MATHS

BOOKS - ARIHANT MATHS

TRIGONOMETRIC EQUATIONS AND INEQUATIONS

Examples

1. If $\sin\alpha, 1, \cos 2\alpha$ are in GP, then find the general solution for α

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2. If $\frac{1}{6}\sin\theta, \cos\theta$ and $\tan\theta$ are in G.P. then the general solution for θ is

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

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

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

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6. Solve $\frac{\sin x + \mathrm{i}\cos x}{1+i}, i = \sqrt{-1}$ when it is purely imaginary .

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

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8. If $x \neq \frac{n\pi}{2}$, $n \in I$ and $(\cos x)^{\sin^2 x-3\sin x+2}=1$, then find the general solution of x.

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9. Solve $\frac{\tan 3x-\tan 2x}{1+\tan 3x\tan 2x}=1.$

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10. Solve $\sin x=0$ and $\frac{\sin x}{\cos\frac{x}{2}\cos\frac{3x}{2}}=0$ and show their solutions are different .

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11. Find the number of solution of $\tan x + \sec x = 2\cos x$ in $[0, 2\pi]$

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

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13. Solve $\tan\theta + \tan 2\theta + \tan\theta \cdot \tan 2\theta \cdot \tan 3\theta = 1$

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

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15. Solve $\cot\theta = \sin 2\theta$ by substituting $\sin 2\theta = \dfrac{2\tan\theta}{1+\tan^2\theta}$ and again by substituting $\sin 2\theta = 2\sin\theta\cdot\cos\theta$ and check whether the two answer are same or not .

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

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17. Solve the equation $\sqrt{3}\cos x + \sin x = \sqrt{2}$.

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18. Find the number of distinct solution of $\sec x + \tan x = \sqrt{3}$, where $0 \le x \le 3\pi$

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19. Prot that the equation $k\cos x - 3\sin x = k + 1$ possess a solution if $k \in (-\infty, 4]$.

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

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21. Find the number of solutions of $\cos x = |1 + \sin x|, 0 \leq x \leq 3\pi$

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22. Solve the following equation:

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

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23. Solve the equation $5\sin^2 x - 7\sin x\cos x + 16\cos^2 x = 4$

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24. Solve the equation $(\cos x - \sin x)\left(2\tan x + \frac{1}{\cos x}\right) + 2 = 0$

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25. Solve : $\sin^{10} x + \cos^{10} x = \frac{29}{16}\cos^4 2x$

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26. Solve the equation $\sin x + \cos x - 2\sqrt{2}\sin x \cos x = 0$

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

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28. If $\tan(A - B) = 1$, and $\sec(A + B) = \frac{2}{\sqrt{3}}$, find the smallest positive values of A and B and also their most general values.

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29. If $x + y = 2\pi/3$ and $\sin x / \sin y = 2$, then the general solution for x and y

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30. 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)

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31. The equation $2\cos^2\left(\frac{x}{2}\right)\sin^2 x = x^2 + \frac{1}{x^2}, 0 \leq x \leq \frac{\pi}{2}$ has

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32. General solution of equation $\sin^6 x = 1 + \cos^4 3x$

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33. solve $\sin^4 x = 1 + \tan^8 x$

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

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35. The number of real solution of the equation $\sqrt{1+\cos 2x} = \sqrt{2}\sin^{-1}(\sin x),\ -\pi \leq x \leq \pi$, is

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36. Find the most general solution for $2^{\sin x} + 2^{\cos x} = 2^{\left(1-\left(\frac{1}{\sqrt{2}}\right)\right)}$

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37. Solve $\left|\sqrt{3}\cos x - \sin x\right| \geq 2$ for $x \in [0, 4\pi]$.

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38. Find the differentiate of $2x \cos x$ with respect to x

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39. Find the solution set of the inequality $\sin x > \frac{1}{2}$.

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40. Find the solution set of the inequality $\cos x \geq \frac{1}{2}$.

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41. Number of solutions of the equation $\sin^4 x - \cos^2 x \sin x + 2\sin^2 x + \sin x = 0$ in $0 \leq x \leq 3\pi$ is _____.

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42. Solve : $2\cos^2\theta + \sin\theta \leq 2$, where $\pi/2 \leq \theta \leq 3\pi/2$.

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43. Solve $\sin^2\theta > \cos^2\theta$.

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44. Find the solution set for , $|\tan x| \leq 1$ when $x \in [-\pi, \pi]$

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45. Solve the inequality $\sin 2x > \sqrt{2}\sin^2 x + (2-\sqrt{2})\cos^2 x$

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46. Solve $\tan^3 x + 3 > 3\tan x + \tan^2 x$.

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47. The number of solution of equation $8\left[x^2-x\right]+4[x]=13+12[\sin x]$, $[.]$ denotes GIF is

A. (a)0

B. (b)2

C. (c)4

D. (d)6

Answer: A

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48. The total number of ordered pairs (x, y) satisfying $|x|+|y|=2, \sin\left(\frac{\pi x^2}{3}\right)=1,$ is equal to 2 (b) 3 (c) 4 (d) 6

A. 1

B. 2

C. 4

D. 3

Answer: D

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49. Solve the equation:

$$\cos^2\left[\frac{\pi}{4}\left(\sin x+\sqrt{2}\cos^2 x\right)\right]-\tan^2\left[x+\frac{\pi}{4}\tan^2 x\right]=1$$

A. 1

B. 2

C. 4

D. 8

Answer: B

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

A. 0

B. 2

C. more than 2

D. 1

Answer: D

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52. x_1 and x_2 are two solutions of the equation $e^x \cos x = 1$, The minimum number of the solution of the equation $e^x \sin x = 1$, lying between x_1 and x_2 can be

A. 0

B. 1

C. 3

D. None of these

Answer: B

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53. Find the differentiate of $\tan^2 x - \sec^2 x$ with respect to x.

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54. Number of solutions of the equation $\cos^4 2x + 2\sin^2 2x$

$= 17(\cos x + \sin x)^8, 0 < x < 2\pi$ is

A. 4

B. 8

C. 10

D. 16

Answer: A

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55. Factor: $16x^3 - y^4x^3$

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56. Number of solutions of the equation $\cot(\theta) + \cot\left(\theta + \frac{\pi}{3}\right) + \cos\left(\theta - \frac{\pi}{3}\right) + \cot(3\theta) = 0$, where $\theta \in \left(0, \frac{\pi}{2}\right)$

A. Infinite

B. 0

C. 1

D. None of these

Answer: C

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57. $0 < a < 2\pi, \sin^{-1}(\sin a) < x^2 - 2x$ for all $x \in I$ then $a \in$

A. $(0, \pi + 1)$

B. $\left(\pi + 1, \frac{3\pi}{2}\right)$

C. $\left(\frac{3\pi}{2}, 2\pi - 1\right)$

D. $(2\pi - 1, 2\pi)$

Answer: B::C

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58. 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 pi

B. x cannot be an even number 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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59. Solve $\frac{\sqrt{5}-1}{\sin x}+\frac{\sqrt{10+2\sqrt{5}}}{\cos x}=8, x \in \left(0, \frac{\pi}{2}\right)$

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

B. $\frac{3\pi}{10}$

C. $\frac{9\pi}{10}$

D. $\frac{7\pi}{10}$

Answer: A::B

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60. find the range of values of t for which $2\sin t=\frac{1-2x+5x^2}{3x^2-2x-1}$

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

B. $\left[\frac{3\pi}{10}, \frac{\pi}{2}\right]$

C. $\left[-\frac{\pi}{2}, \frac{\pi}{10}\right] \cup \left[\frac{3\pi}{10}, \frac{\pi}{2}\right]$

D. All of these

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

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61. The system of equations $\tan x = a \cot x, \tan 2x = b \cos y$

A. Cannot have a solution if a=0

B. Cannot have a solution if a=1

C. Cannot have a solution if $2\sqrt{a} > |b(1-a)|$

D. has a solution of all a and b

Answer: B::C

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62. If $\frac{y+3}{2y+5} = \sin^2 x + 2\cos x + 1,$ then the value of y lies in the interval $\left(-\infty, -\frac{8}{3}\right)$ (b) $\left(-\frac{12}{5}, \infty\right)$ $\left(-\frac{8}{3}, -\frac{12}{5}\right)$ (d) $\left(-\frac{8}{3}, \infty\right)$

A. $\left(-\infty, -\frac{8}{3}\right]$

B. $\left[-\frac{12}{5}, \infty\right)$

C. $\left[-\frac{8}{3}, -\frac{12}{5}\right]$

D. $\left(-\infty, -\frac{8}{3}\right] \cup \left[-\frac{12}{5}, \infty\right)$

Answer: A::B::D

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63. Which of the following set of values of x satisfies the equation $2^{(2\sin^2 x - 3\sin x + 1)} + 2^{(2 - 2\sin^2 x + 3\sin x)} = 9$?

A. $x = n\pi \pm \frac{\pi}{6}, n \in I$

B. $x = n\pi \pm \frac{\pi}{3}, n \in I$

C. $x = n\pi, n \in I$

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

Answer: A::D

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64. For $0 < \theta < \frac{\pi}{2}$, the solution (s) of $\sum_{m=1}^{6} \operatorname{cosec}\left(\theta + \left((m-1)\frac{\pi}{4}\right)\right)\operatorname{cosec}\left(\theta + \frac{m\pi}{4}\right) = 4\sqrt{2}$. Find correct options

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

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

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

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

Answer: C::D

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65. If $\frac{1+\sin 6^\circ}{\cos 6^\circ} = \tan A = \sqrt{\frac{1+\sin B}{1-\sin B}}$, where A and $B \in (0, 90^\circ)$, then

A. A=8B

B. 8A=B

C. A=7B=6°

D. $A + B = 54^\circ$

Answer: A::C::D

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66. If $\sqrt{1 + \sin A} - \sqrt{1 - \sin A} = 2\cos\frac{A}{2}$, then value of A can be

(a)90° (b)260° (c)300° (d)190°

A. 90°

B. 260°

C. 300°

D. 190°

Answer: A::B::D

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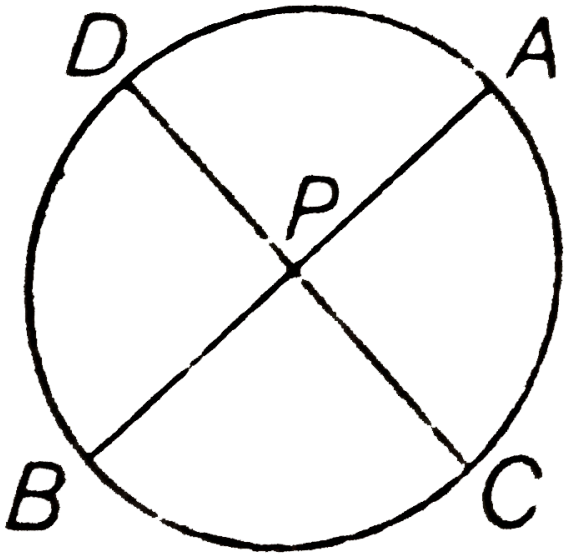
67. Consider a circle , in which a point P is lying inside the circle such that $(PA)(PB) = (PC)(PD)$ (as shown in figure) .



On the basis of above information , answer the question:

Let PA=4 , PB=3 cm and CD is diameter of the circle having the length 8 cm.

If $PC > PD$, then $\frac{PC}{PD}$ is equal to

A. (a) 3

B. (b) 4

C. (c) 5

D. (d) 6

Answer: A

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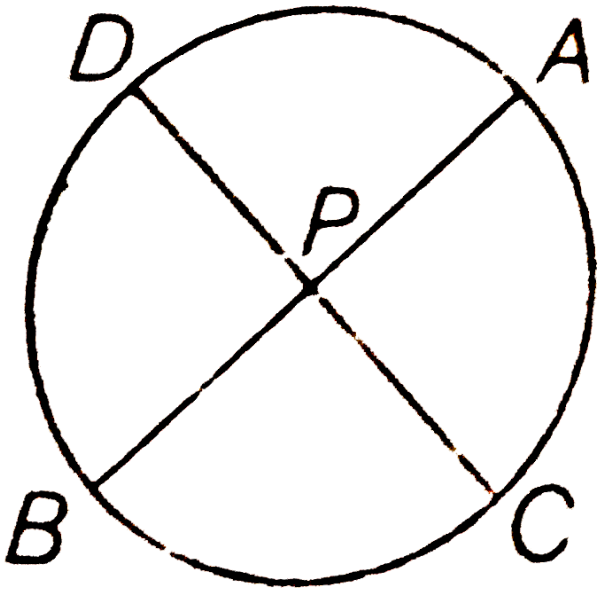
68. Consider a circle , in which a point P is lying inside the circle such that $(PA)(PB) = (PC)(PD)$ (as shown in figure) .



On the basis of above information , answer the questions

If $PA = |\cos\theta + \sin\theta|$ and $PB = |\cos\theta - \sin\theta|$, then maximum value of (PC)(PD) , is equal to

A. (a)1

B. (b)$2\sqrt{2}$

C. (c)$\sqrt{2}$

D. (d)2

Answer: A

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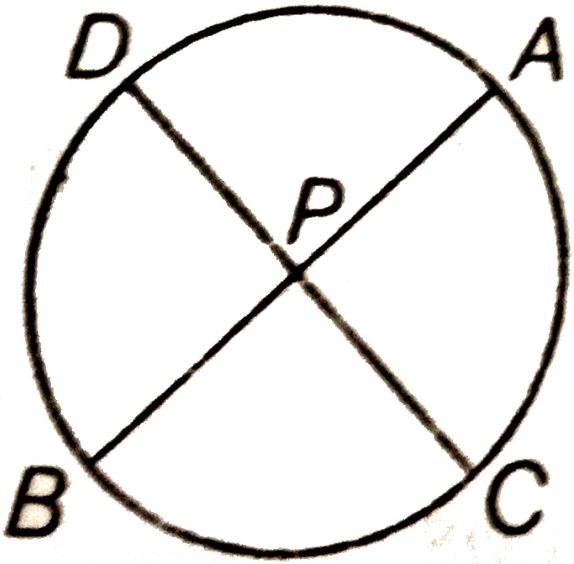
69. Consider a circle , in which a point P is lying inside the circle such that $(PA)(PB) = (PC)(PD)$ (as shown in figure) .



On the basis of above information , answer the questions

If $\log_{PA} x = 2, \log_{PB} x = 3, \log_x PC = 4,$ then $\log_{PD}$ x is equal to

A. (a) $\frac{7}{12}$

B. (b) $\frac{12}{7}$

C. (c) $-\frac{7}{12}$

D. (d) $-\frac{6}{19}$

Answer: D

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70. PA and PB are two tangents drawn from point P to circle of radius 5 . A line is drawn from point P which cuts at C and D such that PC=5 and PD=15 and $\angle APB = \theta$.

On the basis of above information answer the questions .

Area of ΔAPB is

A. A. $\frac{25\sqrt{3}}{2}$

B. B. $25\sqrt{3}$

C. C. $\frac{75\sqrt{3}}{2}$

D. D. $\frac{75\sqrt{3}}{4}$

Answer: D

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71. Find the value of$3 + 2 \cdot (8 - 3)$

A. $(a)25$

B. $(b) 13$

C. $(c) 17$

D. $(d) 24$

Answer: B

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72. Simplify: $(4x^2 - 2x) - (-5x^2 - 8x)$.

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73. $3\sin^2 x - 7\sin x + 2 = 0, x \in \left[0, \frac{\pi}{2}\right]$ and $f_n(\theta) = \sin^n \theta + \cos^n \theta$.

On the basis of above information, the value of $f_4(x)$ is:

A. (a) $\frac{97}{81}$

B. (b) $\frac{57}{81}$

C. (c) $\frac{65}{81}$

D. (d) $\frac{73}{81}$

Answer: C

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74. $3\sin^2 x - 7\sin x + 2 = 0, x \in \left[0, \frac{\pi}{2}\right]$ and $f_n(\theta) = \sin^n \theta + \cos^n \theta$.

On the basis of above information, the value of $\frac{\sin 5x + \sin 4x}{1 + 2\cos 3x}$ is:

A. (a) $\frac{3 + 2\sqrt{2}}{9}$

B. (b) $\frac{3 + 4\sqrt{2}}{9}$

C. (c) $\frac{4\sqrt{2} - 2}{9}$

D. (d) $\frac{4\sqrt{2} - 3}{9}$

Answer: B

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75. Number of integral solution of the equation $\log_{\sin x}\sqrt{\sin^2 x}+\log_{\cos x}\sqrt{\cos^2 x}=$, where $x\in[0,6\pi]$ is

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76. If $x_k=(\sec\theta)^{\frac{1}{2^k}}+(\tan\theta)^{\frac{1}{2^k}}$ and $y_k=(\sec\theta)^{\frac{1}{2^k}}-(\tan\theta)^{\frac{1}{2^k}}$, then value of $3y_n\prod_{k=0}^{n}(x_k)$ is equal to

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77. The number of ordered pairs (α,β) , where $\alpha,\beta\in[0,2\pi]$ satisfying $\log_{2\sec x}\left(\beta^2-6\beta+10\right)=\log_3|\cos\alpha|$ is

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78. If $\frac{\cos^3\theta}{(1-\sin\theta)}+\frac{\sin^3\theta}{(1+\cos\theta)}=1+\cos\theta$, then number of possible values of θ is (where $\theta\in[0,2\pi]$)

A. 5

B.

C.

D.

Answer: $\theta = \frac{\pi}{2}$ **which is not possible.**

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79. If the sum of all value of x satisfying the system of equations

$\tan x + \tan y + \tan x \cdot \tan y = 5$

$\sin(x + y) = 4 \cos x \cdot \cos y$

is $\frac{k\pi}{2}$, where $x \in \left(0, \frac{\pi}{2}\right)$ then find the values of k .

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80. Statement I $x = \frac{k\pi}{13}, k \in I$ does not represent the general solution of trigonometric equation.

$\sin 13x - \sin 13x \cos 2x = 0$

Statement II Both $x = r\pi, r \in I$ and $x = \frac{k\pi}{13}, k \in I$ satisfies the trigonometric equation.

$\sin 13x - \sin 13x \cos 2x = 0$

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81. Find $\frac{dy}{dx}$ if $2x - 3y = \sin x - \cos x$

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82. If $0 \leq x \leq 3\pi, 0 \leq y \leq 3\pi$ and $\cos x \cdot \sin y = 1$, then find the possible number of values of the orederd pair (x,y) .

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83. If $\theta \in [0, 3\pi]$ and $r \in R$. Then , find the pair of (r, θ) satisfying $2\sin\theta = r^4 - 2r^2 + 3$.

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84. Find all the value of θ satisfying the equation , $\sin 7\theta = \sin\theta + \sin 3\theta$ such that $0 \leq \theta \leq \pi$

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85. Solve $\sin 3x + \cos 2x = -2$

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86. $\sin(3\theta + \alpha) + \sin(3\theta - \alpha) + \sin(\alpha - \theta) - \sin(\alpha + \theta) = \cos\alpha$

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87. Solve $\sin 2x + \cos 4x = 2$.

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88. Find all the solution of $4\cos^2 x \sin x - 2\sin^2 x = 3\sin x$

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89. Solve the equation: $1 + 2\cos ecx = -\frac{\sec^2\left(\frac{x}{2}\right)}{2}$

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90. Find all values of θ lying between 0 and 2π satisfying the equation $r\sin\theta = \sqrt{3}$ and $r + 4\sin\theta = 2\left(\sqrt{3}+1\right)$

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91. Solve the following system of equations. $\sin x + \cos y = 1, \cos 2x - \cos 2y = 1$

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92. 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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93. 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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94. A triangle ABC is such that $\sin(2A + B) = \frac{1}{2}$ and If A, B and C are in $A.P.$, then find the value of A and C

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95. 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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96. Solve $\sin x\left(\cos\frac{x}{4} - 2\sin x\right) + \left(1 + \sin\frac{x}{4} - 2\cos x\right)\cos x = 0.$

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97. Find all possible triplets (x,y,z) such that $(x+y) + (y+2z)\cos 2\theta + (z-x)\sin^2\theta = 0$, for all θ.

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98. For every real number find all the real solutions to equation $\sin x + \cos(a+x) + \cos(a-x) = 2$

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

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100. Solve the equation $a \cos x + \cot x + 1 = \text{cosec } x$

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101. Find the value of 'a' which the system of equation $\sin x \cdot \cos y = a^2$ and $\sin y \cdot \cos x = a$ have a solution

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102. Find all the number 'a' for which any root of the equation $\sin 3x = a \sin x + (4 - 2|a|)\sin^2 x$ is a root of the equation

$\sin 3x + \cos 2x = 1 + 2\sin x \cos 2x$ and any root of the latter equation is a root of the former .

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103. Solve the inequality $\frac{5}{4}\sin^2 x + \sin^2 x \cdot \cos^2 x > \cos 2x.$

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104. Solve the inequality . $\sin x \cos x + \frac{1}{2}\tan x \geq 1$

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105. What is the radius of a circle that has a circumference of 3.14meters?

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106. What is the radius of a circle that has a circumference of $\frac{22}{7}$meters?

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107. Prove that the equation $2\sin x = |x| + a$ has not solution for $a \in \left(\frac{3\sqrt{3}-\pi}{3}, \infty\right)$.

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108. In ΔABC, prove that $\operatorname{cosec}\frac{A}{2} + \operatorname{cosec}\frac{B}{2} + \operatorname{cosec}\frac{C}{2} \geq 6$.

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109. If $\frac{1}{\cos\alpha \cdot \cos\beta} + \tan\alpha \cdot \tan\beta = \tan\gamma$, where $0 < \gamma < \frac{\pi}{2}$ and α, β are positive acute angles , show that $\frac{\pi}{4} < \gamma < \frac{\pi}{2}$

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110. Which is the smallest?

A. (a) -1

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

C. (c) 0

D. (d) 3

Answer: $\Rightarrow$ **x and y must be same sign, which is true in ist and 3rd quadrant only.**

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Examples Matching Type Questions

1. Find $\frac{dy}{dx}$ if $\tan 2x = \sin y$

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Examples Subjective Type Examples

1. Find the solution of the equation $(\sin x + \cos x)\sin 2x = a\left(\sin^3 x + \cos^3 x\right)$ located between $\frac{\pi}{2}$ and π and for which values of 'a' does this equation have at most one solution satisfying the condition $\frac{\pi}{2} \leq x \leq \pi$.

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2. What is the radius of a circle that has a circumference of 6.28 meters?

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Exercise For Session 1

1. Solve $\sin 5x = \cos 2x$ for $0 \leq x \leq 2\pi$

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2. Find the number of value of x in $[0, 5\pi]$ satisfying the equation $3\cos 2x - 10\cos x + 7 = 0$

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3. If $2\tan^2 x - 5\sec x = 1$ for exactly seven distinct value of $x \in \left[0, \frac{n\pi}{2}\right], n \in N$ then find the greatest value of n.

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4. Find the general solution of equation $\sec^2 x = \sqrt{2}(1 - \tan^2 x)$

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5. Solve $7\cos^2\theta + 3\sin^2\theta = 4$.

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6. The general solution of equation $\tan^2\alpha + 2\sqrt{3}\tan\alpha = 1$

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7. Find the number of solutions of $\sin^2 x - \sin x - 1 = 0 \in [-2\pi, 2\pi]$

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8. The most general of θ satisfying $\tan\theta + \tan\left(\frac{3\pi}{4} + \theta\right) = 2$ are given by

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9. Find the general solution of $\sin x + \sin 5x = \sin 2x + \sin 4x$.

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10. Solve $\cos\theta \cdot \cos 2\theta \cdot \cos 3\theta = \frac{1}{4}, 0 \leq \theta \leq \pi$

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11. Write the subsets of $\{1, 2, 3\}$

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12. Find the roots of the equation $\cot x - \cos x = 1 - \cot x \cos x$

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13. Write the subsets of $\{2, 4, 6\}$

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14. Write the subsets of $\{1, 3, 5\}$

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15. Find the number of roots of the equation $16\sec^3\theta - 12\tan^2\theta - 4\sec\theta = 9$ in interval $(-\pi, \pi)$

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Exercise For Session 2

1. Solve the equation $\sin x + \cos x = 1$

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2. Solve $\sqrt{3}\cos\theta - 3\sin\theta = 4\sin 2\theta\cos 3\theta$.

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3. Solve $\cot\theta + \operatorname{cosec}\theta = \sqrt{3}$

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4. Solve $\sqrt{2}\sec\theta + \tan\theta = 1.$

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5. Find the general solution of the equation

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

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6. Solve $2\sin^2 x - 5\sin x\cos x - 8\cos^2 x = -2.$

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7. Solve the equation $(1-\tan\theta)(1+\sin 2\theta)=1+\tan\theta$

Watch Video Solution

Exercise For Session 3

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

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2. Find the general solution of $\operatorname{cosec}x=-2$ and $\cot x=\sqrt{3}$

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3. Find common roots of the equations $2\sin^2 x+\sin^2 2x=2$

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4. Solve the equation , $\sqrt{3}\sin 2A = \sin 2B$ and $\sqrt{3}\sin^2 A + \sin^2 B = \frac{1}{2}(\sqrt{3}-1)$.

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5. Find the number of solutions of $\sin^2 x \cos^2 x = 1 + \cos^2 x \sin^4 x$ in the interval $[0, 2\pi]$

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6. Solve $1 + \sin x \sin^2\left(\frac{x}{2}\right) = 0$ in $[-\pi, \pi]$

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

Watch Video Solution

8. Find the number of real solution of the equation $(\cos x)^5 + (\sin x)^3 = 1$ in the interval $[0, 2\pi]$

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9. Find the number of solution of the equation $1 + e^{\cot^2 x} = \sqrt{2|\sin x| - 1} + \frac{1 - \cos 2x}{1 + \sin^4 x} f$ or $x \in (0, 5\pi)$.

Watch Video Solution

10. Find the derivative of $y = \sin 2x + \cos 3x$

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Exercise For Session 4

1. If $2\cos x < \sqrt{3}$ and $x \in [-\pi, \pi]$, then find the solution set for x.

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2. 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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3. If $\cos x - \sin x \geq 1$ and $0 \leq x \leq 2\pi$, then find the solution set for x.

Watch Video Solution

4. Evaluate $\int \left(\cos ec^{-1}x + \sec^{-1}x\right)dx$

Watch Video Solution

5. Find the set of values of x , which satisfy $\sin x \cdot \cos^3 x > \cos \cdot \sin^3 x, 0 \leq x \leq 2\pi$.

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6. The set of all x in (−π/2,π/2) satisfying $|4\sin x - 1| < \sqrt{5}$ is given by $(a)\left(-\frac{\pi}{10}, \frac{3\pi}{10}\right)$ (b) $\left(\frac{\pi}{10}, \frac{3\pi}{10}\right)$ $(c)\left(-\frac{\pi}{2}, \frac{3\pi}{10}\right)$ (d) none of these

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7. Solve $\sin^4\left(\frac{x}{3}\right) + \cos^4\left(\frac{x}{3}\right) > \frac{1}{2}$

Watch Video Solution

8. Solve $\tan x - \tan^2 x > 0$ and $|2\sin x| < 1$.

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Exercise Single Option Correct Type Questions

1. Show that $\frac{\sin x - \sin y}{\cos x + \cos y} = \tan\left(\frac{x-y}{2}\right)$

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2. Let the smallest positive value of x for which the function $f(x) = \sin\frac{x}{3} + \sin\frac{x}{11}, (x \in R)$ achieves its maximum value be x_0. Express x_0 in degree i.e. $x_0 = \alpha^0$. Then , the sum of the digits in α is

A. 15

B. 17

C. 16

D. 18

Answer: D

Watch Video Solution

3. The number of solutions of the equation $16\left(\sin^5 x + \cos^5 x\right) = 11(\sin x + \cos x)$ in the interval $[0, 2\pi]$ is

A. 6

B. 7

C. 8

D. 9

Answer: A

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4. If $x \sin a + y \sin 2a + z \sin 3a = \sin 4a$ $x \sin b + y \sin 2b + z \sin 3b = \sin 4b$, $x \sin c + y \sin 2c + z \sin 3c = \sin 4c$, then the roots of the equation $t^3 - \left(\frac{z}{2}\right)t^2 - \left(\frac{y+2}{4}\right)t + \left(\frac{z-x}{8}\right) = 0$, $a, b, c, \neq n\pi$, are (a) $\sin a, \sin b, \sin c$ (b) $\cos a, \cos b, \cos c$ (c)$\sin 2a, \sin 2b, \sin 2c$ (d) $\cos 2a, \cos 2b \cos 2c$

A. sin a , sin b , sin c

B. cos a, cos b , cos c

C. sin 2a , sin 2b , sin 2c

D. cos 2a , cos 2b , cos 2c

Answer: B

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5. Find the least positive value of x satisfying

$$\frac{\sin^2 2x + 4\sin^4 x - 4\sin^2 x \cos^2 x}{4 - \sin^2 2x - 4\sin^2 x} = \frac{1}{9}$$

A. (a) $\pi/3$

B. (b) $\pi/6$

C. (c) $2\pi/3$

D. (d) $5\pi/6$

Answer: B

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6. The maximum value of the expression $\left|\sqrt{\sin^2 x + 2a^2} - \sqrt{2a^2 - 1 - \cos^2 x}\right|$, where $aandx$ are real numbers, is $\sqrt{3}$ (b) $\sqrt{2}$ (c) 1 (d) $\sqrt{5}$

A. 1

B. 2

C. $\sqrt{2}$

D. $\sqrt{3}$

Answer: C

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7. The general solution of $8\tan^2\frac{x}{2} = 1 + \sec x$ is

A. $x = 2n\pi \pm \cos^{-1}\left(\frac{-1}{3}\right)$

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

C. $x = 2n\pi \pm \cos^{-1}\left(\frac{1}{3}\right)$

D. None of these

Answer: C

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8. General solution of $\tan\theta + \tan 4\theta + \tan 7\theta = \tan\theta \tan 4\theta \tan 7\theta$ is

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

B. $\theta = \frac{n\pi}{12}$

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

D. None of these

Answer: B

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9. Find the number of solution of the equation $e^{\sin x} - e^{-\sin x} - 4 = 0$

A. x=0

B. $x = \sin^{-1}\left[\log\left(2 - \sqrt{5}\right)\right]$

C. no real solution

D. None of the above

Answer: C

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10. Find the number of solution(s) of the equation

$\cos\left(\pi\sqrt{x}\right)\cos\left(\pi\sqrt{x-4}\right) = 1.$

A. > 2

B. 2

C. 1

D. 0

Answer: C

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11. The number of real solution of equation $\sin(e^x) = 5^x + 5^{-x}$ is :

A. 0

B. 1

C. 2

D. Infinitely many

Answer: A

Watch Video Solution

12. Evaluate $\int 3x^5 \, dx$

Watch Video Solution

13. Let $2\sin^2 x + 3\sin x - 2 > 0$ and $x^2 - x - 2 < 0$ (x is measured in radian) . Then 'x' lies in the interval .

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

B. $\left(-1, \frac{5\pi}{6}\right)$

C. $(-1, 2)$

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

Answer: D

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14. The number of points of intersection of two curves $y = 2\sin xandy = 5x^2 + 2x + 3is$ 0 b. 1 c. 2 d. ∞

A. 0

B. 1

C. 2

D. ∞

Answer: A

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15. The number of all the 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) 3 (d) infinite

A. 0

B. 1

C. 3

D. Infinite

Answer: D

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16. Find $\frac{dy}{dx}$ if $2x + 3y = \sin x$

Watch Video Solution

17. In the interval $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ the equation $\log_{\sin\theta}(\cos 2\theta) = 2$ has

A. no solution

B. a unique solution

C. two solution

D. infinitely many solution

Answer: B

Watch Video Solution

18. If $\sum_{i=1}^{n} \cos\theta_i = n$, then the value of $\sum_{i=1}^{n} \sin\theta_i$.

A. n-1

B. 0

C. n

D. n+1

Answer: B

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19. If $(\sin\alpha)^x + (\cos\alpha)^x \geq 1, 0 < a < \frac{\pi}{2}$ then

A. $n \in [2, \infty)$

B. $(-\infty, 2]$

C. $n \in [-1, 1]$

D. None of these

Answer: B

Watch Video Solution

20. The most general values of 'x' for which $\sin x + \cos x = \min_{a \in R}\left[1, a^2 - 4a + 6\right]$ are given by

A. $2n\pi$

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

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

D. None of these

Answer: C

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21. Find $\frac{dy}{dx}$ if $2x + 3y = \sin y$

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

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

B. $\left\{x : x = 2n\pi \pm \frac{2\pi}{3}, n \in I\right\}$

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

D. None of these

Answer: A

Watch Video Solution

23. Find the number of integral value of n so that $\sin x(\sin x + \cos x) = n$ has at least one solution.

A. 2

B. 1

C. 3

D. zero

Answer: A

Watch Video Solution

24. Find the number of solutions to $\sin\{x\} = \cos\{x\}$, where $\{\cdot\}$ denotes the fractional part, in $[0, 2\pi]$.

A. 5

B. 6

C. 7

D. None of these

Answer: B

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25. If $a, b \in [0, 2\pi]$ and the equation $x^2 + 4 + 3\sin(ax + b) - 2x = 0$ has at least one solution, then the value of $(a + b)$ can be $\frac{7\pi}{2}$ (b) $\frac{5\pi}{2}$ (c) $\frac{9\pi}{2}$ (d) none of these

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

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

C. $\frac{9\pi}{2}$

D. None of these

Answer: B

Watch Video Solution

26. The value of 'a' for which the equation $4\cos ec^2\pi(a+x)+a^2-4a=0$ has a real solution is

A. a=1

B. a=2

C. a=10

D. None of these

Answer: B

Watch Video Solution

27. If the equation $2\cos x + \cos 2\lambda x = 3$ has only one solution , then λ is

A. 1

B. A rational number

C. An irrational number

D. None of these

Answer: C

Watch Video Solution

28. Let n be a positive integer such that $\sin\left(\frac{\pi}{2n}\right) + \cos\left(\frac{\pi}{2n}\right) = \frac{\sqrt{n}}{2}$.

Then

A. n=4

B. n=5

C. n=9

D. n=6

Answer: D

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29. The number of solution of the equation $5\sec\theta - 13 = 12\tan\theta$ in $[0, 2\pi]$ is

A. 2

B. 1

C. 4

D. 0

Answer: D

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30. The number of solutions of the equation $x^3 + x^2 + 4x + 2\sin x = 0$ in $0 \leq x \leq 2\pi$ is

A. Zero

B. One

C. Two

D. Four

Answer: B

Watch Video Solution

31. 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. 0

B. 1

C. -1

D. 1 or -1

Answer: D

Watch Video Solution

32. The equation $\sin x + \sin y + \sin z = -3$ for $0 \leq x \leq 2\pi$, $0 \leq y \leq 2\pi$, $o \leq z \leq 2\pi$, has

A. one solution

B. two sets of solutions

C. four sets of solutions

D. no solutions

Answer: A

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33. If $x = n\pi + (-1)^n \alpha, n \in I$ and $x = n\pi + (-1)^n \beta$ are the roots of $4\cos x - 3\sec x = \tan x$, then $4(\sin\alpha + \sin\beta)$ is

A. -1

B. 1

C. 2

D. None of these

Answer: A

Watch Video Solution

34. If tan $m\theta = \tan n\theta$ and general value of θ are in AP, then common difference is

A. $\frac{1}{m-n}$

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

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

D. None of these

Answer: C

Watch Video Solution

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

A. $x = n\pi \pm \frac{\pi}{3}, n \in I$

B. $x = n\pi \pm \frac{\pi}{6}, n \in I$

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

D. None of the above

Answer: A

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36. $\lambda\cos x - 3\sin x = \lambda + 1$ is solvable for which value of λ .

A. $\lambda \in [0, 5]$

B. $\lambda \in [4, 5]$

C. lambda in (-oo,4]`

D. None of these

Answer: C

Watch Video Solution

37. $\cos 2x - 3\cos x + 1 = \dfrac{1}{(\cot 2x - \cot x)\sin(x - \pi)}$ holds , if

A. (a) cos x =0

B. (b) cos x =1

C. (c) $\cos x = \dfrac{5}{2}$

D. (d) for no value of x

Answer: A

Watch Video Solution

38. If $\sec x \cos 5x = -1$ and $0 < x < \dfrac{\pi}{4}$, then x is equal to

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

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

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

D. None of these

Answer: A

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39. If $\sin^{100}\theta - \cos^{100}\theta = 1$, then θ is

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

Watch Video Solution

40. If $\sqrt{3}\sin x - \cos x = \min_{\alpha \in R}\{2, e^2, \pi, \alpha^2 - 4\alpha + 7\}$, then

A. (a)$x = 2n\pi, n \in I$

B. (b)$x = 2n\pi + \frac{2\pi}{3}, n \in I$

C. (c)$x = n\pi + (-1)^n \frac{\pi}{4} + \frac{\pi}{6}, n \in I$

D. (d)$x = n\pi + (-1)^n \frac{\pi}{4} - \frac{\pi}{3}, n \in I$

Answer: B

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41. The number of solutions of the equation $\cos 4x + 6 = 7\cos 2x$, when $x \in [315^\circ, 317^\circ]$ is

A. 0

B. 1

C. 2

D. 4

Answer: A

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42. The number of solutions of $\cot(5\pi\sin\theta) = \tan(5\pi\cos\theta),\ \forall\theta \in (0, 2\pi)$ is

A. 10

B. 14

C. 21

D. 28

Answer: B

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

A. $\sqrt{3}+1$

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

C. $\sqrt{3}-1$

D. None of these

Answer: B

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44. The total number of solutions of $\cos x=\sqrt{1-\sin 2x}$ in $[0, 2\pi]$ is equal to

A. 2

B. 3

C. 5

D. None of these

Answer: A

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45. Solve : $\cos 3x.\cos^3 x + \sin 3x.\sin^3 x = 0$

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

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

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

D. None of these

Answer: A

Watch Video Solution

46. Total number of solutions of $\sin x = \frac{|x|}{10}$ is equal to

A. 4

B. 6

C. 7

D. None of these

Answer: B

Watch Video Solution

47. 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. zero

B. 1

C. 2

D. infinite

Answer: B

Watch Video Solution

48. α and β are two positive value of x for which $2\cos x, |\cos x|$ and $1-3\cos^2 x$ are in GP. The minimum value of $|\alpha-\beta|$ is equal to

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

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

C. $2\cos^{-1}\left(\frac{2}{3}\right)$

D. none of these

Answer: C

Watch Video Solution

49. If $\cos x - \frac{\cot\beta\sin x}{2} = \frac{\sqrt{3}}{2}$, then the value of $\tan\frac{x}{2}$ is

A. $\tan\frac{\beta}{2}\tan 15^\circ$

B. $\tan\frac{\beta}{2}$

C.$\tan 15^\circ$

D. None of these

A. $\tan\frac{\beta}{2}\tan 15^\circ$

B. $\tan\frac{\beta}{2}$

C. $\tan 15^\circ$

D. None of the above

Answer: A

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50. The expression $n\sin^2\theta + 2n\cos(\theta+\alpha)\sin\alpha\sin\theta + \cos 2(\alpha+\theta)$ is independent of θ, the value of n is

A. 1

B. 2

C. 3

D. 4

Answer: B

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51. The value of the determinants $\begin{vmatrix} 1 & a & a^2 \\ \cos(n-1)x & \cos nx & \cos(n+1)x \\ \sin(n-1)x & \sin nx & \sin(n+1)x \end{vmatrix}$ is zero if

A. $x = n\pi$

B. $x = n\pi/2$

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

D. $x = \dfrac{1+a^2}{2a} n \in I$

Answer: A

Watch Video Solution

52. If $\frac{\sin(3\alpha)}{\cos(2\alpha)} < 0$ If α lies in

A. $\left(\frac{13\pi}{48}, \frac{14\pi}{48}\right)$

B. $\left(\frac{14\pi}{48}, \frac{18\pi}{48}\right)$

C. $\left(\frac{18\pi}{48}, \frac{23\pi}{48}\right)$

D. any of these intervals

Answer: A

Watch Video Solution

53. If $f(x) = \begin{vmatrix} \sin^2\theta & \cos^2\theta & x \\ \cos^2\theta & x & \sin^2\theta \\ x & \sin^2\theta & \cos^2\theta \end{vmatrix} \theta \in (0, \pi/2)$, then roots of f(x)=0 are

A. 1/2,-1

B. 1/2,-1,0

C. $-1/2, 1, 0$

D. $-1/2, \ -1, 0$

Answer: A

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54. The equation $\sin x + \sin y + \sin z = \ -3 \text{for} \ \ 0 \leq x \leq 2\pi, 0 \leq y \leq 2\pi, 0 \leq z \leq 2\pi$ has

A. one solution

B. two sets of solutions

C. four sets of solutions

D. no solutions

Answer: A

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55. If $\sec x \cos 5x + 1 = 0$, where $0 < x < \frac{\pi}{2}$, then x=

A. $\frac{\pi}{6}, \frac{\pi}{4}$

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

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

D. None of these

Answer: C

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56. If $|k| = 5$ and $0^\circ \leq \theta \leq 360^\circ$, then the number of different solution of $3\cos\theta + 4\sin\theta = k$ is

A. Zero

B. Two

C. One

D. Infinite

Answer: B

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57. If $\cot(\alpha+\beta=0,$ then $\sin(\alpha+2\beta$ can be

A. $\cos\beta$

B. $\cos\alpha$

C. $\sin\beta$

D. $\cos 2\beta$

Answer: A

Watch Video Solution

58. If $:\cot\theta+\cot\left(\frac{\pi}{4}+\theta\right)=2,$ then $:\theta=$

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

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

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

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

Answer: D

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

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

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

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

D. None of these

Answer: B

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60. Evaluate $\int (\sin^2 x + \cos^2 x) dx$

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Exercise More Than One Correct Option Type Questions

1. Find the value of t which satisfies $(t - [|\sin x|])! = 3!5!7! where [.]$ denotes the greatest integer function.

A. 9

B. 10

C. 11

D. 12

Answer: B::C

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2. Let

$f(x) = \cos(a_1 + x) + \frac{1}{2}\cos(a_2 + x) + \frac{1}{2^2}\cos(a_1 + x) + + \frac{1}{2^{n-1}}\cos(a_n$

where $a)1, a_2 a_n \in R$. If $f(x_1) = f(x_2) = 0, then |x_2 - x_1|$ may be equal

to

A. π

B. 2π

C. 3π

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

Answer: A::B::C

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3. Let α, β, γ parametric angles of 3 points P,Q and R respectively lying on $x^2 + y^2 = 1$. If the length of chords AP, AQ and AR are in GP where A is (-1,0), then $[Given, \alpha, \beta, \gamma \in (0, 2\pi)]$.

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4. Let x, y, z be elements from interval $[0, 2\pi]$ satisfying the inequality $(4 + \sin 4x)\left(2 + \cot^2 y\right)\left(1 + \sin^4 z\right) \leq 12 \sin^2 z$, then

A. the number of ordered pairs (x,y) is 5

B. the number of ordered pairs (y,z) is 8

C. the number of ordered pairs (z,x) is 8

D. the number of pairs (y,z) such that z=y is 2

Answer: C::D

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5. The number of integral values of a for which the system of linear equations $x \sin\theta - 2y\cos\theta - az = 0$, $x + 2y + z = 0$, $-x + y + z = 0$ may have non-trivial solutions, then

A. The given system will have infinite solutions for a=2

B. The number of integer values of a is 3 for the system to have nontrivial solutions.

C. For a=1 there exists θ for which the system will have infinite solutions

D. For a=3 there exists θ for which the system will have unique solutions

Answer: B::C::D

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6. The equation $2\sin^3\theta + (2\lambda - 3)\sin^2\theta - (3\lambda + 2)\sin\theta - 2\lambda = 0$

A. 0

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

C. 1

D. -1

Answer: A::C::D

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7. If $x + y = 2\pi/3$ and $\sin x / \sin y = 2$, then the

A. number of value of $x \in [0, 4\pi]$ are 4

B. number of value of $x \in [0, 4\pi]$ are 2

C. number of value of $y \in [0, 4\pi]$ are 2

D. number of value of $y \in [0, 4\pi]$ are 8

Answer: A

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8. If $0 < x < 2\pi$ and $|\cos x| \leq \sin x$, then

A. the set of all values of x is $\left[\frac{\pi}{4}, \frac{3\pi}{4}\right]$

B. the number of solutions that are integral multiple of $\frac{\pi}{4}$ is four

C. the sum of the largest and the smallest solution is π

D. the set of all value of x is $x \in \left[\frac{\pi}{2}, \frac{\pi}{2}\right) \cup \left(\frac{\pi}{2}, \frac{3\pi}{4}\right]$

Answer: A::C

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9. If $xandy$ are positive acute angles such that $(x+y)$ and $(x-y)$ satisfy the equation $\tan^2\theta - 4\tan\theta + 1 = 0,$ then

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

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

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

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

Answer: C::D

Watch Video Solution

10. If $x + y = \frac{4\pi}{3}$ and $\sin x = 2\sin y$, then

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

B. (b)$y = \frac{5\pi}{6} - n\pi, n \in I$

C. (c)Both (a) and (b)

D. (d)None of the above

Answer: C

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11. The number of solutions of the equations $y = \frac{1}{3}[\sin\theta + [\sin\theta + [\sin\theta]]]$ and $[y + [y]] = 2\cos\theta$ [where , [.] denote the greatest integer function] is/are

A. 0

B. 1

C. 2

D. infinte

Answer: A

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12. If $[\sin x] + [\sqrt{2}\cos x] = -3, x \in [0, 2\pi]$, (where ,[.] denotes the greatest integer function), then

A. $x \in \left(\pi, \frac{5\pi}{4}\right)$

B. $x \in \left(\pi, \frac{7\pi}{6}\right)$

C. $x \in \left[\pi, \frac{5\pi}{4}\right]$

D. None of these

Answer: A

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13. If $\alpha \in [-2\pi, 2\pi]$ and $\cos.\frac{\alpha}{2} + \sin.\frac{\alpha}{2} = \sqrt{2}(\cos 36^\circ - \sin 18^\circ)$, then a value of α

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

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

C. $-\frac{5\pi}{6}$

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

Answer: A::D

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14. The number of value of α in the interval $[-\pi, 0]$ satisfying $\sin\alpha + \int_{\alpha}^{2\alpha} \cos 2x dx = 0$, then

A. $\alpha = 0$

B. $\alpha = 0, -\pi, -\frac{\pi}{3}$

C. $\alpha = \frac{\pi}{6}, \frac{5\pi}{6}$

D. None of the above

Answer: A::B

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15. Find the number of solution of $\theta \in [0, 2\pi]$ satisfying the equation $\left((\log)_{\sqrt{3}} \tan\theta\left(\sqrt{(\log)_{\tan\theta} 3 + (\log)_{\sqrt{3}} 3\sqrt{3} = -1}\right.\right.$

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

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

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

D. > 2

Answer: A::C

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16. If α and β are the solution of $a\cos\theta + b\sin\theta = c$, then

A. $\sin\alpha + \sin\beta = \dfrac{2bc}{a^2+b^2}$

B. $\sin\alpha + \sin\beta = \dfrac{c^2-a^2}{a^2+b^2}$

C. $\sin\alpha + \sin\beta = \dfrac{2ac}{b^2+c^2}$

D. $\sin\alpha + \sin\beta = \dfrac{c}{a^2+b^2}$

Answer: A::B

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17. The solution of the equation $\sin 2x + \sin 4x = 2\sin 3x$ is

A. $x = \dfrac{n\pi}{3}$

B. $x = n\pi$

C. $x = 2n\pi$

D. None of the above

Answer: A::C

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18. One of the general solutions of $4\sin^4 x + \cos^4 x = 1$ is

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

B. $n\pi$

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

D. None of these

Answer: B::C

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19. The value of x $, 0 \leq x \leq \frac{\pi}{2}$ which satisfy the equation $81^{\sin^2 x} + 81^{\cos^2 x} = 30$ are

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

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

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

D. $\frac{7\pi}{18}$

Answer: A::C

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20. The value of x in $\left(0, \frac{\pi}{2}\right)$ satisfying $\frac{\sqrt{3}-1}{\sin x}+\frac{\sqrt{3}+1}{\cos x}=4\sqrt{2} is/are \frac{\pi}{12}$ (b) $\frac{5\pi}{12}$ (c) $\frac{7\pi}{24}$ (d) $\frac{11\pi}{36}$

A. $\frac{\pi}{15}$

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

C. $\frac{11\pi}{36}$

D. $\frac{3\pi}{10}$

Answer: B::C

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21. The values of α for which the equation $\frac{\alpha^2}{1-\tan^2 x} = \frac{\sin^2 + \alpha^2 - 2}{\cos 2x}$ has solution can be

A. $\alpha \leq -1$

B. $\alpha \geq 1$

C. $\alpha = 1/2$

D. α in any real number

Answer: A::B

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22. For which values of a does the equation $4\sin\left(x+\frac{\pi}{3}\right)\cos\left(x-\frac{\pi}{6}\right) = a^2 + \sqrt{3}\sin 2x - \cos 2x$ have solution? Find the solution for a-0.

A. -2

B. 0

C. 2

D. $a, a \in]-2, 2[$

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

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23. Which of the following is/are correct?

A. $(\tan x)^{In(\sin x)} > (\cot x)^{In \sin x}, \forall x \in (0, \pi/4)$

B. $4^{In \operatorname{cosec} x} < 5^{In \operatorname{cosec} x}, \forall x \in (0, \pi/2)$

C. $(1/2)^{In(\cos x)} < (1/3)^{In(\cos x)}, \forall x \in (0, \pi/2)$

D. $2^{In(\tan x)} > 2^{In(\tan x)}, \forall x \in (0, \pi/2)$

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

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24. If $\begin{vmatrix} 1+\cos^2\theta & \sin^2\theta & 4\cos 6\theta \\ \cos^2\theta & 1+\sin^2\theta & 4\cos 6\theta \\ \cos^2\theta & \sin^2\theta & 1+4\cos 6\theta \end{vmatrix} = 0$, and $\theta \in \left(0, \frac{\pi}{3}\right)$, then value of θ is

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

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

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

D. None of these

Answer: A::B

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25. If [x] dnote the greatest integer less than or equal to x then the equation $\sin x = [1+\sin x] + [1-\cos x][$ has no solution in

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

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

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

D. R

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

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Exercise Passage Based Questions

1. If number of solution and sum of solution of the equation $3\sin^2 x - 7\sin x + 2 = 0, x \in [0, 2\pi]$ are respectively N and S and $f_n(\theta) = \sin^n \theta + \cos^n \theta$. On the basis of above information , answer the following questions.

Value of N is

A. 1

B. 2

C. 3

D. 4

Answer: B

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2. If number of solution and sum of solution of the equation $3\sin^2 x - 7\sin x + 2 = 0, x \in [0, 2\pi]$ are respectively N and S and $f_n(\theta) = \sin^n \theta + \cos^n \theta$. On the basis of above information , answer the following questions.

Value of S is

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

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

C. 2π

D. π

Answer: D

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3. If number of solution and sum of solution of the equation $3\sin^2 x - 7\sin x + 2 = 0, x \in [0, 2\pi]$ are respectively N and S and $f_n(\theta) = \sin^n \theta + \cos^n \theta$. On the basis of above information , answer the following questions.

If α is solution of equation $3\sin^2 x - 7\sin x + 2 = 0, x \in [0, 2\pi]$, then the value of $f_4(\alpha)$ is

A. $\frac{97}{81}$

B. $\frac{57}{81}$

C. $\frac{65}{81}$

D. 0

Answer: C

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4. Let $\log_a N = \alpha + \beta$ where α is integer and $\beta = [0, 1)$. Then , On the basis of above information , answer the following questions.

The difference of largest and smallest integral value of N satisfying $\alpha = 3$ and $a = 5$, is

A. 499

B. 500

C. 501

D. 502

Answer: A

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5. Find the minimum or maximum value of the function if $f(x) = 9x^2 + 12x + 2$

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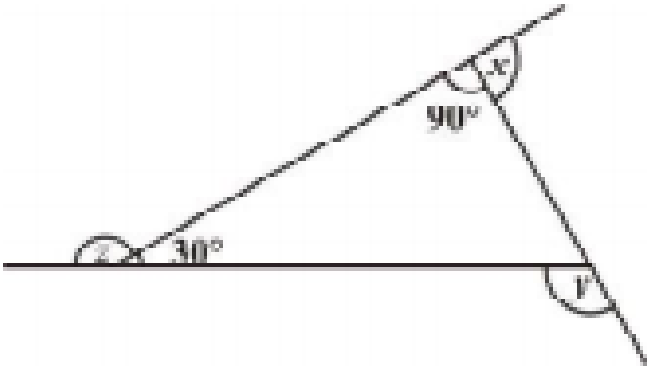
6. Find x+y+z



A. $150^\circ, 15^\circ, 15^\circ$

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

C. $120^\circ, 30^\circ, 30^\circ$

D. $75^\circ, 52.5^\circ, 52.5^\circ$

Answer: C

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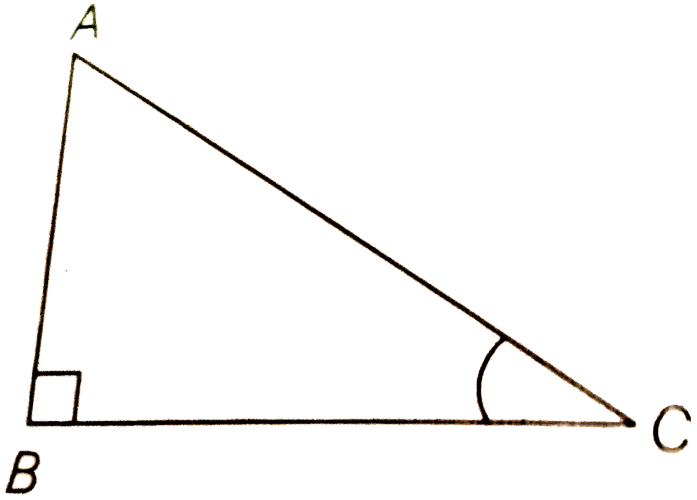
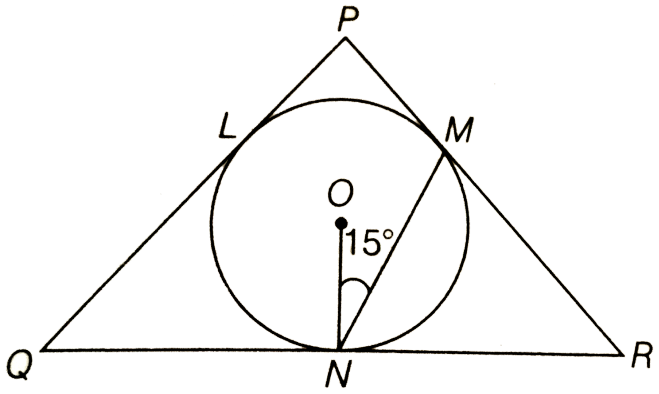
7. If an angle and a side of a right angle triangle is known , then rest of the sides and angles can be found as follows

In ΔABC(figure), if $\angle B = 90^\circ, \angle C = \theta$ and $BC = x$, then $AB = x\tan\theta$ and $AC = x\sec\theta$.



Now, consider in isosceles triangle PQR (Figure 2),



Where PQ=PR and $20N = \sqrt{3}$

On the basis of the above information answer the question

The angle of triangle PQR are

A. $\tan 15^\circ$

B. $\sqrt{3}\tan 15^\circ$

C. $\cot 15^\circ$

D. $\sqrt{3}\cot 15^\circ$

Answer: D

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8. Evaluate $\int \frac{1}{x+1} dx$

A. `

B.

C.

D.

Answer: A

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9. Evaluate $\int \frac{1}{x+5} dx$

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10. Find $\frac{dy}{dx}$ if $y = 2\sin x - \cos x$

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11. Consider the equation $5\sin^2 x + 3\sin x \cos x - 3\cos^2 x = 2$..... (i)

$\sin^2 x - \cos 2x = 2 - \sin 2x$..... (ii)

If $\tan\alpha, \tan\beta$ satisfy (i) and $\cos\gamma, \cos\delta$ satisfy (ii) , then $\tan\alpha \cdot \tan\beta + \cos\gamma + \cos\delta$ can be equal to

A. $\left(1 + \sqrt{69}/6\right.$

B. $-1-\sqrt{69}/6$

C. $\frac{-3+\sqrt{69}}{6}$

D. $\frac{3-\sqrt{69}}{3}$

Answer: A

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12. Find the number of solution of the equations

$\sin^3 x \cos x + \sin^2 x \cdot \cos^2 x + \sin x \cdot \cos^3 x = 1$, when $x \in [0, 2\pi]$

A. -1

B. $-\frac{5}{3}+\frac{2}{\sqrt{13}}$

C. $\frac{5}{3}-\frac{2}{\sqrt{13}}$

D. $\frac{5}{3}+\frac{2}{\sqrt{13}}$

Answer: B

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13. Evaluate $\int \frac{1}{2x+8}$`dx

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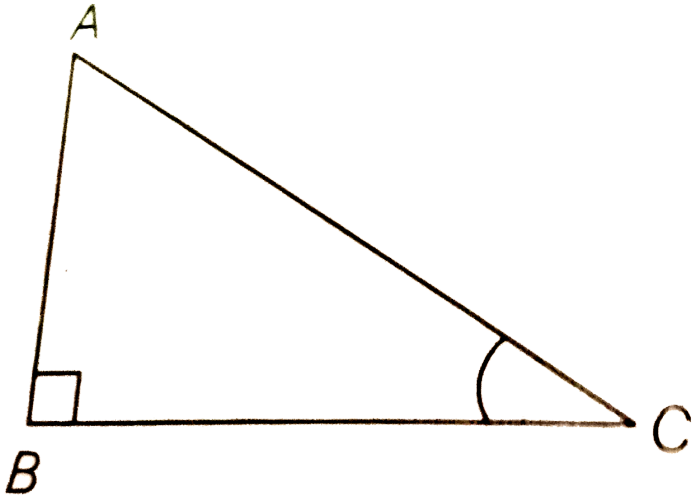
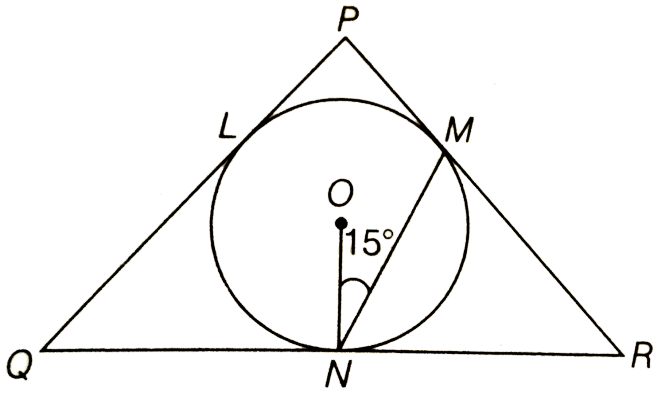
Trigonometric Equations And Inequations Exercise 3 Passage Based Questions

1. If an angle and a side of a right angle triangle is known , then rest of the sides and angles can be found as follows

In ΔABC(figure), if $\angle B = 90^\circ, \angle C = \theta$ and $BC = x$, then $AB = x\tan\theta$ and $AC = x\sec\theta$.



Now, consider in isosceles triangle PQR (Figure 2),



Where PQ=PR and $20N = \sqrt{3}$

On the basis of the above information answer the question

The angle of triangle PQR are

A. π

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

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

D. 3π

Answer: B

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Exercise Single Integer Answer Type Questions

1. Evaluate $\int_0^1 \frac{1}{x+1} dx$

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2. If the sum of the root of the equation $\cos 4x + 6 + 7\cos 2x$ in the interval [0,314] is $k\pi$, $k \in R$ Find (k-1248)

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3. Find $\frac{dy}{dx}$ if $ax + by^2 = \cos y$

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4. Number of ordered pair (x,y) which satisfies the relation $\frac{x^4+1}{8x^2} = \sin^2 y \cdot \cos^2 y$, where $y \in [0, 2\pi]$

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5. Find $\frac{dy}{dx}$ if $\sin(x-y)=3x$

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6. The value of $\sin\left(\cot^{-1}x\right)$ is equal to

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7. Let $p, q \in N$ and $q > p$, the number of solutions of the equation $q|\sin\theta| = p|\cos\theta|$ in the interval $[0, 2\pi]$ is

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8. If $\theta_1, \theta_2, \theta_3$ are three values lying in $[0, 3\pi)$ for which $\tan\theta = \lambda$, then the value of

$\left|\tan\left(\frac{\theta_1}{3}\right)\tan\left(\frac{\theta_2}{3}\right)+\tan\left(\frac{\theta_2}{3}\right)\tan\left(\frac{\theta_2}{3}\right)+\tan\left(\frac{\theta_3}{3}\right)\tan\left(\frac{\theta_1}{3}\right)\right|$ is

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9. If α be the smallest positive root of the equation $\sqrt{\sin(1-x)}=\sqrt{\cos x}$, then the approximate integeral value of α must be .

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10. Find the sum of all real values of X satisfying the equation $\left(x^2-5x+5\right)^{x^2+4x-60}=1$.

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11. If $\tan(\pi\cos\theta)=\cot(\pi\sin\theta)$,then $\cos^2(\theta-\pi/4)$ is equal to

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12. If $3\sin x + 4\cos x = 5$, then the value of $90\tan^2\left(\frac{x}{2}\right) - 60\tan\left(\frac{x}{2}\right) + 110$ is equal to

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Exercise Statement I And Ii Type Questions

1. Evaluate $\int_0^1 \frac{2}{2x+12}dx$

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2. Find the number of solution of the equations

$2^{\cos x} = |\sin x|$, when $x \in [-2\pi, 2\pi]$

A. Statement I is true , Statement II is true , Statement II is a correct explanation for Statement I.

B. Statement I is true , Statement II is true , Statement II is not a correct explanation for Statement II.

C. Statement I is true , Statement II is false

D. Statement I is false , Statement II true .

Answer: B

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3. Statement -1: If $2\sin 2x - \cos 2x = 1, x \neq (2n+1)\frac{\pi}{2}, n \in Z$, then $\sin 2x + \cos 2x = 5$

Statement-2: $\sin 2x + \cos 2x = \frac{1 + 2\tan x - \tan^2 x}{1 + \tan^2 x}$

A. A. Statement I is true , Statement II is true , Statement II is a correct explanation for Statement I.

B. B. Statement I is true , Statement II is true , Statement II is not a correct explanation for Statement II.

C. C. Statement I is true , Statement II is false

D. D. Statement I is false , Statement II true .

Answer: D

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4. Statement I The system of linear equations

$x + (\sin\alpha)y + (\cos\alpha)z = 0$

$x + (\cos\alpha)y + (\sin\alpha)z = 0$

$-x + (\sin\alpha)y - (\cos\alpha)z = 0$

has a not trivial solution for only one value of α lying between 0 and π.

Statement II $\begin{vmatrix} \sin x & \cos x & \cos x \\ \cos x & \sin x & \cos x \\ \cos x & \cos x & \sin x \end{vmatrix} = 0$

has no solution in the interval $-\pi/4 < x < \pi/4$.

A. Statement I is true , Statement II is true , Statement II is a correct explanation for Statement I.

B. Statement I is true , Statement II is true , Statement II is not a correct explanation for Statement II.

C. Statement I is true , Statement II is false

D. Statement I is false , Statement II true .

Answer: B

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5. Let $\theta \in (\pi/4, \pi/2)$, then

Statement I $(\cos\theta)^{\sin\theta} < (\cos\theta)^{\cos\theta} < (\sin\theta)^{\cos\theta}$

Statement II The equation $e^{\sin\theta} - e^{-\sin\theta} = 4$ ha a unique solution.

A. (a)Statement I is true , Statement II is true , Statement II is a correct explanation for Statement I.

B. (b)Statement I is true , Statement II is true , Statement II is not a correct explanation for Statement II.

C. (c)Statement I is true , Statement II is false

D. (d)Statement I is false , Statement II true .

Answer: C

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6. If $\exp\left[\left(\sin^2 x + \sin^4 x + \sin^6 x + ... \infty\right) \ \ln 2\right]$ satisfies the equation $y^2 - 9y + 8 = 0$, then the value of $\frac{\cos x}{\cos x + \sin x}, 0 < x < \frac{\pi}{2}$, is

A. Statement I is true , Statement II is true , Statement II is a correct explanation for Statement I.

B. Statement I is true , Statement II is true , Statement II is not a correct explanation for Statement II.

C. Statement I is true , Statement II is false

D. Statement I is false , Statement II true .

Answer: C

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Exercise Matching Type Questions

1. Evaluate $\int \frac{1}{e^x} dx$

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2. What is 7% Equals to

A. 0.07

B. 0.7

C. 0.007

D. 0.0007

Answer: A

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Trigonometric Equations And Inequations Exercise 6 Matching Type Questions

1. Evaluate $\int \frac{1}{e^{2x}} dx$

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Exercise Subjective Type Questions

1. Find the number of solution of the equations

$|\cot x| = \cot x + \frac{1}{\sin x}$, when $\in [0, 2\pi]$

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2. Find the number of solution of the equations

$\sin^3 x \cos x + \sin^2 x \cdot \cos^2 x + \sin x \cdot \cos^3 x = 1$, when $x \in [0, 2\pi]$

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3. Find the number of solution of the equations

$2^{\cos x} = |\sin x|$, when $x \in [-2\pi, 2\pi]$

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4. Find the number of solution of the equations

$|\cos x| = [x]$, (where [.] denotes the greatest integer function).

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5. Find the number of solution of the equations

$x + 2\tan x = \frac{\pi}{2}$, when $x \in [0, 2\pi]$

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6. The equation $\sin^4 x + \cos^4 x + \sin 2x + \alpha = 0$ is solvable for (a) $-\frac{5}{2} \leq \alpha \leq \frac{1}{2}$ (b) $-3 \leq \alpha < 1$ (c) $-\frac{3}{2} \leq \alpha \leq \frac{1}{2}$ (d) $-1 \leq \alpha \leq 1$

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7. If $32\tan^3\theta = 2\cos^2\alpha - 3\cos\alpha$ and $3\cos 2\theta = 1$ then the general value of α is

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8. Solve the following system of simultaneous equation for $xandy$.

$4^{\sin x} + 3^{1/\cos y} = 11\ 5x16^{\sin x} - 2x3^{1/\cos y} = 2$

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9. Find all number x , y that satisfy the equation

$$\left(\sin^2 x + \frac{1}{\sin^2 x}\right)^2 + \left(\cos^2 x + \frac{1}{\cos^2 x}\right)^2 = 12 + \frac{1}{2}\sin y.$$

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10. Find $\frac{dy}{dx}$ if $3x - 5y = \sec x$

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11. Solve for x and y , $1 - 2x - x^2 = \tan^2(x + y) + \cot^2(x + y)$.

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12. Solve the system of equations

$\tan^2 x + \cot^2 x = 2\cos^2 y$

$\cos^2 y + \sin^2 z = 1$

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13. Find all the pairs of x,y that satisfy the equation $\cos x + \cos y + \cos(x + y) = -\frac{3}{2}$

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14. Solve the equation $\cot\left(\frac{\theta}{2}\right) - \operatorname{cosec}\left(\frac{\theta}{2}\right) = \cot\theta$

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15. Find the general solution of $1 + \sin^3 x + \cos^3 x = \frac{3}{2}\sin 2x$

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16. Solve $(\log_{\sin x} 2)\left(\log_{\sin^2 x} a\right) = -1$ stating any condition on a' that may be required for the existence of the solution.

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17. Cosider the equation $\int_0^x \left(t^2 - 8t + 13\right)dt = x\sin(a/x)$

where x and a are values that satisfy the given equation, is

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18. If $\tan x = \frac{b}{a}$, find the value of $(a\cos 2x + b\sin 2x)$.

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19. Find all number of pairs x,y that satisfy the equation $\tan^4 x + \tan^4 y + 2\cot^2 x \cdot \cot^2 y = 3 + \sin^2(x+y)$.

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20. Determine all value of 'a' for which the equation $\cos^4 x - (a+2)\cos^2 x - (a+3) = 0$, possess solution.

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21. For $x \in (-\pi, \pi)$ find the value of x for which the given equation $\left(\sqrt{3}\sin x + \cos x\right)^{\sqrt{\sqrt{3}\sin 2x - \cos 2x + 2}} = 4$ is satisfied.

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22. Show that the equation , $\sec\theta + \operatorname{cosec}\theta = c$ has two roots between 0 and 2π , if $c^2 < 8$ and four root if $c^2 > 8$.

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23. Solve the equation $(\cos x - \sin x)\left(2\tan x + \frac{1}{\cos x}\right) + 2 = 0$

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Exercise Questions Asked In Previous 13 Years Exam

1. Let $S = \left\{x \in (-\pi, \pi) : x \neq 0, \pm\frac{\pi}{2}\right\}$. The sum of all distinct solutions of the equation $\sqrt{2}\sec x + \operatorname{cosec} x + 2(\tan x - \cot x)$ $= 0$ in the set S is equal to

A. $-\frac{7\pi}{9}$

B. $-\frac{2\pi}{9}$

C. 0

D. $\frac{5\pi}{9}$

Answer: C

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2. The number of distinct solution 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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3. For $x \in (0, \pi)$ the equation $\sin x + 2\sin 2x - \sin 3x = 3$ has

A. infinitely many solutions

B. three solutions

C. one solutions

D. no solutions

Answer: D

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4. Let $\varphi, \phi \in [0, 2\pi]$ be such that $2\cos\theta(1-\sin\phi) = \sin^2\theta\left(\tan\left(\frac{\theta}{2}\right) + \cot\theta/2\right)\cos\phi - 1, \tan(2\pi-\theta) > 0$ and $-1 < \sin\theta < -\frac{\sqrt{3}}{2}$ then φ lies between

A. $0 < \phi < \frac{\pi}{2}$

B. $\frac{\pi}{2} < \phi < \frac{4\pi}{3}$

C. $\frac{4\pi}{3} < \phi < \frac{3\pi}{2}$

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

Answer: A::C::D

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5. Evaluate $\int \frac{1}{\cot x} dx$

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

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7. 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 _____.

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8. The number of solutions of the pair of equations $2\sin^2\theta - \cos 2\theta = 0$

$2\cos^2\theta - 3\sin\theta = 0$ in the interval $[0, 2\pi]$ is

A. 0

B. 1

C. 2

D. 4

Answer: C

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9. The set of values of θ satisfying the inequatioin $2\sin^2\theta - 5\sin\theta + 2 > 0$, where $o < \theta < 2\pi$, is

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

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

C. $\left[0, \frac{\pi}{3}\right] \cup \left[\frac{2\pi}{3}, 2\pi\right]$

D. None of the above

Answer: A

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10. If $0 \leq x \leq 2\pi$, then the number of real values of x, which satisfy the equation $\cos x + \cos 2x + \cos 3x + \cos 4x = 0$, is

A. 3

B. 5

C. 7

D. 9

Answer: C

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11. The possible values of $\theta \in (0, \pi)$ such that $\sin(\theta) + \sin(4\theta) + \sin(7\theta) = 0$ are (1) $\frac{2\pi}{9}, \frac{i}{4}, \frac{4\pi}{9}, \frac{\pi}{2}, \frac{3\pi}{4}, \frac{8\pi}{9}$ (2) $\frac{\pi}{4}, \frac{5\pi}{12}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{3\pi}{4}, \frac{8\pi}{9}$ (3) $\frac{2\pi}{9}, \frac{\pi}{4}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{3\pi}{4}, \frac{35\pi}{36}$ (4) $\frac{2\pi}{9}, \frac{\pi}{4}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{3\pi}{4}, \frac{8\pi}{9}$

A. $\frac{2\pi}{9}, \frac{\pi}{4}, \frac{4\pi}{9}, \frac{\pi}{2}, \frac{3\pi}{4}, \frac{8\pi}{9}$

B. $\frac{\pi}{4}, \frac{5\pi}{12}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{3\pi}{4}, \frac{8\pi}{9}$

C. $\frac{2\pi}{9}, \frac{\pi}{4}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{3\pi}{4}, \frac{35\pi}{36}$

D. $\frac{2\pi}{9}, \frac{\pi}{4}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{3\pi}{4}, \frac{8\pi}{9}$

Answer: A

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12. The 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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