

B. 4

C. 6

D. 10

Answer: C

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26. Find the most general value of θ satisfyingn the equation $\tan\theta = -1$ and $\cos\theta = \frac{1}{\sqrt{2}}$.

A. $n\frac{\pi}{7\pi}/14$

B. $n\pi - \frac{7\pi}{14}$

C. $2n\pi + \frac{7\pi}{14}$

D. none of these

Answer: C

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27. The smallest positive angle which satisfies the equation $2\sin^2\theta + \sqrt{3}\cos\theta + 1 = 0$ is $\frac{5\pi}{6}$ b. $\frac{2\pi}{3}$ c. $\frac{\pi}{3}$ d. $\frac{\pi}{6}$

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

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

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

D. none of these

Answer: A

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