MATHS

BOOKS - PATHFINDER MATHS (BENGALI ENGLISH)

TRIGONOMETRIC RATIOS AND IDENTITIES

Question Bank

1. Express $\tan\theta$ in terms of $\cos\theta$

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2. If $\sin\theta + \sin^2\theta = 1$then prove that $\cos^{12}\theta + 3\cos^{10}\theta + 3\cos^8\theta + \cos^6\theta - 1 = 0$

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3. Prove that : $(\tan\theta + \cot\theta)^2 = \sec^2\theta + \cos ec^2\theta = \sec^2\theta \cos ec^2\theta$

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4. Find the general value of θ satisfying both $\sin\theta = \left(-\frac{1}{2}\right)$ and $\tan\theta = \frac{1}{\sqrt{3}}$

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5. find $\tan 75^\circ$

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6. Find the value of $\tan 13\frac{\pi}{12}$

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7. Prove that $70^\circ = \tan 20^\circ + 2\tan 50^\circ$

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8. if $A + B = 45^\circ$ find the value of (1+tan A)(1+ tan B)

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9. If $0 < \beta < \alpha < \left(\frac{\pi}{4}\right), \cos(\alpha + \beta) = \frac{3}{5}$ and $\cos(\alpha - \beta) = \frac{4}{5}$ then find the avlue of $\sin 2\alpha$

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10. If $2\sin\alpha\cos\beta\sin\gamma = \sin\beta\sin(\alpha + \gamma)$ then prove that $\tan\alpha, \tan\beta, \tan\gamma$ are in H.P.

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11. if cos(x-y)cosx and cos(x+y) are in H.P then evaluate $\left|\cos x . \frac{\sec y}{2}\right|$

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12. Prove that tan A+2 tn A+4 tan A+8cot 8A=cot A`

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13. Evaluate :

$\cos 12^{\circ} \cos 24^{\circ} \cos 36^{\circ} \cos 48^{\circ} \cos 72^{\circ} \cos 84^{\circ}$

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14. If α, β, γ are in A.P. show that $\cot \beta = \frac{\sin \alpha - \sin \gamma}{\cos \gamma - \cos \alpha}$

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15. prove $\sin\alpha + \sin\left(\alpha + \frac{2\pi}{3}\right) + \sin\left(\alpha + \frac{4\pi}{3}\right) = 0$

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16. Prove that $\frac{\cos 7x + \cos 5x}{\sin 7x - \sin 5x} = \cot x$

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17. if $\tan\left(\frac{\pi}{9}\right), x, \tan\left(\frac{5\pi}{18}\right)$ are in A.P. and $\tan\left(\frac{\pi}{9}\right), y, \tan\left(\frac{7\pi}{18}\right)$ are also in A.P. then find the relation between x and y

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18. find the value of k which satisfy $\tan\theta + \tan\left(\theta + \frac{\pi}{3}\right) + \tan\left(\theta - \frac{\pi}{3}\right) = k\tan 3\theta$

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19. $\sin^3 x . \sin 3x = \sum_{m \to 0}^{n} C_m \cos mx$ is an identity in x,where C_m s are constants then find the value of 'n'.

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20. Find $\sin\left(\frac{\pi}{n}\right) + \sin\left(\frac{3\pi}{n}\right) + \sin\left(\frac{5\pi}{n}\right) + \ldots\ldots\ldots$ to n terms

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21. Find θ if $\sin\theta - \cos\theta < 0$

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22. Find A/2 if $2\sin\left(\frac{A}{2}\right) = \sqrt{1+\sin A} + \sqrt{1-\sin A}$

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23. Find the range of A/2 if it satisfies $2\cos\left(\frac{A}{2}\right) = \sqrt{1+\sin A} - \sqrt{1-\sin A}$

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24. Find the maximum and minimum of 3sin 2x+4 cos 2x+3

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25. Prove that $-4 \leq 5\cos\theta + 3\cos\left(\theta + \frac{\pi}{3}\right) + 3 \leq 10$ for all values of θ

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26. Find the maximum value of$1 + \sin\left(\frac{\pi}{4} + \theta\right) + 2\cos\left(\frac{\pi}{4} - \theta\right)$ for all real values of θ

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27. Find $\cos(\alpha+\beta)$ if $\tan\left(\frac{\alpha}{2}\right)$ and $\tan\left(\frac{\beta}{2}\right)$ are roots of the equiation $8x^2-26x+15=0$

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28. If $\sec\alpha$ and $\operatorname{cosec}\alpha$ are the roots of $x^2-px+q=0$ then prove that $p^2=q(q+2)$

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29. If $A+B+C=180^\circ$ then prove that $\sin\left(\frac{A}{2}\right)+\sin\left(\frac{B}{2}\right)+\sin\left(\frac{C}{2}\right)=1+4\sin\left(\frac{\pi-A}{4}\right)\sin\left(\frac{\pi-B}{4}\right)\sin\left(\frac{\pi-C}{4}\right)$

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30. If x+y+z=xyz then prove that $\frac{3x-x^3}{1-3x^2}+\frac{3y-y^3}{1-3y^2}+\frac{3z-z^3}{1-3z^2}=\frac{3x-x^3}{1-3x^2}.\frac{3y-y^3}{1-3y^2}.\frac{3z-z^3}{1-3z^2}$

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31. Simplify the product $\cos A\cos 2A\cos 2^2A.\ldots..\cos 2^{n-1}A$

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32. Prove that the value of $\sum_{r=0}^{10}\cos^3\left(\frac{r\pi}{3}\right)$ is equal to $-\frac{1}{8}$

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33. If sinx+cosx=m and secx+cosecx=n prove that $n\left(m^2-1\right)=2m$

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34. if $x \sin^3\theta + y\cos^3\theta = \sin\theta\cos\theta$ and $x\sin\theta - y\cos\theta = 0$ prove that $x^2 + y^2 = 1$

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35. Show that $\frac{\sin^2\theta}{1-\cot\theta} + \frac{\cos^2\theta}{1-\tan\theta} = 1 + \sin\theta\cos\theta$

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36. If a $\sec\alpha + b\tan\alpha = d$ and $b\sec\alpha + a\tan\alpha = c$ prove that $a^2 + c^2 = b^2 + d^2$

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37. If a $\cos^3\theta + 3a\cos\theta\sin^2\theta = x$ and $a\sin^3\theta + 3a\cos^2\theta\sin\theta = y$ prove that $(x+y)^{\frac{2}{3}} + (x-y)^{\frac{2}{3}} = 2a^{\frac{2}{3}}$

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38. If $\cos\alpha = \frac{1}{2}\left(x + \frac{1}{x}\right), \cos\beta = \frac{1}{2}\left(y + \frac{1}{y}\right)$ then evaluate $\cos(\alpha - \beta)$

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39. If cos 2x + 2 cosx = 1 then evaluate $\sin^2 x\left(2 - \cos^2 x\right)$

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40. Prove that $\sqrt{3}\cos ec20^\circ - \sec 20^\circ = 4$

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41. Without using tables prove that $(\sin 12^\circ)(\sin 48^\circ)(\sin 54^\circ)$=1/8`

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42. In any triangle prove that $\cot\left(\frac{A}{2}\right)+\cot\left(\frac{B}{2}\right)+\cot\left(\frac{C}{2}\right)=\cot\left(\frac{A}{2}\right)\cot\left(\frac{B}{2}\right)\cot\left(\frac{C}{2}\right)$

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43. Find the value of $\left(1+\cos\left(\frac{\pi}{8}\right)\right)\left(1+\cos\left(3\frac{\pi}{8}\right)\right)\left(1+\cos\left(5\frac{\pi}{8}\right)\right)\left(1+\cos\left(7\frac{\pi}{8}\right)\right)$

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44. Find the value of $\frac{\sqrt{(1+\sin 2A)}+\sqrt{1-\sin 2A}}{\sqrt{1+\sin 2A}-\sqrt{1-\sin 2A}}$ when $|\tan A|<1$ and $|A|$ is acute.

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45. Find the maximum and minimum value of 6sinx cosx +4cos2x

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46. If $f(x) = \frac{\sin 3x}{\sin x}, X \neq n\pi$ then find range of f(x)

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47. Find the maximum and minimum value of $\cos^2\theta - 6\sin\theta.\cos\theta + 3\sin^2\theta + 2$

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48. Prove that $\sin 6^\circ \sin 42^\circ \sin 66^\circ \sin 78^\circ = \frac{1}{16}$

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49. if $0 < \alpha, \beta, \gamma < \left(\frac{\pi}{2}\right)$ prove that $\sin\alpha + \sin\beta + \sin\gamma > \sin(\alpha + \beta + \gamma)$

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50. Show that $\sin\left(\frac{\pi}{n}\right) + \sin\left(3\frac{\pi}{n}\right) + \sin\left(5\frac{\pi}{n}\right) + \ldots . nterms = 0$

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51. $\frac{\tan\theta + \sec\theta - 1}{\tan\theta - \sec\theta + 1} =$

A. $\frac{1 - \sin\theta}{\cos\theta}$

B. $\frac{1 - \cos\theta}{\sin\theta}$

C. $\frac{1 + \sin\theta}{\cos\theta}$

D. `(1+costheta)/sintheta

Answer: C

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52. If $\sec\theta = \sqrt{2}$ and $\frac{3\pi}{2} < \theta < 2\pi$. Then the value of $\frac{1 + \tan\theta + \cos ec\theta}{1 + \cot\theta - \cos ec\theta}$ is

A. (-1)

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

C. $\left(-\sqrt{2} \right)$

D. 1

Answer: A

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53. $\frac{\cos ec(2\pi + \theta)\cos(2\pi + \theta)\tan\left(\frac{\pi}{2} + \theta\right)}{\sec\left(\frac{\pi}{2} + \theta\right)\cos\theta\cot(\pi + \theta)}$

A. 2

B. 4

C. (-1)

D. 1

Answer: D

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54. In triangle ABC, right angled at C, (tanA+tanB) equal to

A. a+b

B. $\frac{c^2}{ab}$

C. $\frac{a^2}{bc}$

D. $\frac{b^2}{ac}$

Answer: B

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55. If $\sin\theta$ and $\cos\theta$ are the roots of the equation $ax^2 - bx + c = 0$, then a, b and c satisfy the relation

A. $a^2 + b^2 = 2ac$

B. $a^2 - b^2 = 2ac$

C. $a^2 + b^2 = c^2$

D. $b^2 - a^2 = 2ac$

Answer: D

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56. $(\cos\alpha + \cos\beta)^2 + (\sin\alpha + \sin\beta)^2 =$

A. $4\sin^2\left(\frac{\alpha+\beta}{2}\right)$

B. $4\cos^2\left(\frac{\alpha+\beta}{2}\right)$

C. $4\sin^2\left(\frac{\alpha-\beta}{2}\right)$

D. $4\cos^2\left(\frac{\alpha-\beta}{2}\right)$

Answer: D

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57. If $\tan\beta = \frac{2\sin\alpha\sin\gamma}{\sin(\alpha+\gamma)}$, then $\cot\alpha, \cot\beta, \cot\gamma$ are in

A. G.P.

B. H.P.

C. A.G.P

D. A.P.

Answer: D

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58. If $(1+\tan 1^\circ)(1+\tan 2^\circ)....(1+\tan 45^\circ) = 2^n$, then the value of n is

A. 22

B. 23

C. 24

D. 25

Answer: B

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59. If $\alpha + \beta = \left(\frac{\pi}{2}\right)$ and $\beta + \gamma = \alpha$, then the $\tan\alpha$ equals:

A. $2(\tan\beta + \tan\gamma)$

B. $\tan\beta + \tan\gamma$

C. $\tan\beta + 2\tan\gamma$

D. $2\tan\beta + \tan\gamma$

Answer: C

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60. If $\sec(\theta + \alpha) + \sec(\theta - \alpha) = \frac{2}{\cos\theta}$. then $\cos^2\theta$ is equal to

A. $1 - \cos\alpha$

B. $1 + \cos\alpha$

C. $\sin\alpha$

D. $1 - \sin\alpha$

Answer: B

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61. If tanA=(1-cosB)/sinB, then

A. tanA=tanB/2

B. tanA=tanB

C. tan(A/2) = tanB

D. none of these

Answer: A

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62. If m and M be the minimum and maximum value of $10\cos^2 x - 6\sin x\cos x + 2\sin^2 x$ respectively then M+m is equal to

A. 1

B. 11

C. 10

D. 12

Answer: D

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63. $3(\sin x - \cos x)^4 + 6(\sin x + \cos x)^2 + 4\left(\sin^6 x + \cos^6 x\right)$ is equal to

A. 11

B. 12

C. 13

D. 14

Answer: C

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64. If $\tan x=(b/a)$, then $a\cos 2x+b\sin 2x$ is equal to

A. a

B. b

C. a/b

D. b/a

Answer: A

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65. $\tan 9^\circ - \tan 27^\circ - \tan 63^\circ + \tan 81^\circ$ is equal to

A. 0

B. 1

C. (-1)

D. 4

Answer: D

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66. $\frac{1+\sin\theta-\cos\theta}{1+\sin\theta+\cos\theta}$=

A. $\cot\left(\frac{\theta}{2}\right)$

B. $\sin\left(\frac{\theta}{2}\right)$

C. $\cos\left(\frac{\theta}{2}\right)$

D. $\tan\left(\frac{\theta}{2}\right)$

Answer: D

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67. The number of ordered pairs (α, β), where $\alpha, \beta \in (-\pi, \pi)$ satisfying $\cos(\alpha - \beta) = 1$ and $\cos(\alpha - \beta) = 1$ and $\cos(\alpha + \beta) = \frac{1}{e}$ is

A. 0

B. 1

C. 2

D. 4

Answer: D

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68. The number of solutions of the equation $\frac{x}{100} = \sin x$ is

A. 63

B. 32

C. 33

D. 0

Answer: A

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69. If $m\tan(\theta - 30^\circ) = n\tan(\theta + 120^\circ)$, then $\cos 2\theta$ is equal to

A. $\frac{m-n}{2(m+n)}$

B. m+n

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

D. m-n

Answer: C

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70. The equation $\cos 2x + a \sin x = 2a - 7$ possessses a solution if

A. $a < 2$

B. $2 \leq a \leq 6$

C. $a > 6$

D. a is any integer

Answer: B

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71. $\dfrac{\sin 5\theta + \sin 2\theta - \sin \theta}{\cos 5\theta + 2\cos 3\theta + 2\cos^2 \theta + \cos \theta}$ is equal to

A. $\tan \theta$

B. $\cos \theta$

C. $\cot \theta$

D. none of these

Answer: A

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72. If $4n\alpha = \pi$, then $\cot\alpha \cot 2\alpha \cot 3\alpha \ldots. \cot(2n-1)\alpha$ is equal to

A. 0

B. 1

C. n

D. n^2

Answer: B

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73. If $\theta \neq (2n+1)\frac{\pi}{2}.\, n \in I,$ then the least value of $(\sin\theta + \cos ec\theta)^2 + (\cos\theta + \sec\theta)^2$ is

A. 2

B. 4

C. 8

D. 9

Answer: D

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74. If $\sin x + \sin^2 x = 1$n then the value of $\cos^{12} x + 3\cos^{10} x + 3\cos^8 x + \cos^6 x - 1$ is equal to

A. 0

B. 1

C. 2

D. $\sin^2 x$

Answer: D

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75. If

$\text{coses}\theta - \sin\theta = m, \sec\theta - \cos\theta = n, \text{eliminate}\theta$

A. 0

B. 1

C. (-1)

D. 2

Answer: B

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76. Find the value of $\left(1+\cos\left(\frac{\pi}{8}\right)\right)\left(1+\cos\left(3\frac{\pi}{8}\right)\right)\left(1+\cos\left(5\frac{\pi}{8}\right)\right)\left(1+\cos\left(7\frac{\pi}{8}\right)\right)$

A. 44198

B. $\cos\left(\frac{\pi}{8}\right)$

C. 44204

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

Answer: C

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77. $\left(\cos^4\left(\frac{\pi}{8}\right)\right)+\left(\cos^4\left(\frac{3\pi}{8}\right)\right)+\left(\cos^4\left(\frac{5\pi}{8}\right)\right)+\left(\cos^4\left(\frac{7\pi}{8}\right)\right)$ is

A. 44/198

B. 44200

C. 442/57

D. 3/2

Answer: C

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78. The value of $\sum_{r=1}^{9} \frac{\sin^2(r\pi)}{18}$ =

A. 2

B. 3

C. 4

D. 5

Answer: D

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79. If $A + B + C = \frac{3\pi}{2}$, then cos2A +cos2B+cos2C is

A. 1-4 cosA cosB cosC

B. 4 sinA sinB sinC

C. 1+2 cosA cosB cosC

D. 1-4 sin A sin B sin C

Answer: D

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80. The number of points of intersection of 2y=1 and y=sinx, $-2\pi \leq x \leq 2\pi$

A. 1

B. 2

C. 3

D. 4

Answer: D

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81. If $\sin\alpha, \sin\beta$ and $\cos\alpha$ are in G.P. then roots of the equation $x^2 + 2x\cot\beta + 1 = 0$ are always.

A. equal

B. real

C. imaginary

D. greater than 1

Answer: B

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82. If $x = \sec\phi - \tan\phi$ and $y = \cos ec\phi + \cot\phi$, then

A. xy+1=x-y

B. xy+1=y-x

C. xy+1=x+y

D. none of these

Answer: B

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83. For any triangle ABC,

$\frac{(a+b+c)(b+c-a)(c+a-b)(a+b-c)}{4b^2c^2}$ is equal to

A. cos2a

B. 1+cosA

C. 1-cosA

D. $\sin^2 A$

Answer: D

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84. Which one is correct?

A. $\sin 1^\circ > \sin 1$

B. $\sin 1^\circ < \sin 1$

C. $\sin 1^\circ = \sin 1$

D. $\sin 1^\circ = \frac{\pi}{180} \sin 1$

Answer: B

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85. In a ΔABC, if $\cot A \cot B \cot C > 0$, then the Δ is

A. acute angled

B. right angled

C. abtuse angle

D. does not exist

Answer: A

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86. $\cos\left(\frac{\pi}{14}\right)+\cos\left(\frac{3\pi}{14}\right)+\cos\left(\frac{5\pi}{14}\right)=$

A. $\frac{1}{2}\tan\left(\frac{\pi}{14}\right)$

B. $\frac{1}{2}\cos\left(\frac{\pi}{14}\right)$

C. $\frac{1}{2}\cot\left(\frac{\pi}{14}\right)$

D. None of these

Answer: C

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87. If $\frac{2\sin\alpha}{1+\cos\alpha+\sin\alpha}$=x, then $\frac{1-\cos\alpha+\sin\alpha}{1+\sin\alpha}$=

A. 1/x

B. x

C. 1+x

D. 1-x

Answer: D

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88. If $\sec\alpha$ and $\cos ec\alpha$ are two roots of $x^2 - px + q = 0$ then

A. $p^2q^2 = 2q + 1$

B. `p^2=q(q+2)

C. $p^2 = q(q-2)$

D. None of these

Answer: A

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89. If $\cos\theta + \sec\theta = (-2)$ then $\cos^n\theta + \sec^n\theta$= (If n is even)

A. 2

B. (-2n)

C. 3n

D. None of these

Answer: A

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90. Given $A = \sin^2\theta + \cos^4\theta$. Then for all real values of θ, which one is correct ?

A. $1 < A < 2$

B. $\left(\frac{3}{4}\right) \leq A \leq 1$

C. $\left(\frac{13}{16}\right) \leq A \leq 1$

D. $\left(\frac{3}{4}\right) \leq A \leq \left(\frac{13}{16}\right)$

Answer: B

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91. The minimum value of cos(cosx) is

A. 0

B. (-cos1)

C. cos1

D. (-1)

Answer: C

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92. If $S = \cos^2\left(\frac{\pi}{n}\right) + \cos^2\left(\frac{2\pi}{n}\right) + ... + \frac{\cos^2((n-1)\pi)}{n}$, then S equals

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93. If $\cos 5\theta = a\cos\theta + b\cos^2\theta + c.\cos^5\theta = d$, then

A. a=20

B. b=(-30)

C. a+b+c=2

D. a+b+c+d=1

Answer: D

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94. prove that In an acute angled triangle ABC, $\sec A + \sec B + \sec C \geq 6$ is

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95. If $T_n = \sin^n\theta + \cos^n\theta$, then $\frac{T_6 - T_4}{T_6} = m$ holds for value of m satisfying

A. $m \in \left[-1, \left(\frac{1}{3}\right)\right]$

B. $m \in \left[0, \left(\frac{1}{3}\right)\right]$

C. $m \in [-1, 0]$

D. $m \in \left(-1, \left(-\frac{1}{2}\right)\right)$

Answer: C::D

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96. Value of the expression 2sinx-cos2x is

A. greater than(-3/2)

B. equal to (-3/2)

C. less than (-3/2)

D. none of these

Answer: A::B

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97. The range of function $\tan\left(\frac{\pi}{4}\sin^2 x\right)$ must be

A. a proper subset of [-1,1]

B. [-1,1]

C. [0,1]

D. [-sqrt2,sqrt2]

Answer: A::C

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98. The inequation $4\sin 3x + 5 \geq 4\cos 2x + 5\sin x$

A. is equivalent to $\sin x \leq 1$

B. is equivalent to $\sin x \geq 1$

C. is true for all x

D. is true only when sinx=1

Answer: A::C

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99. If $7\cos x - 24\sin x = d\cos(x+\alpha), o < \alpha < \frac{\pi}{2}$, be true for all $x \in R$, then

A. d=25

B. $\alpha = \sin^{-1}\left(\frac{24}{25}\right)$

C. d=-25

D. $\alpha = \cos^{-1}\left(\frac{7}{24}\right)$

Answer: A::B

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100. Prove that $|\sin\theta\sin(60^\circ-\theta)\sin(60^\circ+\theta)| \leq \frac{1}{4}$ for all values of θ.

A. the minimum value of y is (-1/4)

B. the maximum value of y is 1

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

D. $y \geq -1$

Answer: A::C

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101. In a ΔABC

A. $\sin A \sin B \sin C \leq \frac{3\sqrt{3}}{8}$

B. $\sin^2 A + \sin^2 B + \sin^2 C \leq \frac{9}{4}$

C. sinAsinBsinC is always positive

D. sin^2(A)+sin^2(B)<1+cosC

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

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102. In a triangle $\tan A + \tan B + \tan C = 6$ and $\tan A \tan B = 2$, then the values of tanA, tanB and tanC are

A. 1,2,3

B. 2,1,3

C. 1,2,0

D. none of these

Answer: A::B

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103.

$0 < \theta < \frac{\pi}{2}$, if $x = \sum_{n=0}^{\infty} \cos^{2n}\theta, y = \sum_{n=0}^{\infty} \sin^{2n}\theta, z = \sum_{n=0}^{\infty} \cos^{2n}\theta \sin^{2n}\theta$

A. xyz=xz+y

B. xyz=xy+z

C. xyz=x+y+z

D. xyz=yz+x

Answer: B::C

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104. If $\tan\alpha$ and $\tan\beta$ are the roots of the equation $x^2 + px + q = 0 (p \neq 0)$, then

A. $\sin^2(\alpha+\beta) = q$

B. $\tan(\alpha+\beta) = \frac{p}{q-1}$

C. $\cos(\alpha+\beta) = 1-q$

D. `sin(alpha+beta)=-p

Answer: B

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105. Let $f(\theta, \alpha) = 2\sin^2\theta + 4\cos(\theta + \alpha)\sin\theta.\sin\alpha + \cos 2(\theta + \alpha)$

The value of $f\left(\frac{\pi}{3}, \frac{\pi}{4}\right)$ is

A. 0

B. 1

C. 2

D. 3

Answer: A

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106. Let $f(\theta, \alpha) = 2\sin^2\theta + 4\cos(\theta + \alpha)\sin\theta.\sin\alpha + \cos 2(\theta + \alpha)$

The value of $f\left(\frac{\pi}{3}, \frac{\pi}{4}\right)$ is

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107. Let $f(\theta) = \sqrt{a^2 \cos^2 \theta + b^2 \sin^2 \theta} + \sqrt{a^2 \sin^2 \theta + b^2 \cos^2 \theta}$

Maximum value of $[f(\theta)]^2$

A. $(a+b)^2$

B. $(a-b)^2$

C. $2(a^2+b^2)$

D. $2\sqrt{a^2+b^2}$

Answer: A

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108. Let $f(\theta) = \sqrt{a^2 \cos^2 \theta + b^2 \sin^2 \theta} + \sqrt{a^2 \sin^2 \theta + b^2 \cos^2 \theta}$

Minimum value of $[f(\theta)]^2$

A. $(a+b)^2$

B. $(a-b)^2$

C. $2(a^2+b^2)$

D. `2sqrt(a^2+b^2)

Answer: C

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109. If $\cos\left(\frac{\pi}{7}\right), \cos\left(\frac{3\pi}{7}\right), \cos\left(\frac{5\pi}{7}\right)$ are the roots of the equation $8x^3 - 4x^2 - 4x + 1 = 0$

The value of $\sec\left(\frac{\pi}{7}\right) + \sec\left(\frac{3\pi}{7}\right) + \sec\left(\frac{5\pi}{7}\right)$ is

A. 2

B. 4

C. 8

D. none of thesee

Answer: B

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110. If $\cos\left(\frac{\pi}{7}\right), \cos\left(\frac{3\pi}{7}\right), \cos\left(\frac{5\pi}{7}\right)$ are the roots of the equation $8x^3 - 4x^2 - 4x + 1 = 0$

The value of $\sec\left(\frac{\pi}{7}\right) + \sec\left(\frac{3\pi}{7}\right) + \sec\left(\frac{5\pi}{7}\right)$ is

A. $x^3 - 35x^2 + 7x - 21 = 0$

B. $x^3 - 35x^2 + 21x - 7 = 0$

C. $x^3 - 21x^2 + 35x - 7 = 0$

D. $x^3 - 21x^2 + 7x - 35 = 0$

Answer: C

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111. Match List - I with List-II

List - I		List - II	
(1)	Circular plate is expanded by heat from radius 5 cm to 5.06 cm. Approximate increase in area is	(P)	4
(2)	If an edge of a cube increases by 1%, then percentage increase in volume is	(Q)	0.6π
(3)	If the rate of decrease of $\frac{x^2}{2}-2x+5$ is twice the rate of decrease of x, then x is equal to (rate of decreases is non-zero)	(R)	3
(4)	Rate of increase in area of equilateral triangle of side 15 cm, when each side is increasing at the rate of 0.1 cm/s, is	(S)	$\frac{3\sqrt{3}}{4}$

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112. Match List - I with List-II

List - I		List - II	
(1)	Circular plate is expanded by heat from radius 5 cm to 5.06 cm. Approximate increase in area is	(P)	4
(2)	If an edge of a cube increases by 1%, then percentage increase in volume is	(Q)	0.6π
(3)	If the rate of decrease of $\frac{x^2}{2}-2x+5$ is twice the rate of decrease of x, then x is equal to (rate of decreases is non-zero)	(R)	3
(4)	Rate of increase in area of equilateral triangle of side 15 cm, when each side is increasing at the rate of 0.1 cm/s, is	(S)	$\frac{3\sqrt{3}}{4}$

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113. If $\cos x + \sin x = \sqrt{2}\cos x$ and cosx-sinx=k.sinx, then $k^2 = ?$

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114. If $\sin\theta + \cos\theta = 1$, then find the minimum value of $(1 + \sec\theta)(1 + \cos ec\theta)$

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115. If M be the maximum value of $1 + 2\sin x + 3\cos x$, then 3M-10 is equal to

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116. If $4n\alpha = \pi$, then the numerical value of $\tan\alpha, \tan 2\alpha, \tan 3\alpha \ldots . \tan(2n-1)\alpha$ is equal to

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117. If $\alpha = \frac{\pi}{15}$ and $\cos 2\alpha \cos 4\alpha \cos 8\alpha \cos 14\alpha = \lambda$ then $2^6\lambda$ is equal to

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118. $0 < x < \frac{\pi}{4}$ and $\frac{\pi}{4} < y < \frac{\pi}{2}$ and $\sum_{k=0}^{\infty}(-1)^k \tan^{2k} x = p$ $\sum_{k=0}^{\infty}(-1)^k \cot^{2k} y = q$, then find the reciprocal value of $\sum_{k=0}^{\infty}(-1)^k \tan^{2k} x \cot^{2k} y = q$

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119. The number of sides of two regular polygons are in the ratio 5:4 and the difference between their interior and is 9° . find the number of sides in the two polygons.

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120. If cosx=-3./5 x lies in the third quadrant fins the values of other five trignometric functions.

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121. If $\tan\alpha = \frac{m}{m+1}, \tan\beta = \frac{1}{2m+1}$ prove that $\alpha + \beta = \frac{\pi}{4}$

Watch Video Solution

122. If $\frac{\sin(\theta+\alpha)}{\cos(\theta-\alpha)} = \frac{1-m}{1+m}$ prove that $\tan\left(\left(\frac{\pi}{4}\right)-\theta\right)\tan\left(\left(\frac{\pi}{4}\right)-\alpha\right) = m$

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123. Prove that $\cos\alpha + \cos\beta + \cos\gamma + \cos(\alpha+\beta+\gamma) = 4\cos\left(\frac{\alpha+\beta}{2}\right)\cos\left(\frac{\beta+\gamma}{2}\right)\cos\left(\frac{\gamma+\beta}{2}\right)$

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124. prove that

(sinA+sin3A+sin5A+sin7A)/(cosA+cos3A+cos5A+cos7A)=tan4A

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125. show that $\frac{\sin x}{\cos 3x} + \frac{\sin 3x}{\cos 9x} + \frac{\sin 9x}{\cos 27x} = \frac{1}{2}(\tan 27x - \tan x)$

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126. If in a triangle ABC $\cot\left(\frac{A}{2}\right) + \cot\left(\frac{C}{2}\right) = 2\cot\left(\frac{B}{2}\right)$ then find the minimum value of $\cot\left(\frac{B}{2}\right)$

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127. If in $\triangle ABC$ cosA+cosB+cosC=3/2 then prove that triangle is equilateral

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128. If $\tan\left(\frac{\alpha}{2}\right) = \sqrt{\frac{a-b}{a+b}}\tan\left(\frac{\beta}{2}\right)$ prove that $\cos\alpha = \frac{a\cos\beta + b}{a + b\cos\beta}$

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129. If $\tan\alpha = \frac{1}{7}, \sin\beta = \frac{1}{\sqrt{10}}$ prove that $\alpha + 2\beta = \left(\frac{\pi}{4}\right)$ where $0 < \alpha < \frac{\pi}{2}$ and $0 < \beta < (\pi/2)$

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130. Show that $2^{\sin x} + 2^{\cos x} \geq 2^{1-\left(\frac{1}{\sqrt{2}}\right)}$

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131. $\frac{\sin(-660^\circ)\tan(1050^\circ).\sec(420^\circ)}{\cos(225^\circ)\cos ec(315^\circ)\cos(510^\circ)} =$

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

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

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

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

Answer: C

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132. If $A + B + C = 180^\circ$ and $\tan A + \tan B + \tan C \geq k$ where A,B,C are acute angles then the value of [k] where [.] denotes G.I.F is

A. 3

B. 4

C. 5

D. none of these

Answer: C

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133. The value of $\sin\theta$ and $\tan\theta$ if $\cos\theta = \left(-\frac{12}{13}\right)$ and θ lies in the third quadrant is

A. (-5/13) and (5/12)

B. 95/12) and (-5/13)

C. (-12/13) and (-5/13)

D. none of these

Answer: A

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134. The expression $3\left\{\sin^4\left(\left(3\frac{\pi}{2}\right)-\alpha\right)+\sin^4(3\pi-\alpha)\right\}-2\left\{\sin^6\left(\frac{\pi}{2}+\alpha\right)+\sin^6(5\pi-\alpha)\right\}$ is equal to

A. 0

B. 1

C. 3

D. $\sin 4\alpha = \cos 6\alpha$

Answer: B

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135. $\cos 510^\circ \cos 330^\circ + \sin 390^\circ \cos 120^\circ =$

A. 2

B. (-1)

C. 0

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

Answer: B

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136. If ABCD is a cyclic quadrilateral then the value of cosA+cosB+cos C+cos D is

A. 0

B. 1

C. 2(cosB-cosD)

D. 2(cosA-cosC)

Answer: A

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137. If (secA-tan A)(secB -tan B)(sec C-tan C)(sec A+tan A)(sec B+tan B)(sec C+tan C) is equal to

A. ± 1

B. 1

C. (-1)

D. none of these

Answer: B

Watch Video Solution

138. The value of the expression $1 - \frac{\sin^2 y}{1+\cos y} + \frac{1+\cos y}{\sin y} - \frac{\sin y}{1-\cos y}$ is equal to

A. 0

B. 1

C. siny

D. cosy

Answer: D

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139. $\sin^2 A + \sin^2(A-B) + 2\sin A \cos B \sin(B-A)$ is equal to

A. $\sin^2 A$

B. $\sin^2 B$

C. $\cos^2 A$

D. $\cos^2 B$

Answer: B

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140. Let A and B denote the statements A:$\cos\alpha + \cos\beta + \cos\gamma = 0$,B: $\sin\alpha + \sin\beta + \sin\gamma = 0$ if $\cos(\beta - \alpha) + \cos(\gamma - \alpha) + \cos(\alpha - \beta) = \left(-\frac{3}{2}\right)$ then

A. A is true and B is false

B. A is false and B is true

C. both A and B are trure

D. both A and B are false

Answer: C

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141. If $\tan\beta = \dfrac{n\sin\alpha\cos\beta}{1-n\cos^2\alpha}$ then $\tan(\alpha+\beta)$ is equal to

A. $(n-1)\tan\alpha$

B. $(n+1)\tan\alpha$

C. $\dfrac{\tan\alpha}{n+1}$

D. `tanalpha/(1-n)

Answer: D

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142. The value of $\sin 20^\circ \sin 40^\circ \sin 60^\circ \sin 80^\circ$ is

A. (3/8)

B. (1/8)

C. (3/16)

D. none of these

Answer: C

Watch Video Solution

143. In a triangle ABC,sin A-cos B=cosC,then angle B is

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

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

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

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

Answer: A

Watch Video Solution

144. If $U_n = 2\cos n\theta$ then $U_1U_n - U_{n-1}$ is equal to

A. U_{n+2}

B. U_{n+1}

C. $U_2 U_{n+1}$

D. none of these

Answer: B

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145. If $\pi < 2\theta < \frac{3\pi}{2}$ then $\sqrt{2+\sqrt{2+2\cos 4\theta}}$ is equal to

A. $(-2\cos\theta)$

B. $(-2\sin\theta)$

C. $2\cos\theta$

D. $2\sin\theta$

Answer: D

Watch Video Solution

146. If$\cos 5\theta = a\cos^5\theta + b\cos^3\theta + os\theta$ then c is equal to

A. (-5)

B. 1

C. 5

D. none of these

Answer: C

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147. Let n be an odd integer if $\sin n\theta = \sum_{r=0}^{n} b_r \sin^r\theta$ every value of θ then

A. $b_0 = 1, b_1 = 3$

B. $b_0 = 0, b_1 = n$

C. $b_0 = (-1), b_1 = n$

D. $b_0 = 0, b_1 = n^2 + 3n + 3$

Answer: B

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148. if $x \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ then the minimum value of $\cos^2 x + \left(\frac{\sec x}{4}\right)$ is

A. (3/2)

B. (3/4)

C. (5/4)

D. $3\sqrt{3} \div \frac{2}{4}\sqrt{3}$

Answer: B

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149. The number of real solutions of the equation $\sin(e^x) = 2^x + 2^{-x}$ is

A. 1

B. 0

C. 2

D. infinite

Answer: B

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150. The maximum value of $4\sin^2 x + 3\cos^2 x + \sin\left(\frac{x}{2}\right) + \cos\left(\frac{x}{2}\right)$ is

A. $4 + \sqrt{2}$

B. $3 + \sqrt{2}$

C. 9

D. 4

Answer: A

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151. If $\sin^2\theta = \sin\phi\cos\phi$ then the value of $\cos 2\theta$ is

A. $\cos^2\left(\frac{\pi}{4}+\phi\right)$

B. $2\cos^2\left(\frac{\pi}{4}+\phi\right)$

C. $3\cos^2\left(\frac{\pi}{4}+\phi\right)$

D. $4\cos^2\left(\frac{\pi}{4}+\phi\right)$

Answer: B

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152. If in a triangle ABC,$\sin^2 A + \sin^2 B + \sin^2 C = 2$ then the triangle is always

A. isosceles

B. right angled

C. acute angled

D. obtuseangled

Answer: B

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153. If α and β are solutions of$\sin^2 x + a\sin x + b = 0$ as well as of $\cos^2 x + c\cos x + d = 0$ then $\sin(\alpha + \beta)$ is equal to

A. $\frac{2bd}{b^2 + d^2}$

B. $\frac{a^2 + c^2}{2ac}$

C. $\frac{b^2 + d^2}{2bd}$

D. $\frac{2ac}{a^2 + c^2}$

Answer: D

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154. If $\theta \neq (2n+1)\frac{\pi}{2}.\, n \in I,$ then the least value of $(\sin\theta + \cos ec\theta)^2 + (\cos\theta + \sec\theta)^2$ is

A. 2

B. 4

C. 8

D. 9

Answer: C

Watch Video Solution

155. If in a triangle ABC ,(sin A+sin B +sin C)(sinA+sinB-sin C)=3sinAsinB then angle C is equal to

A. 30°

B. 45°

C. 60°

D. 75°

Answer: C

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156. Let n be a fixed 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=6

D. none of these

Answer: C

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157. Minimum value of $4x^2-4x|\sin\theta|-\cos^2\theta$ is equal to

A. (-2)

B. (-1)

C. (-1/2)

D. 0

Answer: B

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158. The maximum value of the expression $\left|\sqrt{\left(\sin^2 x + 2a^2\right)} - \sqrt{\left(2a^2 - 1 - \cos^2 x\right)}\right|$ where a and x are real number is

A. $\sqrt{3}$

B. $\sqrt{2}$

C. 1

D. $\sqrt{5}$

Answer: B

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159. For $0 < \theta < \frac{\pi}{2}$ the solution of $\sum_{m=1}^{6} \operatorname{cosec}\left(\theta + \frac{(m-1)\pi}{4}\right)\operatorname{cosec}\left(\theta + \frac{m\pi}{4}\right) = 4\sqrt{2}$ is

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

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

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

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

Answer: C

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160. If $\tan\alpha$ and $\tan\beta$ be the roots of the equation $\left(x^2 + px + q = 0\right)$ then the value of the expression $\sin^2(\alpha+\beta) + p\sin(\alpha+\beta)\cos(\alpha+\beta) + q\cos^2(\alpha+\beta)$ is

A. p

B. q

C. 0

D. 1

Answer: B

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161. If $\tan 9\theta = \frac{3}{4}(\text{where} 0 < \theta < \frac{\pi}{18})$ then the value of $(3\cos ec3\theta - 4\sec 3\theta)$ is equal to

A. 3

B. 4

C. 5

D. 10

Answer: D

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162. If A,B,C are interior angles of a triangle ABC such that $(\cos A + \cos B + \cos C)^2 + (\sin A + \sin B + \sin C)^2 = 9$ then the number of possible triangle is

A. 0

B. 1

C. 3

D. infinite

Answer: D

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163. If $\tan\theta + \sec\theta = e^x$ then $\cos\theta$ equals

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

B. $\frac{2}{e^x + e^{-x}}$

C. $\frac{e^x - e^{-x}}{2}$

D. $\frac{e^x - e^{-x}}{e^x + e(-x)}$

Answer: B

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164. If λ be the minimum value of , $y = (\sin x + \cos ecx)^2 + (\cos x + \sec x)^2 + (\tan x + \cot x)^2$ where x∈R . Find $\lambda - 6$

A. 4

B. 6

C. 7

D. 8

Answer: A

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165. If $\left(\sqrt{2}\cos x + \sqrt{2}\sin x + \sqrt{7}\right)m = 1$ holds then

A. greatest-ve integral value of m is(-1)

B. least positive value of m is 5

C. nosuch m exists

D. `m in[-7,-1]cap(1,infty)

Answer: C

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166. if $\cos\theta_1 + \cos\theta_2 + \cos\theta_3 = 3$then $\sin^2\theta_1 + \sin^4\theta_2 + \sin^6\theta_3 =$

A. 3

B. (-3)

C. 0

D. none of these

Answer: C

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167. If $\sin\theta + \cos ec\theta = 2$ then $\sin^n\theta + \cos ec^n\theta =$

A. 2

B. 1

C. 3

D. none of these

Answer: A

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168. If $\tan\left(\frac{\alpha}{2}\right)$ and $\tan\left(\frac{\beta}{2}\right)$ are the roots of the equation $8x^2 - 26x + 15 = 0$ then $\cos(\alpha + \beta)$ is equal to

A. (-627/725)

B. 627/725

C. (-725/627)

D. (-1)

Answer: A

Watch Video Solution

169. $4\sin^2 x + 4\cos^2 x \geq k$ then k is

A. 1

B. 2

C. 4

D. none of these

Answer: C

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170. If sin A,cos A and tan A are in G.P. then $\cos^3 A + \cos^2 A$ is equal to

A. 1

B. 2

C. 4

D. none of these

Answer: A

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171. If $x + \frac{1}{x} = 2\cos\theta$ then $x^3 + \frac{1}{x^3} =$

A. $\cos 3\theta$

B. 2cos3theta`

C. $\frac{1}{2}\cos 3\theta$

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

Answer: B

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172. If $A = \sin^2\theta + \cos^4\theta$ then for all real values of θ

A. $1 \leq A \leq 2$

B. $\frac{3}{4} \leq A \leq 1$

C. $\frac{13}{16} \leq A \leq 1$

D. $\frac{3}{4} \leq A \leq \frac{13}{16}$

Answer: B

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173. If sin A,cosA and tan A are in G.P. then $\cot^6 A - \cot^2 A$ is equal to

A. (-1)

B. 0

C. 1

D. (1/2)

Answer: C

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174. The sign of the product $(\sin 2)(\sin 3)(\sin 5)$ is

A. negative

B. positive

C. 0

D. none of these

Answer: A

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175. No.of solution in the equation x=4 sinx when $x \in [0, 2\pi]$

A. 1

B. 2

C. 3

D. 4

Answer: B

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176. The value of $\sin 10^\circ + \sin 20^\circ + \sin 30^\circ + \ldots . + \sin 360^\circ$ is equal to

A. 0

B. 1

C. $\sqrt{3}$

D. 2

Answer: A

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177. if $\sin^4\alpha\cos^2\alpha = \sum_{k=0}^{3} c_k \cos 2k\alpha$ then $c_1 + c_3 = \ldots. c_0 + c_2 = \ldots.$ and $c_0 + c_1 + c_2 + c_3$=.....`.are

A. 0,1,2

B. 0,0,0

C. 0,2,3

D. 0,-1,2

Answer: B

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

A. (-4)

B. (-2)

C. 2

D. 4

Answer: A::B::C

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179. For +ve integer n, let $f_n(\theta) = \tan\left(\frac{\theta}{2}\right)(1+\sec\theta)(1+\sec 2\theta)(1+\sec 4\theta)\ldots..(1+\sec 2^n\theta)$ then

A. $f_2\left(\frac{\pi}{16}\right) = 1$

B. $f_3\left(\frac{\pi}{32}\right) = 1$

C. $f_4\left(\frac{\pi}{64}\right) = 1$

D. $f_5\left(\frac{\pi}{128}\right) = 1$

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

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180. If $x = \sec\phi - \tan\phi$ and $y = \cos ec\phi + \cot\phi$, then

A. $x = \frac{y+1}{y-1}$

B. $x = \frac{y-1}{y+1}$

C. $y = \frac{1+x}{1-x}$

D. xy+x-y+1=0

Answer: B::C::D

Watch Video Solution

181. If $\sec\theta + \tan\theta = 1$ then one root of equation $a(b-c)x^2 + b(c-a)x + c(a-b) = 0$ is

A. $\tan\theta$

B. $\sec\theta$

C. $\cos\theta$

D. $\sin\theta$

Answer: B::C

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182. if cosx+secx=(-2) then for a positive integer n $\cos^n x + \sec^n x$ is

A. always2

B. always(-2)

C. (-2),if n is odd

D. 2 if n is even

Answer: C::D

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183. $\sec^2\theta = 4x\dfrac{y}{(x+y)^2}$ is true if and only if

A. $x = y \neq 0$

B. x=y,$x \neq 0$

C. x=y

D. $x \neq 0, y \neq 0$

Answer: A::B

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184. If $\tan x = \dfrac{2b}{a-c}, (a \neq c)$

$y = a\cos^2 x + 2b\sin x\cos x + c\sin^2 x$ and

$z = a\sin^2 x - 2b\sin x\cos x + c\cos^2 x$ then

A. y=z

B. y+z=a+c

C. y-z=a-c

D. $y - z = (a - c)^2 + 4b^2$

Answer: B::C

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185. If secA+tanA=3/2 then

A. sinA=5/13

B. sin2A=120/169

C. cos2A=119/169

D. secA-tanA=2/3

Answer: C

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186. If $\tan\theta = \frac{\sin\alpha - \cos\alpha}{\sin\alpha + \cos\alpha}1$ then

A. $\sin\alpha - \cos\alpha = \pm\sqrt{2}\sin\theta$

B. $\sin\alpha + \cos\alpha = \pm\sqrt{2}\cos\theta$

C. $\cos 2\theta - \sin 2\alpha$

D. $\sin 2\theta + \cos 2\alpha = 0$

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

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187. The value of $\cos\left(\frac{\pi}{15}\right)\cos\left(2\frac{\pi}{15}\right)\cos\left(3\frac{\pi}{15}\right)\cos\left(4\frac{\pi}{15}\right)\cos\left(5\frac{\pi}{15}\right)\cos\left(6\frac{\pi}{15}\right)\cos\left(7\frac{\pi}{15}\right)$ is eqaul to

A. $\frac{1}{2^6}$

B. $\frac{1}{2^7}$

C. $\frac{1}{2^8}$

D. none of these

Answer: B

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188. The value of $\cos\left(\frac{2\pi}{7}\right)\cos\left(\frac{4\pi}{7}\right)\cos\left(\frac{6\pi}{7}\right)$ is

A. (-1/2)

B. (1/2)

C. (1/4)

D. (1/8)

Answer: D

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189. The value of $\sin\left(\frac{\pi}{14}\right)\sin\left(3\frac{\pi}{14}\right)\sin\left(5\frac{\pi}{14}\right)\sin\left(7\frac{\pi}{14}\right)\sin\left(9\frac{\pi}{14}\right)\sin\left(11\frac{\pi}{14}\right)\sin\left(13\frac{\pi}{14}\right)$ is?

A. 1

B. (1/8)

C. (1/32)

D. (1/64)

Answer: D

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190. If $P_n = \sin^n\theta + \cos^n\theta$ where $n \in W$ (whole number)and $\theta \in R(real\nu mber)$

if $P_1 = m$ then the value of $4(1 - P_6)$ is

A. $3(m-1)^2$

B. $3\left(m^2-1\right)^2$

C. $3(m+1)^2$

D. $3\left(m^2+1\right)^2$

Answer: B

Watch Video Solution

191. If $P_n=\sin^n\theta+\cos^n\theta$ where $n\in W$ (whole number)and $\theta\in R$ (real number)

the value of $2P_6-3P_4+10$ is

A. 0

B. 6

C. 9

D. 15

Answer: C

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192. If $P_n = \sin^n \theta + \cos^n \theta$ where $n \in W$ (whole number)and $\theta \in R$ (real number)

the value of $6P_{10} - 15P_8 + 10P_6 + 7$ is

A. 8

B. 6

C. 4

D. 2

Answer: A

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193. if $f(\theta) = a\cos\theta + b\sin\theta$ then $-\sqrt{a^2 + b^2} \leq f(\theta) \leq \sqrt{a^2 + b^2}$

The maximum value of $12\sin\theta - 9\sin^2\theta$ is

A. 3

B. 4

C. 5

D. 21

Answer: B

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194. if $f(\theta) = a\cos\theta + b\sin\theta$ then $-\sqrt{a^2+b^2} \leq f(\theta) \leq \sqrt{a^2+b^2}$

The expression $5\cos\theta + 3\cos\left(\theta + \frac{\pi}{3}\right) + 3$ lies between

A. (-4,10)

B. (5,12)

C. (-5,12)

D. (-4,5)

Answer: A

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195. if $f(\theta) = a\cos\theta + b\sin\theta$ then $-\sqrt{a^2+b^2} \leq f(\theta) \leq \sqrt{a^2+b^2}$

$\sqrt{3}\sin x + \cos x$ is maximum when x is

A. 30°

B. 90°

C. 60°

D. 45°

Answer: C

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196. Find the range of A/2 if it satisfies $2\cos\left(\frac{A}{2}\right) = \sqrt{1+\sin A} - \sqrt{1-\sin A}$

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197. If for two sets A and B,A-B=A then which of the following is true?

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198. Match List - I with List-II

List - I		List - II	
(1)	Circular plate is expanded by heat from radius 5 cm to 5.06 cm. Approximate increase in area is	(P)	4
(2)	If an edge of a cube increases by 1%, then percentage increase in volume is	(Q)	0.6π
(3)	If the rate of decrease of $\frac{x^2}{2}-2x+5$ is twice the rate of decrease of x, then x is equal to (rate of decreases is non-zero)	(R)	3
(4)	Rate of increase in area of equilateral triangle of side 15 cm, when each side is increasing at the rate of 0.1 cm/s, is	(S)	$\frac{3\sqrt{3}}{4}$

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200. Five cards are drawn successively with replacement from a well-shuffled deck of 52 cards. What is the probability that

(i) all the five cards are spades?

(ii) only 3 cards are spades?

(iii) none is a spade?

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201. If $\sin 47^\circ + \sin 61^\circ - \sin 11^\circ - \sin 25^\circ$ equals $\cos k^\circ$,then k=?

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202. The value of $e^{\log_{10} \tan 1^\circ + \log_{10} \tan 2^\circ + \log_{10} \tan 3^\circ + \ldots + \log_{10} \tan 89^\circ}$ is equal to?

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203. $\cos\left(\frac{2\pi}{7}\right)+\cos\left(\frac{4\pi}{7}\right)+\cos\left(\frac{6\pi}{7}\right)$

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204. The values of a for which the equation $\sqrt{a}\sin x-2\cos x=\sqrt{2}+\sqrt{2-a}$ has a solution is

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205. If $u_n=\cos^n\theta+\sin^n\theta$ then $2u_6-ku_4+1=0$ then the numerical quantity k must be equal to

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206. In a ΔABC

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207. If the circumcentre of ΔABC lies on incircle then cosA+cosB+cosC= $\sqrt{k}$, then the numerical quantity k should be

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208. For all θ in $\left[0, \frac{\pi}{2}\right]$ show that $\cos(\sin\theta) > \sin(\cos\theta)$

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209. Show that the value of the function $\frac{\sin x \cos 3x}{\cos x \sin 3x}$, where ever defined never lies between (1/3) and 3

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210. if $\alpha + \beta + \gamma = 2\pi$ prove that $\cos^2\alpha + \cos^2\beta + \cos^2\gamma - 2\cos\alpha\cos\beta\cos\gamma = 1$

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211. If $\cos\alpha + \cos\beta = \frac{1}{3}$ and $\sin\alpha + \sin\beta = \frac{1}{4}$ prove that $\frac{\cos(\alpha-\beta)}{2} = \pm\frac{5}{24}$

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212. Find the value of t, where $t \in \left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ so that $2\sin t = \frac{5x^2 - 2x + 1}{3x^2 - 2x - 1}, x \in R$

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213. If $\exp\left\{\left(\sin^2 x + \sin^4 x + \sin^6 x + \ldots\right) In2\right\}$ satisfies the quadratic equation $x^2 - 9x + 8$=0 then the value of `(cosx)/(cosx+sinx)(0ltxltpi/2)

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214. If $A+B+C=180^\circ$ prove that:

$$\sin(B+2C)+\sin(C+2A)+\sin(A+2B)=4\sin\left(\frac{B-C}{2}\right)\sin\left(\frac{C-A}{2}\right)$$

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215. Prove that

$$(1+\sec 2\theta)\left(1+\sec 2^2\theta\right)\left(1+\sec 2^3\theta\right)\ldots\ldots(1+\sec 2^n\theta)=\tan 2^n\theta.\cot\theta$$

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216. If cot(2x/3)+tan(x/3)=cosec(kx)/3 then the value of k is

A. 1

B. 2

C. 3

D. (-1)

Answer: B

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217. যদি $\theta \in \left(\frac{\pi}{2}, \frac{3\pi}{2}\right)$ হয়, তবে $\sqrt{4\cos^4\theta + \sin^2(2\theta) + 4\cot\theta\cos^2\left(\frac{\pi}{4} - \frac{\theta}{2}\right)}$=

A. $-2\cot\theta$

B. $2\cot\theta$

C. $2\cos\theta$

D. $2\sin\theta$

Answer: B

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218. Which one of the following statements is correct ?

A. $(\cos\theta)^{\frac{1}{2}} \geq \cos\left(\frac{\theta}{2}\right)$

B. $(\cos\theta)^{\frac{3}{4}} \leq \cos\left(3\frac{\theta}{4}\right)$

C. $\cos\left(5\frac{\theta}{6}\right) \geq (\cos\theta)^{\frac{5}{6}}$

D. $\cos\left(\frac{7\theta}{8}\right) \geq (\cos\theta)^{\frac{7}{8}}$

Answer: A::C

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219. For $xbelongs \to (o, \pi)$ the equation sinx+2sin2x-sin3x=3 has

A. infintely many solution

B. three solution

C. one solution

D. no solution

Answer: D

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220. Let $f_k(x) = \frac{1}{k}\left(\sin^k x + \cos^k x\right)$ Then $f_4(x) - f_6(x) =$

A. $\frac{1}{12}$

B. $\frac{5}{12}$

C. $-\frac{1}{12}$

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

Answer: B

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221. The value of $\tan\left(\frac{\pi}{3}\right) + 2\tan\left(\frac{2\pi}{3}\right) + 4\cot\left(\frac{4\pi}{3}\right) + 8\tan\left(\frac{8\pi}{3}\right)$ is

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222. The sum of the series `underset(n=1)sum sin((nipi)/720) is

A. $\sin\left(\frac{\pi}{180}\right)+\sin\left(\frac{\pi}{360}\right)+\sin\left(\frac{\pi}{540}\right)$

B. $\sin\left(\frac{\pi}{6}\right)+\sin\left(\frac{\pi}{30}\right)+\sin\left(\frac{\pi}{120}\right)+\sin\left(\frac{\pi}{360}\right)$

C. sin(pi/6)+sin(pi/30)+sin(pi/120)+sin(pi/360)+sin(pi/720)`

D. $\sin\left(\frac{\pi}{180}\right)+\sin\left(\frac{\pi}{360}\right)$

Answer: C

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223. The minimum value of $2^{\sin x}+2^{\cos x}$ is

A. `2^(1-(1/sqrt2))

B. `2^(1+(1/sqrt2))

C. $2\sqrt{2}$

D. 2

Answer: A

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224. $\cos\left(\frac{2\pi}{7}\right)+\cos\left(\frac{4\pi}{7}\right)+\cos\left(\frac{6\pi}{7}\right)$

A. is equal to zero

B. lies between 0 and 3

C. is a negative number

D. lies between 3 and 6

Answer: C

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225. The expression tanA(1-cotA)+cotA/(1-tanA) can be written as

A. secAcosecA+1

B. tanA+cotA

C. secA+cosecA

D. 1+sinAcosA

Answer: A

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226. For $0 \leq P, Q \leq \left(\frac{\pi}{2}\right)$ if sinP+cosQ=2 then the value of tan((P+Q)/2) is equal to

A. 1

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

C. 44198

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

Answer: A

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227. Let $f(\theta) = \left(1 + \sin^2\theta\right)\left(2 - \sin^2\theta\right)$ then for all values

A. $f(\theta) > \frac{9}{4}$

B. $f(\theta) \leq 2$

C. $f(\theta) > \frac{11}{4}$

D. $2 \leq f(\theta) \leq \frac{9}{4}$

Answer: D

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228. The maximum and minimum values of $\cos^6\theta + \sin^6\theta$ are respectively

A. 1 and 1/4

B. 1 and 0

C. 2 and 0

D. 1 and 1/2

Answer: A

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229. The value of $\cos^2 75^\circ + \cos^2 45^\circ + \cos^2 15^\circ - \cos^2 30^\circ - \cos^2 60^\circ$ is

A. 0

B. 1

C. 1/2

D. 1/4

Answer: C

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230. If $\sin^2 \theta + 3\cos\theta = 2$ then $\cos^3 \theta + \sec^3 \theta$ is

A. 1

B. 4

C. 9

D. 18

Answer: D

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231. $\frac{\cos ec(2\pi+\theta)\cos(2\pi+\theta)\tan\left(\frac{\pi}{2}+\theta\right)}{\sec\left(\frac{\pi}{2}+\theta\right)\cos\theta\cot(\pi+\theta)}$

A. $0 < \psi < \left(\frac{\pi}{2}\right)$

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

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

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

Answer: A::C::D

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232. In a ΔPQR if 3sinP+4cosQ=6 and 4sinQ+3cosP=1 then the angle R is equal to

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

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

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

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

Answer: B

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233. The positive integral value of $n > 3$ satisfying the equation `1/(sin(pi/n))=1/(sin(2pi)/n) =1/(sin(3pi)/n) is

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234. If $A = \sin^2\theta + \cos^4\theta$ then for all real values of θ

A. $\frac{13}{6} \leq A \leq 1$

B. $1 \leq A \leq 2$

C. $\frac{3}{4} \leq A \leq \frac{13}{16}$

D. $\frac{3}{4} \leq A \leq 1$

Answer: D

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235. If $\sin\theta = \frac{2t}{1+t^2}$ and θ lies in the second quadrant then $\cos\theta$ is equal to

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

B. $\frac{t^2-1}{1+t^2}$

C. $-\frac{|1-t^2|}{1+t^2}$

D. $\frac{1+t^2}{|1-t^2|}$

Answer: C

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236. The number of solutions of 2sinx+cosx=3 is

A. 1

B. 2

C. infinite

D. no solution

Answer: D

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237. Let $\tan\alpha = \frac{a}{a+1}$ and $\tan\beta = \frac{1}{2a+1}$ then $\alpha+\beta$ is

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

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

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

D. π

Answer: A

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238. If $\theta + \phi = \frac{\pi}{4}$ then $(1 + \tan\theta)(1 + \tan\phi)$ is equal to

A. 1

B. 2

C. 44318

D. 44199

Answer: B

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239. If $\sin\theta + \cos\theta = 0$ and $0 > \theta > \phi$ then θ

A. 0

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

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

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

Answer: D

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240. The value of $\cos 15^\circ - \sin 15^\circ$ is

A. 0

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

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

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

Answer: B

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241. The period of the function f(x)=cos4x+tan3x is

A. π

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

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

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

Answer: A

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