MATHS

BOOKS - OBJECTIVE RD SHARMA MATHS VOL I (HINGLISH)

TRIGONOMETRIC RATIOS AND IDENTITIES

Illustration

1. The maximum and minimum values of $f(x) = 6\sin x \cos x + 4\cos 2x$ are respectively

A. 5 and -5

B. $2\sqrt{13}$ and $-2\sqrt{13}$

C. 10 and -10

D. none of these

Answer: A

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2. The maximum and minimum values of

$-4 \leq 5\cos\theta + 3\cos\left(\theta + \frac{\pi}{3}\right) + 3 \leq 10$ are respectively

A. and -4

B. 10 and -4

C. 10 and -10

D. 6 and -4

Answer: B

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

A. a unique solution

B. Infinite no, of solution

C. no solution

D. none of these

Answer: C

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4. The least vlaue of $\frac{1}{5\cos x + 12\sin x + 15}$, is

A. -18

B. $1/28$

C. 28

D. $1/18$

Answer: B

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Section I - Solved Mcqs

1. if $a = \cos 2$ and $b = \sin 7$, then

A. $a > 0, b > 0$

B. $ab < 0$

C. $a > b$

D. $a < b$

Answer: B

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2. If $\frac{\pi}{2} < \theta < \frac{3\pi}{2}, then \sqrt{\frac{1-\sin\theta}{1+\sin\theta}}$ is equal to

A. $\sec\theta - \tan\theta$

B. $\sec\theta + \tan\theta$

C. $tha\theta - \sec\theta$

D. none of these

Answer: C

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3. If $0 < \theta < \frac{\pi}{2'}$ and if $\frac{y+1}{1-y} = \sqrt{\frac{1+\sin\theta}{1-\sin\theta'}}$ they y is equal to

A. $\cot\frac{\theta}{2}$

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

C. $\cot\frac{\theta}{2} + \tan\frac{\theta}{2}$

D. $\cot\frac{\theta}{2} - \tan\frac{\theta}{2}$

Answer: B

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4. The set of all poddible ualuse of α in $[-\pi, \pi]$ such that $\sqrt{\frac{1-\sin\alpha}{a+\sin\alpha}}$ is equal to $\sec\alpha - \tan\alpha,$ is

A. $[0, \pi/2)$

B. $[0, \pi/2) \cup (\pi/2, \pi)$

C. $[-\pi, 0]$

D. `(-pi//2,pi//2)

Answer: C

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5. If $|\tan A| < 1$ and $|A|$is acute, then $\frac{\sqrt{1+\sin 2A} + \sqrt{1-\sin 2A}}{\sqrt{1+\sin 2A} - \sqrt{1-\sin 2A}}$ is equal to

A. $\tan A$

B. $-\tan A$

C. $\cot A$

D. $-\cot A$

Answer: C

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6. $\sec^2\theta = = \frac{4ab}{(a+b)^2}$, where a, b $\in R$ is true if and olny if

A. $a + b \neq 0$

B. $a = b, a \neq 0$

C. $a = b$

D. $a \neq 0, b \neq 0$

Answer: B

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7. Which one is true ?

A. $\sin 1 > \sin 2 > \sin 3$

B. $\sin 1 < \sin 2 < \sin 3$

C. $\sin 1 < \sin 3 < \sin 2$

D. $\sin 3 < \sin 1 < \sin 2$

Answer: D

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8. If $10\sin^4\alpha + 15\cos^4\alpha = 6,$ then find the value of $27\cos ec^6\alpha + 8\sec^6\alpha.$

A. 125

B. 250

C. 50

D. 75

Answer: B

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9. Let $\cos(\alpha+\beta)=\frac{4}{5}$ and $\sin(\alpha-\beta)=\frac{5}{13}$ where $0\leq\alpha,\beta\leq\frac{\pi}{4}$ then find $\tan(2\alpha)$

A. $19/12$

B. $20/7$

C. $25/16$

D. $56/33$

Answer: D

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10. If $a=\sin x\cos^3 x$ and $b=\cos x\sin^3 x$ then

A. $a - b > 0 \text{for} x \in (0, \pi/4)$

B. $a - b < 0$ for $x \in (0, \pi/4)$

C. $a + b < 0$ for $x \in (0, \pi/2)$

D. $a + b < 0$ for $x \in (0, \pi/4)$

Answer: A

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11. The expression $\frac{\tan A}{1 - \cot A} + \frac{\cot A}{1 - \tan A}$ can be written as

A. $\sin A \cos A + 1$

B. $\sec A \cos esA + 1$

C. $\tan A + \cot A$

D. $\sec A + \cos ecA$

Answer: B

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

A. $Q \notin P$

B. $P \notin Q$

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

D. $P = Q$

Answer: D

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13. If $x\cos\alpha + y\sin\alpha = x\cos\beta + y\sin\beta = 2a$, then $\cos\alpha\cos\beta =$

A. $\frac{4ax}{x^2 + y^2}$

B. $\frac{4a^2 - y^2}{x^2 + y^2}$

C. $\frac{4ay}{x^2+y^2}$

D. $\frac{4a^2-x^2}{x^2+y^2}$

Answer: B

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14. If $\sin\theta + \cos ec\theta = 2$, then the volume of $\sin^{10}\theta + \cos ec^{10}\theta$, is

A. 2

B. 2^4

C. 2^8

D. none of these

Answer: A

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15. The value of $\sin^8\theta + \cos^8\theta + \sin^6\theta\cos^2\theta + 3\sin^4\theta\cos^2\theta + \cos^6\theta\sin^2\theta + 3\sin^2\theta\cos^4\theta$ is equal to

A. $\cos^2 2\theta$

B. $\sin^2 2\theta$

C. $\cos^3 2\theta + \sin^3 2\theta$

D. none of these

Answer: D

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16. Let $f_k(x) = \frac{1}{k}\left(\sin^k x + \cos^k x\right)$ where $x \in \mathbb{R}$ and $k \geq 1$. Then $f_4(x) - f_6(x)$ equals

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

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

C. $\frac{1}{6}$

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

Answer: B

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17. If $\sin(\theta+\alpha)=a, \cos^2(\alpha+\beta)=b,$ then $\sin(\alpha-\beta)=$

A. $ab-\left(a-a^2\right)\left(1-b^2\right)$

B. $ab-\sqrt{(1-a)^2(1-b)}$

C. $\pm\left\{a\sqrt{b}-\sqrt{\left(1-a^2\right)(1-b)}\right\}$

D. $b\sqrt{a}-\sqrt{(1-a)^2(1-b)}$

Answer: C

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18. Len n be an odd integer. If $\sin n\theta = \sum_{r=0}^{n} b_r \sin^r \theta$ for 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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19. Which one of the following number (s) is/are rational?

A. $\sin 15^\circ$

B. $\cos 15^\circ$

C. $\sin 15^\circ \cos 15^\circ$

D. $\sin 15^\circ \cos 75^\circ$

Answer: C

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20. Let $\frac{3\pi}{4} < \theta < \pi$ and $\sqrt{2\cot\theta + \frac{1}{\sin^2\theta}} = k - \cot\theta$ then $k =$

A. 1

B. -1

C. 0

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

Answer: B

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21. The values of $\sum_{k=1}^{13} \frac{1}{\sin\left(\frac{\pi}{4}+(k-1)\frac{\pi}{6}\right)\sin\left(\frac{\pi}{4}+\frac{kn}{6}\right)}$ is equal

A. $3-\sqrt{3}$

B. $2\left(3-\sqrt{3}\right)$

C. $2\left(3-\sqrt{3}\right)$

D. $2\left(2+\sqrt{3}\right)$

Answer: C

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22. If A > 0, B > 0 and $A+B=\frac{\pi}{6}$, then the minimum value of $\tan A+\tan B$ is

A. $2-\sqrt{3}$

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

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

D. $4 - 2\sqrt{3}$

Answer: D

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

A. $f_2\left(\frac{\pi}{64}\right) = 1$

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

C. $f_4\left(\frac{\pi}{32}\right) = 1$

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

Answer: D

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24. Let $f(\theta) = \sin\theta(\sin\theta + \sin 3\theta)$. $Then$, $f(\theta)$

A. ≥ 0only when$\theta \geq 0$

B. $< 0$for all realθ

C. $\geq 0$for all real0

D. ≤ 0only when ≤ 0

Answer: C

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25. If $\alpha + \beta = \frac{\pi}{2}$ and $\beta + \gamma = \alpha$ then $\tan\alpha$ 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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26. If $5\left(\tan^2 x - \cos^2 x\right) = 2\cos 2x + 9$, then the value of cos4x is

A. $\frac{2}{9}$

B. $\frac{7}{9}$

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

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

Answer: B

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27. If α and β are non-zero real number such that $2(\cos\beta - \cos\alpha) + \cos\alpha\cos\beta = 1$. Then which of the following is treu?

A. $\frac{\alpha}{2} = \pm\sqrt{3}\tan\frac{\beta}{2}$

B. $\tan\frac{\beta}{2} = \pm\sqrt{3}\tan\frac{\alpha}{2}$

C. $\tan\frac{\alpha}{2} = \pm\tan\frac{\beta}{2}$

D. $\tan\frac{\alpha}{2} = \pm\sqrt{2}\tan\frac{\beta}{2}$

Answer: A

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28. The maximum value of $(\cos\alpha_1)(\cos\alpha_2)...(\cos\alpha_n)$, under the restrications

$0 \le \alpha_1, \alpha_2..., \alpha_n \le \frac{\pi}{2}$, and $(\cot\alpha_1)(\cot\alpha_2)...(\cot\alpha_n) = 1is$

A. $\frac{1}{2^n/2}$

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

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

D. 1

Answer: A

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29. The value of $\tan\left(\frac{\pi}{16}\right) + 2\tan\left(\frac{\pi}{8}\right) + 4$ is equal to

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

B. $\cot\frac{\pi}{16}$

C. $\cot\frac{\pi}{16}$

D. none of these

Answer: B

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30. If $\sin A = a\cos B$ and $\cos A = b\sin B$ then, $(a^2 - 1)\tan^2 A + (1 - b^2)\tan^2 B$ is equal to

A. $\frac{a^2 - b^2}{b^2}$

B. $\frac{a^2 - b^2}{a^2}$

C. $\frac{a^2 + b^2}{b^2}$

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

Answer: A

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31. If $\cos^3 x \sin 2x = \sum_{n=1}^{n} a_m \sin mx$ is an identity in x, then which one of the following is in-correct?

A. $a_2 = 0, a_3 = \frac{3}{8}$

B. $a_1 = \frac{1}{2}, n = 6$

C. $a_1 = \frac{1}{4}, n = 5$

D. $\sum a_m = \frac{3}{4}$

Answer: B

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32. If $\cos^4\theta\sec^2\alpha, \frac{1}{2}$ and $\sin^4\theta\cos ec^2\alpha$ are in $A.P.$, then $\cos^8\theta\sec^6\alpha, \frac{1}{2}$ and $\sin^8\theta\cos ec^6\alpha$ are

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: A

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33. If $4n\alpha = \pi$ then $\cot\alpha\cot 2\alpha\cot 3\alpha...\cot(2n-1)\alpha\ n \in Z$ is equal to

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34. If $\sin x + \sin^2 x + \sin^3 x = 1$, then find the value of $\cos^6 x - 4\cos^4 x + 8\cos^2 x$.

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35. If $\theta = \frac{\pi}{2^n + 1}$, prove that: $2^n \cos\theta \cos 2\theta \cos 2^2 \cos 2^{n-1}\theta = 1$.

A. 1

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

C. 2^n

D. none of these

Answer: B

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36. If A and B are two angles satisfying $0 < A, B < \frac{\pi}{2}$ and $A + B = \frac{\pi}{3}$, then the minimum value of

$\sec A + \sec B$ is

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

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

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

D. none of these

Answer: B

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37. If $\cos(\theta - \alpha), \cos\theta, \cos(\theta + \alpha)$ are in H.P. then $\cos\theta . \frac{\sec(\alpha)}{2} =$

A. $\sin\theta = \sqrt{2}\cos\left(\frac{\alpha}{2}\right)$

B. $\cos\theta = \sqrt{2}\cos\left(\frac{\alpha}{2}\right)$

C. $\cos\theta = \sqrt{2}\sin\left(\frac{\alpha}{2}\right)$

D. $\sin\theta = \sqrt{2}\sin\left(\frac{\alpha}{2}\right)$

Answer: B

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38. If $x \sin\theta = y \sin\left(\theta + \frac{2\pi}{3}\right) = z \sin\left(\theta + \frac{4\pi}{3}\right)$, then

A. $x + y + z = 0$

B. $xy + yz + zx = 0$

C. $xyz + x + y + z = 1$

D. none of these

Answer: B

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39. If $2 \sin\alpha \cos\beta \sin\gamma = \sin\beta \sin(\alpha + \gamma), then \tan\alpha, \tan\beta$ and γ are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: C

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

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41. Given tan A and tan B are the roots of $x^2 - ax + b = 0$, The value of $\sin^2(A+B)$ is

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

B. $\frac{a^2}{a^2 + b^2}$

C. $\frac{a^2}{(a+b)^2}$

D. $\frac{a^2}{b^2 + (1-a)^2}$

Answer: A

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42. The value of

$\sin^6\left(\frac{\pi}{49}\right)+\cos^6\left(\frac{\pi}{49}\right)-1+3\sin^2\left(\frac{\pi}{49}\right)\cos^2\left(\frac{\pi}{49}\right)$ is equal to

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43. Find the value of :

$\sin^3\alpha+\sin^3(120^\circ+\alpha)+\sin^3(240^\circ+\alpha)$=

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

B. $-\frac{3}{4}\sin 3\alpha$

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

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

Answer: B

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44. If $\sin 2\theta = \frac{3}{4}, then \sin^3\theta + \cos^3\theta =$

A. $\frac{\sqrt{5}}{8}$

B. $\frac{\sqrt{7}}{8}$

C. $\frac{\sqrt{11}}{8}$

D. none of these

Answer: D

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45. If $\left(1+\sqrt{1+x}\right)\tan x = 1+\sqrt{1-x},$ then sin 4x is equal to

A. 4x

B. 2x

C. x

D. none of these

Answer: C

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46. If $A + B = \frac{\pi}{3}$ and $\cos A + \cos B = 1$, then which of the following is/are true ?

A. $\cos(A - B) = \frac{1}{3}$

B. $|\cos A - \cos B| = \sqrt{\frac{2}{3}}$

C. $\cos(A - B) = -\frac{2}{3}$

D. $|\cos A - \cos B| = \frac{1}{2\sqrt{3}}$

Answer: B::C

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47. Which of the following statements about $\tan 10^\circ$ is true?

A. It is a rational number

B. It is an inrrational number less than 2

C. It is an irrational number greater than 2

D. It is greater than 2

Answer: B::C

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48. Find The Value Of :

$$\sin\left(\frac{\pi}{18}\right) \cdot \sin\left(\frac{5\pi}{18}\right) \cdot \sin\left(\frac{7\pi}{18}\right)$$

A. 1

B. $\frac{1}{8}$

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

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

Answer: B

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49. If $\tan\alpha = \sqrt{a}$ where a is not a perfect square then which of the following is a rational number

A. $\sin 2\alpha$

B. $\tan 2\alpha$

C. $\cos 2\alpha$

D. none of these

Answer: C

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50. If $\sec 2\theta = p + \tan 2\theta,$ then the value of $\sin^2 \theta$ is given by :

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

B. $\frac{1}{2}\left(\frac{p-1}{p+1}\right)^2$

C. $\frac{p^2-1}{1(p^2+1)}$

D. $\frac{p^2-1}{2(p+1)^2}$

Answer: A

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51. The value of $\sin\left(\frac{\pi}{n}\right) + \sin\left(\frac{3\pi}{n}\right) + \sin\left(\frac{5\pi}{n}\right) + \ldots$ to n terms is equal to

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52. The value of $\cos\left(\frac{\pi}{11}\right)+\cos\left(\frac{3\pi}{11}\right)+\cos\left(\frac{5\pi}{11}\right)+\cos\left(\frac{7\pi}{11}\right)+\cos\left(\frac{9\pi}{11}\right)$ is

A. 0

B. 1

C. $1/2$

D. none of these

Answer: C

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53. $\sum_{r=0}^{n}\sin^2\frac{r\pi}{n}$ is equal to

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

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

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

D. none of these

Answer: C

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54. If $\tan\frac{2\pi}{18}, x \text{ and } \tan\frac{7\pi}{18}$ are in A.P. and $\tan\frac{2\pi}{18}, t \text{ and } \tan\frac{5n}{18}$ are in A.P. then the value of $\frac{x}{y}$ will be

A. $1/2$

B. 2

C. 1

D. none of these

Answer: B

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55. The Minimum value of $27^{\cos x} + 81^{\sin x}$ is equal to

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

B. $\frac{2}{9\sqrt{3}}$

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

D. none of these

Answer: B

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56. The value of $\tan\alpha + 2\tan(2\alpha) + 4\tan(4\alpha) + \ldots + 2^{n-1}\tan\left(2^{n-1}\alpha\right) + 2^n\cot(2^n\alpha)$ is

A. $\cos(2^n\alpha)$

B. $2^n\tan(2^n\alpha)$

C. 0

D. $\cot\alpha$

Answer: D

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57. यदि $\tan\theta + \tan\left(\theta + \frac{\pi}{3}\right) + \tan\left(\theta - \frac{\pi}{3}\right) = k\tan 3\theta$ तब $k =$

A. 1

B. 3

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

D. none of these

Answer: B

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58. For $0 < x < \frac{\pi}{6}$, all the values of $\tan^2 3x \cos^2 x - 4\tan 3x \sin 2x + 16\sin^2 x$ lie in the interval

A. $\left(0, \frac{121}{36}\right)$

B. $\left(1, \frac{121}{9}\right)$

C. $(-1, 0)$

D. none of these

Answer: A

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59. In a cyclic quadrilateral ABCD, the value of $2 + \sum \cos AsocB,$ is

A. $\sin^2 A + \sin^2 B,$ is

B. $\sin^2 B + \sin^2,$ D

C. $\sin^2 A + \sin^2 C$

D. $\sin^2 B + \sin^2 C$

Answer: A

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60. If $x + y + z = \pi, \tan x \tan z = 2$ and $\tan y \tan z = 18$,then $\tan^2 z =$

A. 15

B. 16

C. 19

D. 20

Answer: B

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61. Biggest among

$(\sin 1 + \cos 1), \left(\sqrt{\sin 1}\right) + \sqrt{\cos 1}\right), \sqrt{1 + \sin 2}$ and $1, is$

A. $\sin 1 + \cos 1$

B. $\sqrt{\sin 1} + \sqrt{\cos 1}$

C. $\sqrt{1 + \sin 2}$

D. 1

Answer: B

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62. In a $\Delta ABC, \quad \text{if} \quad \tan A + 2\tan B = 0,$ then which one is correct?

A. $0 < \tan^2 C \leq \frac{1}{8}$

B. $\frac{1}{8} < \tan^2 C \leq \frac{1}{2}$

C. $\frac{1}{2} < \tan^2 C < 1$

D. none of these

Answer: A

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63. The maximum value of $1+\sin\left(\frac{\pi}{4}+\theta\right)+2\cos\left(\frac{\pi}{4}-\theta\right)$ for real values of θ is

A. 3

B. 5

C. 4

D. none of these

Answer: C

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64. If $y=4\sin^2\theta-\cos 2\theta$,then y lies in the interval

A. $(-1,5)$

B. $[-1,5]$

C. $(-\infty,-1)\cup(5,\infty)$

D. none of these

Answer: B

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

A. $y \in [1, 2]$

B. $y \in [13/16, 1]$

C. $y \in [3/4, 13/16]$

D. $y \in [3/4, 1]$

Answer: D

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66. The ratio of the greatest value of $2 - \cos x + s \in^2 x$ to its least value is $\frac{7}{4}$ (2) $\frac{9}{4}$ (3) $\frac{13}{4}$ (4) $\frac{5}{4}$

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

B. $\frac{11}{4}$

C. $\frac{13}{4}$

D. none of these

Answer: C

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67. The least value of $\left[\cos^2\theta - 6\sin\theta.\cos\theta + 3\sin^2\theta + 2\right]$ is

A. $4+\sqrt{10}$

B. $4-\sqrt{10}$

C. 0

D. none of these

Answer: B

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68. If $y = \tan^2\theta + \sec\theta, \theta \neq (2n+1)\pi/2, then$

A. $y \in (-\infty, 1]$

B. $y \in (-\infty, -1]$

C. $y \in [-1, \infty)$

D. none of these

Answer: C

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69. Two parallel chords of a circle, which are on the same side of centre,subtend angles of 72° and 144° respetively at the centre Prove that the perpendicular distance between the chords is half the radius of the circle.

A. 6

B. 4

C. 3

D. 2

Answer: A

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70. If $\tan\alpha + \tan\beta + \tan\gamma = \tan\alpha\tan\beta\tan\gamma$, *then*

A. α, β must be angles of a triangle

B. the sum of any two of α, β, γ is equal to the third

C. $\alpha + \beta + \gamma$ must be an integral multiple of π

D. none of these

Answer: C

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71. If $\sin x + \cos x = \frac{1}{5}, 0 \leq x \leq \pi,$ then tan x is equal to

A. $-\frac{4}{3}$ or , $-\frac{3}{4}$

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

C. $\frac{4}{5}$

D. none of these

Answer: A

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72. For f or $A = 133^\circ$, $2\cos\frac{A}{2}$ is equal to

A. $-\sqrt{1+\sin A} - \sqrt{1-\sin A}$

B. $-\sqrt{1+\sin A} + \sqrt{1-\sin A}$

C. $\sqrt{1+\sin A} - \sqrt{1-\sin A}$

D. $\sqrt{1+\sin A} + \sqrt{1-\sin A}$

Answer: C

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73. A and B are positive acute angles satisfying the equations $3\cos^2 A + 2\cos^2 B = 4$ and $\frac{3\sin A}{\sin B} = \frac{2\cos B}{\cos A}$, *then* A+2B is equal to

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

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

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

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

Answer: B

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74. The expression $\frac{\cos 6x + 6\cos 4x + 15\cos 2x + 10}{\cos 5x + 5\cos 3x + 10\cos x}$ is equal to

A. $\cos^2 x$

B. $1 + \cos x$

C. $\cos 2x$

D. $2 \cos x$

Answer: D

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75. If $x = \frac{2 \sin \theta}{1 + \cos \theta + \sin \theta}, then \frac{1 - \cos \theta + \sin \theta}{1 + \sin \theta}$ is equal to $1 + x$ (b) $1 - x$ (c) x (d) $\frac{1}{x}$

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

B. a

C. $1 - a$

D. $1 + a$

Answer: B

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76. The expression $2^{\sin\theta} + 2^{-\cos\theta}$ is minimum when θ is equal to

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

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

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

D. none of these

Answer: B

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77. If A is an obtuse angle, then $\frac{\sin^3 A - \cos^3 A}{\sin A - \cos A} + \frac{\sin A}{\sqrt{1+\tan^2 A}} - 2\tan A \cot A.$ is always equal to

A. 1

B. -1

C. 2

D. none of these

Answer: B

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78. In a triangle ABC, $\cos 3A + \cos 3B + \cos 3C = 1$, then find any one angle.

A. 30°

B. 60°

C. 90°

D. 120°

Answer: D

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79. If $\alpha, \beta, \gamma, \delta$ are the smallest positive angles in ascending order of magnitude which have their sines equal to the positive quantity k, then the value of $4\frac{\sin\alpha}{2} + 3\frac{\sin\beta}{2} + 2\frac{\sin\gamma}{2} + \frac{\sin\delta}{2}$ is equal to $2\sqrt{1-k}$ (b) $2\sqrt{1+k}$ $\frac{\sqrt{1-k}}{2}$ (d) none of these

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

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

C. $2\sqrt{k}$

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

Answer: B

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80. If $0 < x < \frac{\pi}{2}$ and $\sin^n x + \cos^n x \geq 1$, then

A. $[2, \infty)$

B. $(-\infty, 2]$

C. $[-1, 1]$

D. $[-1\infty, 1]$

Answer: B

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81. In a ΔABC, $\cos A + \cos B + \cos C$ belongs to the interval

A. $(1/2, 3/2)$

B. $(1/, 3/2)$

C. $(3/2, 2)$

D. none of these

Answer: B

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82. In an acute-angled triangle ABC, $\tan A + \tan B + \tan C$

A. ≥ 3

B. $\geq \sqrt{3}$

C. $\geq 3\sqrt{3}$

D. none of these

Answer: C

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83. In a ΔABC, $\sin A \sin B \sin C$ is

A. $\geq \frac{3\sqrt{3}}{8}$

B. $\leq \frac{3\sqrt{3}}{8}$

C. $\leq \frac{\sqrt{3}}{8}$

D. $\leq \frac{3}{8}$

Answer: B

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84. In a ΔABC, the value of $\cot\frac{A}{2}\cot\frac{B}{2}\cot\frac{C}{2}$ is

A. $\geq 3\sqrt{3}$

B. ≥ 9

C. $\geq 6\sqrt{3}$

D. none of these

Answer: A

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85. In $a\Delta ABC$, $\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$ is

A. $\leq \frac{3\sqrt{3}}{16}$

B. $\leq \frac{3\sqrt{3}}{8}$

C. $\leq \frac{3\sqrt{3}}{32}$

D. $\frac{3\sqrt{3}}{64}$

Answer: B

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86. If $8\sin^3 x \sin 3x \sin 3x = \sum_{r=0}^{n} a^r \cos rx$ is an identity in x, then n=

A. 3

B. 4

C. 6

D. 9

Answer: C

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87. The number of integral triplets (a, b, c) such thet $a + b\cos 2x + c\sin^2 x = 0$ for all x, is

A. 0

B. 1

C. 3

D. infinitelt many

Answer: D

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88. If $a\sin x + b\cos(x+\theta) + b\cos(x-\theta) = d$, then the minimum value of $|\cos\theta|$ is equal to

A. $\frac{1}{2|b|}\sqrt{d^2 - a^2}$

B. $\frac{1}{2|a|}\sqrt{d^2 - a^2}$

C. $\frac{1}{|d|}\sqrt{d^2 - a^2}$

D. none of these

Answer: A

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89. If A, B, C be an acute angled triangle, then the minimum value of $\tan^4 A + \tan^4 B + \tan^4 C$ will be

A. 729

B. 27

C. $81\sqrt{3}$

D. none of these

Answer: B

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90. If x,y,z are variables and $3\tan x + 4\tan y + 5\tan z = 20,$ then the minimum value of $\tan^2 x + \tan^2 y + \tan^2 z,$ is

A. 10

B. 15

C. 8

D. 12

Answer: C

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91. Let α, β be such that $\pi < alph - \beta < 3\pi$ if $\sin\alpha + \sin\beta = -\frac{21}{65}$ and $\cos\alpha + \cos\beta = -\frac{2}{6}$ then the value of $\cos\frac{\alpha-\beta}{2},$ is

A. $-\frac{6}{65}$

B. $\frac{3}{\sqrt{130}}$

C. $\frac{6}{65}$

D. $-\frac{3}{\sqrt{130}}$

Answer: D

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92. If $u = \sqrt{a^2\cos^2\theta + b^2\sin^2\theta} + \sqrt{a^2\sin^2\theta + b^2\cos^2\theta}$, then the difference between maximum and minimum values of u^2 is

A. $(a-b)^2$

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

C. $(a+b)^2$

D. $2\left(a^2+b^2\right)$

Answer: D

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93. If $A + B + C = 270^\circ$, then

$\cos 2A + \cos 2B + \cos 2C + 4 \sin A \sin B \sin C =$

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94. If θ and ϕ are acute angles satisfying $\sin\theta = \frac{1}{2}, \cos\phi = \frac{1}{3}$ then

$\theta + \phi =$

A. $(\pi/3, \pi/2]$

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

C. $(2\pi/3, 5\pi/6]$

D. $(5\pi/6, \pi]$

Answer: B

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95. If $0 < x < \pi$ and $\cos x + \sin x = \frac{1}{2}$, then tan x is equal to

A. $\frac{1-\sqrt{7}}{4}$

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

C. $\frac{4+\sqrt{7}}{3}$

D. $\frac{\sqrt{7}+1}{4}$

Answer: C

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96. If $\frac{\sin^4\theta}{a} + \frac{\cos^4\theta}{b} = \frac{1}{a+b}$, then which one of the following is incorrect?

A. $\frac{\sin^4\theta}{a^2} = \frac{\cos^4\theta}{b^2}$

B. $\frac{\sin^4\theta}{b^2} = \frac{\cos^4\theta}{a^2}$

C. $\frac{\sin^8\theta}{a^3} + \frac{\cos^8\theta}{b^3} = \frac{1}{(a+b)^3}$

D. $\sin^4\theta = \dfrac{a^2}{(a+b)^2}$

Answer: B

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97. If $\dfrac{\sin^4 x}{2} + \dfrac{\cos^4 x}{3} = \dfrac{1}{5}$ then

A. $\tan^2 x = \dfrac{2}{3}$

B. $\dfrac{\sin^8 x}{8} = 125$

C. $\tan^2 x = \dfrac{1}{3}$

D. $\dfrac{\sin^8 x}{8} + \dfrac{\cos^8 x}{27} = \dfrac{2}{125}$

Answer: A

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98. If $\sin A \sin B \sin C + \cos A \cos B = 1,$ then the value of sinC is

A. 1

B. $1/2$

C. 0

D. -1

Answer: A

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99. The maximum value of the expression $\frac{1}{\sin^2\theta + 3\sin\theta\cos\theta + 5\cos^2\theta}$ is

A. 2

B. 3

C. 4

D. 6

Answer: A

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100. Two parallel chords of a circle of radius 2 are at a distance $\sqrt{3}+1$ apart. If the chord subtend angles $\frac{\pi}{k}$ and $\frac{2\pi}{k}$ at the center, where $k>0$, then the value of [k] is _____

A. 1

B. 2

C. 3

D. 4

Answer: B

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

A. 6

B. 7

C. 8

D. 4

Answer: B

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102. Let $\theta, \phi \in [0, 2\pi]$ be such that $2\cos\theta(1-\sin\phi) = \sin^2\theta\left((\tan)\frac{\theta}{2} + (\cot)\frac{\theta}{2}\right)\cos\phi - 1, \tan(2\pi-\theta) > 0$

Then ϕ cannot satisfy

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

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: B

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103. Let $f:(-1,1) \to R$ be such that $f(\cos 4\theta) = \dfrac{2}{2-\sec^2\theta}$ for $\theta \in \left(0, \dfrac{\pi}{4}\right) \cup \left(\dfrac{\pi}{4}, \dfrac{\pi}{2}\right)$. Then the value(s) of $f\left(\dfrac{1}{3}\right)$ is/are

A. $1 \pm \dfrac{\sqrt{3}}{2}$

B. $1 \pm \sqrt{\dfrac{2}{3}}$

C. $1 \pm \sqrt{\dfrac{1}{3}}$

D. $1 \pm \sqrt{\dfrac{1}{2}}$

Answer: A

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104. Suppose θ and $\phi(\neq 0)$ are such that $\sec(\theta+\phi), \sec\theta$ and $\sec(\theta-\phi)$ are in A.P. If $\cos\theta = k\cos\left(\dfrac{\phi}{2}\right)$ for some

k, then k is equal to

A. ± 1

B. ± 2

C. $\pm \sqrt{2}$

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

Answer: C

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105. The value of $\sec 40^\circ + \sec 80^\circ + \sec 160^\circ$ will be

A. 4

B. -4

C. 6

D. 8

Answer: C

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106. If $\theta = \frac{2\pi}{2009}$, $then \cos\theta \cos 2\theta \cos 3\theta \ldots \cos 1004\theta$ is

A. 0

B. $\frac{1}{2^{2008}}$

C. $\frac{1}{2^{1004}}$

D. $-\frac{1}{2^{1004}}$

Answer: C

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Section II - Assertion Reason Type

1. Statement -1: If $\frac{\pi}{12} \leq \theta \leq \frac{\pi}{3}$, then $\sin\left(\theta - \frac{\pi}{4}\right)\sin\left(\theta - \frac{7\pi}{12}\right)\sin\left(\theta + \frac{\pi}{12}\right)$ lies between $-\frac{1}{4\sqrt{2}}$ and $\frac{1}{4}$.

Statement-2: The value of $\sin\theta\sin\left(\frac{\pi}{3}-\theta\right)\sin\left(\frac{\pi}{3}+\theta\right) is \frac{1}{4}\sin 3\theta.$

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement -1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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2. Statement -1: $\sin 52^\circ + \sin 78^\circ + \sin 50^\circ = 4\cos 26^\circ \cos 39^\circ \cos 25^\circ$

Statement-2: If

$A + B + C = \pi, then \sin A + \sin B + \sin C = 4\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{©}{2}$

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement -1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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3. If n is an odd positive interger, then

$$\left(\frac{\cos A+\cos B}{\sin A-\sin B}\right)^n+\left(\frac{\sin A+\sin B}{\cos A-\cos B}\right)^n=$$

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement -1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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4. Statement-1: $\cos 36^\circ > \tan 36^\circ$

Statement-2: $\cos 36^\circ > \sin 36^\circ$

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement -1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

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5. Statement-1: $\frac{\cos 36^\circ - \cos 72^\circ}{\cos 36^\circ \cos 72^\circ} = 2$

Statement-2: $\sin 15^\circ = \frac{\sqrt{6} - \sqrt{7}}{4}$

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement -1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: C

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6. Statement-1: The vlaue of $\cos 20^\circ \cos 40^\circ \cos 60^\circ \cos 80^\circ is \frac{1}{16}$.

Statement-2: for any θ,

$$\cos\theta \cos(60^\circ - \theta)\cos(60^\circ + \theta) = \frac{1}{4}\cos 3\theta$$

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement -1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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7. Statement-1: For any value of $\theta \neq 0$, $\lim_{n \to \infty} \cos\frac{\theta}{2}\cos\frac{\theta}{2^2}\cos\frac{\theta}{2^3}\ldots\cos\frac{\theta}{2^n} = \frac{\sin\theta}{\theta}$

Statement-2:

$\cos A \cos 2A \cos 2^2 A \ldots \cos 2^{n-1} A = \frac{\sin 2^n A}{2^n \sin A}$ and $\lim_{A \to 0} \frac{\sin A}{A} = 1.$

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement -1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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8. Statement-1: If $\tan A, \tan B$ are the roots of the equation $x^2 - ax - 1 = 0, then \sin^2(A+B) = \frac{a^2}{1+a^2}$

Statement-2: $\sin^2(A+B) = \frac{\tan^2(A+B)}{1+\tan^2(A+B)}$

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement -1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: D

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9. Statement-1: if $\theta \neq 2n\pi + \frac{\pi}{2}, n \in Z,$ then $\frac{\sec^2\theta + \tan\theta}{\sec^2\theta - \tan\theta}$ lies between $\frac{1}{3}$ and $3.$

Statement-2: If $x \in R, then \frac{1}{3} \leq \frac{x^2 - x + 1}{x^2 + x + 1} \leq 3.$

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement -1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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10. In an actue-angled triangle ABC

Statement-1: $\tan^2 \frac{A}{2} + \tan^2 \frac{B}{2} + \tan^2 \frac{C}{2} \geq 1$

Statement-2: $\tan A \tan B \tan C \geq 3\sqrt{3}$

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement -1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

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11. Statement-1: If A, B, C are the angles of a triangle such that angle A is obtuse, then tan $C > 1$.

Statement-2: In any $\Delta ABC <$ we have $\tan A = \frac{\tan B + \tan C}{\tan B \tan C - 1}$

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement -1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: D

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12. Statement-1: The numbers $\sin 18^\circ$ and $-\sin 54^\circ$ are the roots of the quadratic equation with integer coefficients.

Statement-2: If $x = 18^\circ, \cos 3x = \sin 2x$ and $If y = -54^\circ, \sin 2y = \cos 3y.$

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement -1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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13. Statement-1: If $2\sin\frac{\theta}{2} = \sqrt{1+\sin\theta} + \sqrt{1-\sin\theta}, then\theta \in \left((8n+1)\frac{\pi}{2}, (8n+3)\frac{\pi}{2}\right)$

Statement-2: $If\frac{\pi}{4} \leq \theta \leq \frac{3\pi}{4}, then\sin\frac{\theta}{2} > 0.$

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement -1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

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Exercise

1. The value of $\cos 10^\circ - \sin 10^\circ$ is

A. positive

B. negative

C. 0

D. 1

Answer: A

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2. The value of $\cos 1^\circ \cos 2^\circ \cos 3^\circ \ldots \cos 179^\circ$ is

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

B. 0

C. 1

D. none of these

Answer: B

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3. The value of $\tan 1^\circ \tan 2^\circ \tan 3^\circ \ldots \tan 89^\circ$ is

A. 1

B. 0

C. ∞

D. $1/2$

Answer: A

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

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

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

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

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

Answer: A

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5. Which of the following is correct $\sin 1^\circ > \sin 1$

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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6. Given $A = \sin^2\theta + \cos^2\theta$, then for all real θ, $1 \leq A \leq 2$ (b) $\frac{3}{4} \leq A \leq 1$ $\frac{13}{16} \leq A \leq 1$ (d) $\frac{3}{4} \leq A \leq \frac{13}{16}$

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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7. The expression $\tan^2\alpha + \cot^2\alpha$ is

A. ≥ 2

B. ≥ 2

C. ≥ -2

D. none of these

Answer: A

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8. If $\tan\theta = -4/3,$ then $\sin\theta$ is

A. $-4/5\text{but not}4/5$

B. $-4/5 \text{ or } 4/5$

C. $4/5\text{but not} -4/5$

D. none of these

Answer: B

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9. If $\sin\theta + \cos\theta = \sqrt{2}\cos\theta then \cos\theta - \sin\theta$ is equal to

A. $\sqrt{2}\cos\theta$

B. $\sqrt{2}\sin\theta$

C. $\sqrt{2}(\cos\theta + \sin\theta)$

D. none of these

Answer: B

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10. In a right angled triangle, the hypotenuse is four times as long as the perpendicular drawn to it from the opposite vertex. One of the acute angle is

A. 15°

B. 30°

C. 45°

D. none of these

Answer: A

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11. If θ lies in the first quardrant and $\cos\theta = \frac{8}{17}$, then find the value of $\cos(30^\circ + \theta) + \cos(45^\circ - \theta) + \cos(120^\circ - \theta)$.

A. $\frac{23}{17}\left(\frac{\sqrt{3}-1}{2} + \frac{1}{\sqrt{2}}\right)$

B. $\frac{23}{17}\left(\frac{\sqrt{3}+1}{2} + \frac{1}{\sqrt{2}}\right)$

C. $\frac{23}{17}\left(\frac{\sqrt{3}-1}{2} - \frac{1}{\sqrt{2}}\right)$

D. $\frac{23}{17}\left(\frac{\sqrt{3}+1}{2} - \frac{1}{\sqrt{2}}\right)$

Answer: A

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

A. 0

B. $1/2$

C. $3/2$

D. 1

Answer: C

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13. If $\tan(A+B) = p$ and $\tan(A-B) = q$, then the value of tan2A, is

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

B. $\frac{p-q}{1+pq}$

C. $\frac{1+pq}{1+pq}$

D. $\frac{p+q}{1+pq}$

Answer: D

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14. In a triangle ABC, $\sin A - \cos B = \cos C$, then angle B, is

A. $\pi/2$

B. $\pi/3$

C. $\pi/4$

D. $\pi/6$

Answer: A

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15. If θ lies in the first quadrant which of the following in not true

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

B. $\frac{\theta}{2} < \sin\frac{\theta}{2}$

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

D. $\theta\sin(\text{theta})/(2)\text{lt } 2\sin\frac{\theta}{2}$

Answer: B

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16. $\cos 2\theta + 2\cos\theta$ is always

A. greater than $-\frac{3}{2}$

B. less than or equal to $\frac{3}{2}$

C. greater than or equal to $-\frac{3}{2}$

D. none of these

Answer: A

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17. The interior angles of a polygon are in AP The smallest angle is 120 and the common difference is 5. Find the number of sides of the polygon.

A. 9 or 16

B. 9

C. 13

D. 16

Answer: B

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18. The maximum and minimum values of

$-4 \leq 5\cos\theta + 3\cos\left(\theta + \frac{\pi}{3}\right) + 3 \leq 10$ are respectively

A. 5

B. 10

C. 11

D. -11

Answer: B

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19. $\sin 36^\circ \sin 72^\circ \sin 108^\circ \sin 144^\circ = \frac{5}{16}$

A. 5

B. 4

C. 3

D. 1

Answer: A

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20. If $A = \tan 6^0 \tan 42^0$ and $B = \cot 66^0 \cot 78^0$, then

A. $A = 2B$

B. $A = 1/3$

C. $A = B$

D. $3A = 2B$

Answer: C

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21. If $\sin x + \cos esx = 2, then \sin^n x + \cos ec^n x$ is equal to

A. 2

B. 2n

C. $2n - 1$

D. $2n - 2$

Answer: A

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22. If $\frac{x}{a}\cos\alpha + \frac{y}{b}\sin\alpha = 1, \frac{x}{a}\cos\beta + \frac{y}{b}\sin\beta = 1$ and $\frac{\cos\alpha\cos\beta}{a^2} + \frac{\sin\alpha\sin\beta}{b^2}$

then

A. $\tan\alpha\tan\beta = \frac{b^2(x^2 - a^2)}{a^2(y^2 - b^2)}$ and $x^2 + y^2 = a^2 - b^2$

B. $\tan\alpha\tan\beta = \frac{a^2}{b^2}$

C. $x^2 + y^2 = a^2 - b^2$

D. none of these

Answer: A

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

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

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

B. $\frac{7\pi}{24}$ and $\frac{5\pi}{24}$

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

D. none of these

Answer: A

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24. The value of $\sqrt{3}\cot 20^\circ - 4\cos 20^\circ$ is

A. 1

B. -1

C. 4

D. -4

Answer: A

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25. $\sqrt{3}\cos\sec 20^0 - \sec 20^0$

A. 2

B. 1

C. 4

D. -4

Answer: C

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26. The equation $\sin^2\theta = \dfrac{x^2+y^2}{2xy}, x, y \neq 0$ is possible if

A. $x = y$

B. $x = -y$

C. $2x = -y$

D. none of these

Answer: A

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27. The value of $\sin(\pi + \theta)\sin(\pi - \theta)\cos ec^2\theta$ is equal to

A. -1

B. 0

C. $\sin\theta$

D. none of these

Answer: A

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28. If $\frac{\sin(x+y)}{\sin(x-y)} = \frac{a+b}{a-b}$, then show that $\frac{\tan x}{\tan y} = \frac{a}{b}$.

A. b/a

B. a/b

C. ab

D. none of these

Answer: B

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29. if $\sin x + \sin^2 x = 1$, then the value of $\cos^2 x + \cos^4 x$ is

A. 1

B. 2

C. 1.5

D. none of these

Answer: A

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30. If $\tan\left(\frac{x}{2}\right) = \cos ecx - \sin x$ then the value of $\tan^2\left(\frac{x}{2}\right)$ is

A. $2 - \sqrt{5}$

B. $2 + \sqrt{5}$

C. $-2 - \sqrt{5}$

D. none of these

Answer: D

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31. If $\cos A = \frac{3}{4}, then 32 \sin, \frac{A}{2} \sin, \frac{5A}{2} =$ (A) $\sqrt{11}$ (B) `-sqrt(11) (C) 11 (D) -11

A. 7

B. 8

C. 11

D. none of these

Answer: C

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32. $\left(1 + \cos. \frac{\pi}{8}\right)\left(1 + \cos. \frac{3\pi}{8}\right)\left(1 + \cos. \frac{5\pi}{8}\right)\left(1 + \cos. \frac{7\pi}{8}\right)$ is equal to

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

B. $\cos \frac{\pi}{8}$

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

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

Answer: C

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33. If $tan^2\theta = 2tan^2\varphi + 1$, prove that $\cos 2\theta + s \in^2 \varphi = 0$.

A. -1

B. 0

C. 1

D. none of these

Answer: B

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34. If $\sin 2\theta = \cos 3\theta$ where $\theta \in \left(0, \frac{\pi}{2}\right)$, then $\sin\theta$ is equal to

A. $\frac{\sqrt{5}-1}{4}$

B. $-\left(\frac{\sqrt{5}-1}{4}\right)$

C. $\frac{\sqrt{5}+1}{4}$

D. $\frac{\sqrt{5}-1}{2}$

Answer: A

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35. if $y = \cos^2\theta + \sec^2\theta$ then

A. $y = 0$

B. $y \leq 2$

C. $y \geq -2$

D. $y \neq 2$

Answer: D

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36. The value of $\frac{\sin\pi}{14}\frac{\sin(3\pi)}{14}\frac{\sin(5\pi)}{14}\frac{\sin(7\pi)}{14}\frac{\sin(9\pi)}{14}\frac{\sin(11\pi)}{14}\frac{\sin(13\pi)}{14}$ is equal to_____

A. $1/16$

B. $1/64$

C. $1/128$

D. $1/32$

Answer: B

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37. The value of $\sin\left(\frac{\pi}{14}\right)\sin\left(\frac{3\pi}{14}\right)\sin\left(\frac{5\pi}{14}\right)$ is

A. $1/16$

B. $1/8$

C. $1/2$

D. $1/4$

Answer: B

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38. if $\sin(\alpha+\beta)=1$ and $\sin(\alpha-\beta)=\frac{1}{2}$ $0 \leq \alpha, \beta, \leq \frac{\pi}{2}, then$ find $\tan(\alpha+2\beta)$ and $\tan(2\alpha+\beta)$

A. 1

B. -1

C. 0

D. $1/2$

Answer: A

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39. If $\cos(\theta - \alpha) = a$ and $\cos(\theta - \beta) = b$ then the value of $\sin^2(\alpha - \beta) + 2ab\cos(\alpha - \beta)$

A. $a^2 + b^2$

B. $a^2 - b^2$

C. $b^2 - a^2$

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

Answer: A

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40. If $K = \sin\left(\frac{\pi}{18}\right)\sin\left(\frac{5\pi}{18}\right)\sin\left(\frac{7\pi}{18}\right)$, then the numerical value of K is____

A. $1/2$

B. $1/4$

C. $1/8$

D. $1/16$

Answer: C

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41. Find the value of $\log \tan 1^0 \log \tan 2^0 \log \tan 89^0$

A. 0

B. -1

C. 1

D. ∞

Answer: A

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42. If $1 + \sin x + \sin^2 x + \sin^3 x + \infty$ is equal to `4+2sqrt(3),0

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

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

C. $\frac{\pi}{3}$ or $\frac{\pi}{6}$

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

Answer: D

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43. If

$If x\cos\alpha + y\sin\alpha = 2a, x\cos\beta + y\sin\beta = 2a$ and $2\sin\frac{\alpha}{2}\sin\frac{\beta}{2} = 1,$

then

A. $\cos\alpha + \cos\beta = \frac{2ax}{x^2 + y^2}$

B. $\cos\alpha\cos\beta = \frac{2a^2 - y^2}{x^2 + y^2}$

C. $y^2 = 4a(\alpha - x)$

D. $\cos\alpha + \cos\beta = 2\cos\alpha\cos\beta.$

Answer: C

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44. If $\tan x = \frac{2b}{a-c}$, $y = a\cos^2 x + 2b\sin x\cos x + c\sin^2 x$, $z = a\sin^2 x - 2b\sin x\cos x + c\cos^2 x$, prove that $y - z = a - c$.

A. $y = z$

B. $y + z = a - c$

C. $y - z = a - c$

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

Answer: C

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45. If $\alpha + \beta + \gamma = 2\pi$ then

A. $\tan\frac{\alpha}{2}\tan\frac{\beta}{2}+\tan\frac{\gamma}{2}+\tan\frac{\alpha}{2}\tan\frac{\beta}{2}\tan\frac{\gamma}{2}$

B. $\tan\frac{\alpha}{2}\tan\frac{\beta}{2}+\tan\frac{\beta}{2}+\tan\frac{\gamma}{2}\tan\frac{\gamma}{2}\tan\frac{\alpha}{2}=1$

C. $\tan\frac{\alpha}{2}\tan\frac{\beta}{2}+\tan\frac{\gamma}{2}+\ =\ -\tan\frac{\alpha}{2}\tan\frac{\beta}{2}\tan\frac{\gamma}{2}$

D. $\tan\frac{\alpha}{2}\tan\frac{\beta}{2}+\tan\frac{\beta}{2}\tan\frac{\gamma}{2}+\tan\frac{\gamma}{2}\tan\frac{\alpha}{2}=0.$

Answer: A

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46. If $\sin\theta-\cos\theta<0, then\theta$ lies between

A. $n\pi-\frac{3\pi}{4}$ and $n\pi+\frac{\pi}{4}, n\in Z$

B. $n\pi-\frac{\pi}{4}$ and $n\pi+\frac{3\pi}{4}, n\in Z$

C. $2n\pi-\frac{3\pi}{4}$ and $2n\pi-\frac{\pi}{4}, n\in Z$

D. $2n\pi-\frac{3\pi}{4}$ and $2n\pi+\frac{\pi}{4}, n\in Z$

Answer: D

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47. If $2\sin\frac{A}{2} = \sqrt{1+\sin A} + \sqrt{1-\sin A}, then \frac{A}{2}$ lies between,

A. $2n\pi + \frac{\pi}{4}$ and $2n\pi + \frac{3\pi}{4}, n \in Z$

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

C. $2n\pi - \frac{3\pi}{4}$ and $2n\pi - \frac{\pi}{4}, n \in Z$

D. $-\infty$ and $+\infty$

Answer: A

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48. If $2\cos\frac{A}{2} = \sqrt{1+\sin A} + \sqrt{1-\sin A}, then \frac{A}{2}$ iles between,

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

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

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

D. $-\infty$ and $+\infty$

Answer: B

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49. Find the angle θ whose cosine is equal to its tangent.

A. $\cos\theta = 2\cos 18^\circ$

B. $\cos\theta = 2\sin 18^\circ$

C. $\sin\theta = 2\sin 18^\circ$

D. $\sin\theta = 2\cos 18^\circ$

Answer: C

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50. The value of $\cos\left(\frac{2\pi}{15}\right)\cos\left(\frac{4\pi}{15}\right)\cos\left(\frac{8\pi}{15}\right)\cos\left(\frac{14\pi}{15}\right)$, is

A. 1

B. $1/2$

C. $1/4$

D. $1/16$

Answer: D

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51. Find the value of :

$$\cos\left(\frac{\pi}{15}\right)\cos\left(\frac{2\pi}{15}\right)\cos\left(\frac{3\pi}{15}\right)\cos\left(\frac{4\pi}{15}\right)\cos\left(\frac{5\pi}{15}\right)\cos\left(\frac{6\pi}{15}\right)\cos\left(\frac{7\pi}{15}\right) =$$

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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52. The value of $\tan 5\theta$ is

A. $\dfrac{5\tan\theta - 10\tan^3\theta + \tan^5\theta}{1 - 10\tan^2\theta + 5\tan^4\theta}$

B. $\dfrac{5\tan\theta + 10\tan^3\theta - \tan^5\theta}{1 + 10\tan^2\theta - 5\tan^4\theta}$

C. $\dfrac{5\tan^5\theta - 10\tan^3 + \tan\theta}{1 - 10\tan^2\theta + 5\tan^4\theta}$

D. none of these

Answer: A

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53. If $\cos\theta = \cos\alpha\cos\beta$, *then* $\tan\left(\dfrac{\theta+\alpha}{2}\right)\tan\left(\dfrac{\theta-\alpha}{2}\right)$ is equal to

A. $\tan^2\dfrac{\alpha}{2}$

B. $\tan^2\dfrac{\beta}{2}$

C. $\tan^2 \frac{\theta}{2}$

D. $\cot^2 \frac{\beta}{2}$

Answer: B

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54. If $\left|\cos\theta\left\{\sin\theta + \sqrt{\sin^2\theta + \sin^2\alpha}\right\}\right| \leq k$, then the value of k

A. $\sqrt{1 + \cos^2\alpha}$

B. $\sqrt{1 + \sin^2\alpha}$

C. $\sqrt{2 + \sin^2\alpha}$

D. $\sqrt{2 + \cos^2\alpha}$

Answer: B

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

A. 1

B. 0

C. -1

D. $1/2$

Answer: B

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56. The expression

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

A. 0

B. 1

C. 3

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

Answer: B

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57. If $\sin A + \sin B = \frac{\pi}{4}, then (\tan A + 1)(\tan B + 1)$ is equal to

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58. If $\sin A + \sin B = a$ and $\cos A + \cos B = b, then \cos(A + B)$

A. $\frac{a^2 + b^2}{b^2 - a^2}$

B. $\frac{2ab}{a^2 + b^2}$

C. $\frac{b^2 - a^2}{a^2 + b^2}$

D. $\frac{a^2 - b^2}{a^2 + b^2}$

Answer: C

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59. If an angle θ is divided into two parts A and B such that $A - B = x$ and $\tan A : \tan B = k : 1$, then the value of sinx is

A. $\frac{K-1}{K-1}\sin\alpha$

B. $\frac{k}{k+1}\sin\alpha$

C. $\frac{k-1}{k+1}\sin\alpha$

D. none of these

Answer: C

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60. The value of the expression

$$3(\sin\theta - \cos\theta)^4 + 6(\sin\theta + \cos\theta)^2 + 4\left(\sin^6\theta + \cos^6\theta\right)$$

A. 1

B. -1

C. 13

D. 0

Answer: C

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61. If $\tan\left(\frac{\theta}{2}\right) = \frac{5}{2}$ and $\tan\left(\frac{\phi}{2}\right) = \frac{3}{4}$, the value of $\cos(\theta + \phi)$, is

A. $-\frac{364}{725}$

B. $-\frac{627}{725}$

C. $-\frac{240}{339}$

D. $-\frac{339}{725}$

Answer: B

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62. If $\alpha, \beta, \gamma \in \left(0, \frac{\pi}{2}\right)$, then prove that $\frac{\sin(\alpha+\beta+\gamma)}{\sin\alpha+\sin\beta+\sin\gamma} < 1$.

A. < 1

B. > 1

C. $= 1$

D. $= -1$

Answer: A

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63. If $\sin x + \sin y = 3(\cos y - \cos x)$, then the value of $\frac{\sin 3x}{\sin 3y}$, is

A. 1

B. -1

C. 0

D. ± 1

Answer: B

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64. If $\cos x = \tan y, \cos y = \tan z \cos z = \tan x,$ then the value of sin x, is

A. $2\cos 18^\circ$

B. $\cos 18^\circ$

C. $\sin 18^\circ$

D. $2\sin 18^\circ$

Answer: D

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65. If $k = \sin^6 c + \cos^6 x,$ then k belongs to the interval

A. $[7/8, /54]$

B. $[1/2, /5/8]$

C. $[1/4, 1]$

D. none of these

Answer: C

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66. The value of $\tan 9^\circ - \tan 27^\circ - \tan 63^\circ + \tan 81^\circ$ is equal to

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67.

$2\tan^2\alpha\tan^2\beta\tan^2\gamma + \tan^2\alpha\tan^2\beta + \tan^2\beta\tan^2\gamma + \tan^2\gamma\tan^2\alpha = 1$

find the value of $\sin^2\alpha + \sin^2\beta + \sin^2\gamma$

A. 0

B. -1

C. 1

D. ± 1

Answer: C

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68. the value of $e^{\log_{10}\tan 1^\circ + \log_{10}\tan 2^\circ + \log_{10}\tan 3^\circ \ldots . + \log_{10}\tan 89^\circ}$

A. 0

B. e

C. $1/e$

D. 1

Answer: D

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69. For what and only what values of α lying between 0 and $\frac{\pi}{2}$ is the inequality is $\sin\alpha\cos^3\alpha < \sin^3\alpha\cos\alpha$ valid?

A. $\alpha \in (0, \pi/4)$

B. $\alpha \in (0, \pi/2)$

C. $\alpha \in (\pi/4, \pi/2)$

D. none of these

Answer: C

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70. If

$(\sec A - \tan A)(\sec B - \tan B)(\sec C + \tan C) = (\sec A + \tan A)(\sec B +$

then each side is equal to

A. 0

B. 1

C. -1

D. ± 1

Answer: D

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71. If $\pi < \alpha < \frac{3\pi}{2}$ then the expression $\sqrt{4\sin^4\alpha + \sin^2 2\alpha} + 4\cos^2\left(\frac{\pi}{4} - \frac{\alpha}{2}\right)$ is equal to (A) $2 + 4\sin\alpha$ (B) $2 - 4\cos\alpha$ (C) 2 (D) $2 - 4\sin\alpha$

A. $2 + 4\sin\alpha$

B. $2 - 4\sin\alpha$

C. 2

D. none of these

Answer: C

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72. If α is an acute angle and $\sin\left(\frac{\alpha}{2}\right) = \sqrt{\frac{x-1}{2x}}$ then $\tan\alpha$ is

A. $\sqrt{\frac{x-1}{x+1}}$

B. $\frac{\sqrt{x-1}}{x+1}$

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

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

Answer: C

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73. Find the Value of $\tan 82\frac{1}{2^\circ}$

A. $\sqrt{2}+\sqrt{3}+\sqrt{4}+\sqrt{6}$

B. $\left(\sqrt{3}+\sqrt{2}\right)\left(\sqrt{2}-1\right)$

C. $-\left(\sqrt{3}+\sqrt{2}\right)\left(\sqrt{2}+1\right)$

D. none of these

Answer: A

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74. The value of $\tan 6^0 \tan 42^0 \tan 66^0 \tan 78^0$ is 1 (b) $\frac{1}{2}$ (c) $\frac{1}{4}$ (d) $\frac{1}{8}$

A. 1

B. $1/2$

C. $1/4$

D. $1/8$

Answer: A

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75. The value of $\cot 36^\circ \cot 72^\circ$, is

A. $1/5$

B. $1/\sqrt{5}$

C. 1

D. $1/3$

Answer: B

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76. The value of $\frac{\cos\pi}{7}+\frac{\cos(2\pi)}{7}+\frac{\cos(3\pi)}{7}+\frac{\cos(4\pi)}{7}+\frac{\cos(5\pi)}{7}+\frac{\cos(6\pi)}{7}+\frac{\cos(7\pi)}{7}$ is 1 (b) -1 (c) 0 (d) none of these

A. 1

B. -1

C. 0

D. -2

Answer: B

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

A. 1

B. -1

C. $1/2$

D. $-1/2$

Answer: D

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78. The value of $\cos\frac{\pi}{9}\cos\frac{2\pi}{9}\cos\frac{3\pi}{9}$, is

A. $1/8\cos 20$

B. $-1/8$

C. 1

D. 0

Answer: A

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79. The value of $\cos\frac{\pi}{9}\cos\frac{2\pi}{9}\cos\frac{3\pi}{9}\cos\frac{4\pi}{9}$, is

A. $\frac{1}{8}$

B. $\frac{1}{16}$

C. $\frac{1}{64}$

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

Answer: B

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80. The vlaue of $\cos ec^2\frac{\pi}{7}+\cos ec^2\frac{2\pi}{7}+\cos ec^2\frac{3\pi}{7}$, is

A. 20

B. 2

C. 22

D. 23

Answer: D

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81. $\sin 12^\circ \sin 48^\circ \sin 54^\circ =$

A. $1/4$

B. $1/8$

C. $1/16$

D. $1/64$

Answer: B

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82. the value of $\sin\left(\frac{\pi}{7}\right)+\sin\left(\frac{2\pi}{7}\right)+\sin\left(\frac{3\pi}{7}\right)$ is

A. $\cos\frac{\pi}{14}$

B. $\frac{1}{2}\cos\frac{\pi}{14}$

C. $\tan\frac{\pi}{14}$

D. $\frac{1}{2}\tan\frac{\pi}{14}$

Answer: B

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83. $\frac{\cos^6\pi}{9}-33\frac{\tan^4\pi}{9}+27\frac{\tan^2\pi}{9}$ is equal to 0 (b) $\sqrt{3}$ (c) 3 (d) 9

A. 0

B. $\sqrt{3}$

C. 3

D. 9

Answer: C

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84. $\frac{\sin^2 3A}{\sin^2 A} - \frac{\cos^2 3A}{\cos^2 A} =$

A. $\cos 2A$

B. $8\cos 2A$

C. $1/8\cos 2A$

D. none of these

Answer: B

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85. If $\sin A = \frac{336}{625} where 450^\circ < A < 540^\circ, then \sin\frac{A}{4} =$

A. $3/5$

B. $-3/5$

C. $4/5$

D. $-4/5$

Answer: C

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86. If $y = \frac{\tan x}{\tan 3x}$, then

A. $y \in [1/3, 3]$

B. $y \notin [1/3, 3]$

C. $y \in [-3, -1/3]$

D. $y \in [-3, -1/3]$

Answer: B

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87. The value of $\cot^2\frac{\pi}{7}+\cot^2\frac{2\pi}{7}+\cot^2\frac{3\pi}{7}$, is

A. 0

B. 5

C. 9

D. $1/3$

Answer: B

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88. The value of $\sin\frac{\pi}{7}\sin\frac{2\pi}{7}\sin\frac{3\pi}{7}$, is

A. $1/8$

B. $\sqrt{7}/8$

C. $\sqrt{7}/8$

D. $\sqrt{7}/16$

Answer: B

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89. The value of $\sin\frac{2\pi}{7}+\sin\frac{4\pi}{7}+\sin\frac{8\pi}{7}$, is

A. $\sqrt{7}/8$

B. $1/8$

C. $\sqrt{7}/2$

D. $-\sqrt{7}/2$

Answer: C

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90. $\cos\frac{2\pi}{15}\cos\frac{4\pi}{15}\cos\frac{8\pi}{15}\cos\frac{16\pi}{15}=\frac{1}{16}$

A. 0

B. 1

C. -1

D. $1/8$

Answer: D

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91. If $\sin A + \cos A = m$ and $\sin^3 A + \cos^3 A = n$, then

A. $m^3 - 3m + n = 0$

B. $n^3 - 3n + 2m = 0$

C. $m^3 - 3m + 2n = 0$

D. $m^3 + 3m + 2n = 0$

Answer: C

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92. If $\cos A + \cos B = m$ and $\sin A + \sin B = n$ then $\sin(A + B) =$

A. $\frac{mn}{m^2 + n^2}$

B. $\frac{2mn}{m^2 + n^2}$

C. $\frac{m^2 + n^2}{2mn}$

D. $\frac{mn}{m + n}$

Answer: B

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93. If $< A < \frac{\pi}{6}$ and $\sin A + \cos A = \frac{\sqrt{7}}{2}$, then $\tan \frac{A}{2} =$

A. $\frac{\sqrt{7} - 2}{3}$

B. $\frac{\sqrt{7} + 2}{3}$

C. $\frac{\sqrt{7}}{3}$

D. none of these

Answer: A

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94. The value of $\cos\frac{\pi}{11}+\cos\frac{3\pi}{11}+\cos\frac{5\pi}{11}+\cos\frac{7\pi}{11}+\cos\frac{9\pi}{11}$, is

A. 0

B. $-1/2$

C. $1/2$

D. 1

Answer: C

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95. If $n=\frac{\pi}{4\alpha}$, then $\tan\alpha\tan 2\alpha\tan 3\alpha\ldots\ldots.\tan(2n-1)\alpha$ is equal to

A. 0

B. 1

C. -1

D. none of these

Answer: D

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96. the value of $\tan 9^\circ - \tan 27^\circ - \tan 63^\circ + \tan 81^\circ$ is equal to

A. 0

B. 1

C. -1

D. 4

Answer: D

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97. For $x \in R$,

$\tan x + \frac{1}{2}\tan\frac{1}{2^2}\tan\frac{x}{2^2} + \ldots + \frac{1}{2^{n-1}}\tan\left(\frac{x}{2^{n-1}}\right)$ is equal to

A. $2\cot 2x - \frac{1}{2^{n-1}}\cos\left(\frac{x}{2^{n-1}}\right)$

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

C. $\cot\left(\frac{x}{2^{n-1}}\right) - \cot 2x$

D. none of these

Answer: B

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98. If $\frac{\tan 3A}{\tan A} = k$, then $\frac{\sin 3A}{\sin A} =$

A. $\frac{2k}{k-1}, k \in R$

B. $\frac{2k}{k-1}, k \in [1/3, 3]$

C. $\frac{2k}{k-1}, k \notin [1/3, 3]$

D. $\frac{k-1}{2k}, k \notin [1/3, 3]$

Answer: C

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99. If $y = \frac{\sec^2\theta - \tan\theta}{\sec^2\theta + \tan\theta}$,then

A. $\frac{1}{3} < y < 3$

B. $y \notin [1/3, 3]$

C. $-3 < y < -\frac{1}{3}$

D. none of these

Answer: A

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100. If $\cos A = \tan B, \cos B = \tan C, \cos C = \tan A,$ then sin A is equal to

A. $\sin 180^\circ$

B. $2\sin 18^\circ$

C. $2\cos 18^\circ$

D. $2\cos 36^\circ$

Answer: B

Watch Video Solution

101. If $A_1A_2A_3A_4A_5$ be regular pentgon inscribed in anunit circle. Then $(A_1A_2)(A_1A_3)$ is equal to

A. 1

B. 3

C. 4

D. $\sqrt{5}$

Answer: D

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102. If $\tan\alpha$ is equal to the integral solution of the inequality $4x^2 - 16x + 15 < 0$ and $\cos\beta$ is equal to the slope of the bisector of the first quadrant, then $\sin(\alpha+\beta)\sin(\alpha-\beta)$ is equal to $\frac{3}{5}$ (b) $\frac{3}{5}$ (c) $\frac{2}{\sqrt{5}}$ (d) $\frac{4}{5}$

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

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

C. $\frac{4}{5}$

D. $-\frac{4}{5}$

Answer: C

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103. If $\frac{x}{\cos\theta} = \frac{y}{\cos\left(\theta - \frac{2\pi}{2}\right)} = \frac{2}{\cos\left(\theta + \frac{2\pi}{3}\right)}, then x + y + z =$

A. 1

B. 0

C. -1

D. 2

Answer: B

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104. If $\cos A = \frac{3}{4}$ then the value of $\sin\left(\frac{A}{2}\right)\sin\left(\frac{5A}{2}\right)$ is

A. $\frac{1}{32}$

B. $\frac{11}{8}$

C. $\frac{11}{32}$

D. $\frac{11}{16}$

Answer: C

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105. The minimum value of $9\tan^2\theta + 4\cot^2\theta$ is

A. 13

B. 9

C. 6

D. 12

Answer: D

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106. If $x_1, x_2, x_3, \ldots, x_n$ are in A.P. whose common difference is α, then the value of $\sin\alpha(\sec x_1 \sec x_2 + \sec x_2 \sec x_3 + \ldots + \sec x_{n-1}\sec x_n)$ is

A. $\frac{\sin(n-1)\alpha}{\cos x_1 \cos x_n}$

B. $\frac{\sin n\alpha}{\cos x_1 \cos x_n}$

C. $\sin(n-1)\alpha \cos x_1 \cos x_n$

D. $\sin n\alpha \cos x_1 \cos x_n$

Answer: A

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107. If $a\sin^2 x + b\cos^2 x = c, b\sin^2 y + a\cos^2 y = d$ and $a\tan x = b\tan y$ then $\frac{a^2}{b^2} = \ldots\ldots . \left(0 < x, y < \frac{\pi}{2}\right)$

A. $\frac{(b-c)(d-b)}{(a-d)(d-b)}$

B. $\frac{(a-d)(c-a)}{(b-c)(d-b)}$

C. $\frac{(d-a)(c-a)}{(b-c)(d-b)}$

D. $\frac{(b-c)(b-d)}{(a-c)(a-d)}$

Answer: B

Watch Video Solution

108. If $a_{n+1} = \sqrt{\frac{1}{2}(1+a_n)} then \cos\left(\frac{\sqrt{1-a_0^2}}{a_1 a_2 a_3 ... to \infty}\right) =$

A. 1

B. -1

C. a_0

D. $1/a_0$

Answer: C

View Text Solution

109. If $\alpha, \beta, \gamma, \delta$ are the smallest positive angles in ascending order of magnitude which have their sines equal to the positive quantity k, then the value of $4\frac{\sin\alpha}{2} + 3\frac{\sin\beta}{2} + 2\frac{\sin\gamma}{2} + \frac{\sin\delta}{2}$ is equal to $2\sqrt{1-k}$ (b) $2\sqrt{1+k}$ $\frac{\sqrt{1-k}}{2}$ (d) none of these

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

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

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

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

Answer: B

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110. The value of $\cos y \cos\left(\frac{\pi}{2}-x\right)-\cos\left(\frac{\pi}{2}-y\right)\cos x+\sin y \cos\left(\frac{\pi}{2}-x\right)+\cos x \sin\left(\frac{\pi}{2}\right.$ is zero if $x=0$ (b) $y=0$ $x=y$ (d) $n\pi+y-\frac{\pi}{4}(n \in Z)$

A. $x=0$

B. $y=0$

C. $x=y+\frac{\pi}{4}$

D. $x=\frac{3\pi}{4}+y$

Answer: D

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111. If $\cos x - \sin\alpha \cot\beta \sin x = \cos\alpha$, *then* $\tan\frac{x}{2}$ is equal to

A. $\cot\frac{\alpha}{2}\tan\frac{\beta}{2}$

B. $-\tan\frac{\alpha}{2}\cot\frac{\beta}{2}$

C. $-\tan\frac{\alpha}{2}\tan\frac{\beta}{2}$

D. $\cot\frac{\alpha}{2}\cot\frac{\beta}{2}$

Answer: B

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112. The expression

$\cos ec^2 A \cot^2 A - \sec^2 A \tan^2 A - \left(\cot^2 A - \tan^2 A\right)\left(\sec^2 A \cos ec^2 A - 1\right)$

is equal to

A. 1

B. -1

C. 0

D. 2

Answer: C

Watch Video Solution

113. If $\sin\alpha - \cos\alpha = m$, then the value of $\sin^6\alpha + \cos^6\alpha$ in terms of m is

A. $\frac{4 - 3\left(m^2 - 1\right)^2}{4}$

B. $\frac{4 + 3\left(m^2 - 1\right)^2}{4}$

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

D. none of these

Answer: A

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114. if $0 \leq x \leq \pi$ and $81^{\sin^2 x} + 81^{\cos^2 x} = 30$ then $x =$

A. $\frac{\pi}{6}, \frac{\pi}{3}$

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

C. $\frac{5\pi}{6}, \frac{\pi}{3}$

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

Answer: A

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115. If $\cos(A - B) = \frac{3}{5}$ and $\tan A \tan B = 2$, then

A. $\cos A \cos B = \frac{1}{5}$

B. $\sin A \sin B = -\frac{2}{5}$

C. $\cos(A + B) = -\frac{1}{5}$

D. none of these

Answer: A

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116. The value of $\frac{3+\cot 76^\circ \cot 16^\circ}{\cot 76^\circ + \cot 16^\circ}$ is

A. $\cot 44^\circ$

B. $\tan 44^\circ$

C. $\tan 2^\circ$

D. $\cot 46^\circ$

Answer: A

Watch Video Solution

117. If $\sin x + \sin^2 = 1$, then $\cos^8 x + 2\cos^6 x + \cos^4 x =$

A. 0

B. -1

C. 2

D. 1

Answer: D

Watch Video Solution

118. If $x = y\cos\left(\frac{2\pi}{3}\right) = z\cos\left(\frac{4\pi}{3}\right)$, then xy+yz+zx=

A. -1

B. 0

C. 1

D. 2

Answer: B

Watch Video Solution

119. If $\sin\alpha = \sin\beta$ and $\cos\alpha = \cos\beta$, then

A. $\sin\dfrac{\alpha+\beta}{2} = 0$

B. $\cos\dfrac{\alpha+\beta}{2} = 0$

C. $\sin\dfrac{\alpha-\beta}{2} = 0$

D. $\cos\left(\dfrac{\alpha-\beta}{2}\right) = 0$

Answer: C

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120. If $\sin\theta_1 + \sin\theta_2 + \sin\theta_3 = 3, then\cos\theta_1 + \cos\theta_2 + \cos\theta_3 =$

A. 3

B. 2

C. 1

D. 0

Answer: D

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121. If A lies in the third quadrant and $3\tan A - 4 = 0$, then $5\sin 2A + 3\sin A + 4\cos A$ is equal to

A. 0

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

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

D. 48/5`

Answer: A

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122. tan 5x tan3x $\tan 2x =$

A. $\tan 5x - \tan 3x \tan 2x$

B. $\dfrac{\sin 5x - \sin 3x - \sin 2x}{\cos 5x - \cos 3x - \cos 2x}$

C. 0

D. none of these

Answer: A

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123. The value of $\sin 12^\circ \sin 24^\circ \sin 48^\circ$, is

A. $\cos 20^\circ \cos 40^\circ \cos 60^\circ \cos 80^\circ$

B.

C. $\sin 20^\circ \sin 40^\circ \sin 60^\circ \sin 80^\circ$

D. $3/15$

Answer: A

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124. If $A + B + C = \frac{3\pi}{2}$, *then* $\cos 2A + \cos 2B + \cos 2C =$

A. $1 - 4\cos A \cos B \cos C$

B. $4\sin A \sin B \sin C$

C. $1 + 2\cos A \cos B \cos C$

D. $1 - 4\sin A \sin B \sin C$

Answer: D

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125. If $A + C = B$, *then* $\tan A \tan B \tan C =$

A. $\tan A \tan B + \tan C$

B. $\tan B - \tan C - \tan A$

C. $\tan A + \tan C - \tan B$

D. $-(\tan A \tan B + \tan C)$

Answer: B

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126. If $\tan(\cot x) = \cot(\tan x)$, *then* $\sin 2x$ is equal to

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

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

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

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

Answer: B

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127. If $\tan\theta = \frac{a}{b}$ then $b\cos 2\theta + a\sin 2\theta =$

A. a

B. b

C. b/a

D. a/b

Answer: B

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128. If $A = 130^\circ$ and $x = \sin A + \cos A,$ then

A. $x > 0$

B. $x < 0$

C. $x = 0$

D. $x \geq 0$

Answer: A

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129. The value of the expression

A. 0

B. 2

C. 3

D. 1

Answer: D

View Text Solution

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

A. $A = \cos^2\theta + \sin^4\theta,$

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

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

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

Answer: D

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131. The minimum value of the expression $\sin\alpha + \sin\beta + \sin\gamma$, where α, β, γ are real numbers satisfying $\alpha + \beta + \gamma = \pi$ is

A. positive

B. zero

C. negative

D. -3

Answer: A

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132. Which of the following statement is incorrect

A. $\sin\theta = -1/5$

B. $\cos\theta = 1$

C. $\sec\theta = 1/2$

D. $\tan\theta = 20$

Answer: C

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133. The value of $\sin\left(\frac{\pi}{14}\right)\sin\left(\frac{3\pi}{14}\right)\sin\left(\frac{5\pi}{14}\right)$ is

A. 1

B. $1/4$

C. $1/8$

D. $\sqrt{2}/7$

Answer: C

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134. If $\sin\theta + \operatorname{cosec}\theta = 2$, then $\sin^2\theta + \operatorname{cosec}^2\theta$ is equal to

A. 1

B. 4

C. 2

D. none of these

Answer: C

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135. If $\tan\theta = \frac{1}{2}$ and $\tan\phi = \frac{1}{3}$, then the value of $\theta + \phi$ is

A. $\pi/6$

B. π

C. zero

D. $\pi/4$

Answer: D

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136. $\cos^{12} x + 3\cos^{10} x + 3\cos^{8} x + \cos^{6} x - 2$

A. 0

B. 1

C. 2

D. $\sin^{2} x$.

Answer: D

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137. Write the maximum value of $12s\int h\eta - 9\sin^2\ \theta.$

A. 3

B. 4

C. 5

D. 2

Answer: B

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138. If $f(x) = \cos^2 x + \sec^2 x$, its value always is

A. $f(x) < 1$

B. $f(x) = 1$

C. $2 > f(x) > 1$

D. $f(x) \geq 2$

Answer: D

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139. The maximum value of $3\cos x + 4\sin x + 5,$ is

A. 5

B. 9

C. 7

D. none of these

Answer: D

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140. If $\cos\alpha + \cos\beta + \cos\gamma = 0 = \sin\alpha + \sin\beta + \sin\gamma$, then which of the following is/are true:- (a) $\cos(\alpha - \beta) + \cos(\beta - \gamma) + \cos(\gamma - \delta) = -\frac{3}{2}$ (b)

$\cos(\alpha-\beta)+\cos(\beta-\gamma)+\cos(\gamma-\delta)=-\frac{1}{2}$ (c)

$\sum\cos 2\alpha+2\cos(\alpha+\beta)+2\cos(\beta+\gamma)+2\cos(\gamma+\alpha)=0$ (d)

$\sum\sin 2\alpha+2\sin(\alpha+\beta)+2\sin(\beta+\gamma)+2\sin(\gamma+\alpha)=0$

A. A is true and B is false

B. A is false and B is true

C. both A and B are true

D. both A and B are false

Answer: C

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141. $\cos(\alpha-\beta)=1 and \cos(\alpha+\beta)=\frac{l}{e}$, where $\alpha,\beta\mu\in[-\pi,\pi]$.

Number of pairs of α,β which satisfy both the equations is 0 (b) 1 (c) 2 (d) 4

A. 0

B. 1

C. 2

D. 4

Answer: D

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142. The maximum value of $\sin\left(\theta + \frac{\pi}{6}\right) + \cos\left(\theta + \frac{\pi}{6}\right)$ is attained at $\theta \in \left(0, \frac{\pi}{2}\right)$

A. $\pi / 12$

B. $\pi / 6$

C. $\pi / 3$

D. $\pi / 2$

Answer: A

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143. If $A + B + C = \pi$ and $m\angle C$ is obtuse then $\tan A . \tan B$ is

A. $\tan A \tan B > 1$

B. $\tan A \tan B > 1$

C. $\tan A \tan B = 1$

D. none of these

Answer: B

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

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

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

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

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

Answer: A

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145. If $\tan\theta = x - \frac{1}{4x}$, then $\sec\theta - \tan\theta$ is equal to

A. $-2x, \frac{1}{2x}$

B. $-\frac{1}{2x}, 2x$

C. $2x$

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

Answer: A

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146. If $\sec\theta = x + \frac{1}{4x}$, then $sec\theta + tan\theta =$ $x, \frac{1}{x}$ (b) $2x, \frac{1}{2x}$ (c) $-2x, \frac{1}{2x}$ (d) $-\frac{1}{x}, x$

A. $x, \frac{1}{x}$

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

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

D. $-\frac{1}{x}, x$

Answer: B

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147. If $\pi < \theta < 2\pi, then \sqrt{\frac{1+\cos\theta}{1-\cos\theta}}$ is equal to

A. $\cos ec\theta + \cot\theta$

B. $\cos ec\theta - \cot\theta$

C. $-\cos ec\theta + \cot\theta$

D. $-\cos ec\theta - \cot\theta$

Answer: D

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148. If θ lies in the second quadrant, then the value $\sqrt{\left(\frac{1-\sin\theta}{1+\sin\theta}\right)}+\sqrt{\left(\frac{1+\sin\theta}{1-\sin\theta}\right)}$

A. $2\sec\theta$

B. $-2\sec\theta$

C. $\sec\theta$

D. $-\sec\theta$

Answer: B

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149. $\sin^2\theta=\frac{(x+y)^2}{4xy}$ where x,y $\in$ R gives θ if and only if

A. $a+y=0$

B. $x=y$

C. $|x| = |y| \neq 0$

D. none of these

Answer: C

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150. $\sec\theta = \dfrac{a^2 + b^2}{a^2 - b^2}, where a, b \in R,$ gives real balues of θ if and only if

A. $a = b \neq 0$

B. $|a| \neq |b| \neq 0$

C. $a + b = 0, a \neq 0$

D. none of these

Answer: B

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151. If $0^\circ < \theta < 180^\circ$ then $\sqrt{2+\sqrt{2+\sqrt{2+\ldots+\sqrt{2(1+\cos\theta)}}}}$,

then being n number of 2's, is equal to

A. $2\cos\dfrac{\theta}{2^n}$

B. $2\cos\dfrac{\theta}{2^{n-1}}$

C. $2\cos\dfrac{\theta}{2^{n+1}}$

D. none of these

Answer: A

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152. $\sin 65^\circ + \sin 43^\circ - \sin 29^\circ - \sin 7^\circ$ is equal to

A. $\cos 36^\circ$

B. $\cos 18^\circ$

C. $\cos 9^\circ$

D. none of these

Answer: D

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153. If $\sec\alpha$ and $\cos ec\alpha$ are the roots of the equation $x^2 - ax + b = 0$, then

A. $a^2 = b(b-2)$

B. $a^2 = b(b+2)$

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

D. none of these

Answer: B

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154. The value of the expression $3(\sin x - \cos x)^4 + 4\left(\sin^6 x + \cos^6 x\right) + 6(\sin x + \cos x)^2$ is

A. 10

B. 12

C. 13

D. none of these

Answer: C

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155. If $\cos(\alpha + \beta)\sin(\gamma + \delta) = \cos(\alpha - \beta)\sin(\gamma - \delta)$ then the value of $\cot\alpha\cot\beta\cot\gamma,$ is

A. $\cot\delta$

B. $-\cot\delta$

C. $\tan\delta$

D. $-\tan\delta$

Answer: A

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156. $\sin^2 5^\circ + \sin^2 10^\circ + \sin^2 15^\circ + \ldots\ldots + \sin^2 85^\circ + \sin^2 90^\circ =$

A. $7\frac{1}{2}$

B. $8\frac{1}{2}$

C. $9\frac{1}{2}$

D. none of these

Answer: C

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157. If $\sin x + \sin^2 x = 1$, then find the value of $\cos^{12} x + 3\cos^{10} x + 3\cos^8 x + \cos^6 x - 1$

A. 2

B. 1

C. 0

D. -1

Answer: C

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158. If ABCD is a cyclic quadrilateral, then the value of cosA-cosB+cosC-cosD is equal to

A. 1

B. 0

C. -1

D. none of these

Answer: B

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159. If ABCD, is a cycling quadrilateral such that $\tan A - 5 = 0$ and $5\cos B + 3 = 0$, then the quadratic equation whose roots are $\cos C$ and $\tan D$, is

A. $39x^2 - 16x - 48 = 0$

B. $39x^2 + 88x - 48 = 0$

C. $39x^2 - 88x - 48 = 0$

D. none of these

Answer: A

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160. If $\sin(\pi \cot \theta) = \cos(\pi \tan \theta)$, then

A. $\cot 2\theta = \frac{1}{4}, \frac{3}{4}$

B. $\cot 2\theta = 4, \frac{4}{3}$

C. $\cot 2\theta = -\frac{3}{4}, -\frac{1}{4}$

D. none of these

Answer: A

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161. The value of $\sin x \sin y \sin(x-y) + \sin y \sin z \sin(y-z) + \sin z \sin x \sin(z-x) + \sin(x-y)\sin(y-z)\sin(z-x)$, is

A. 0

B. 1

C. 2

D. -1

Answer: A

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162. If ABCD is a convex quadrilateral such that $4\sec A + 5 = 0$ then the quadratic equation whose roots are tan A and cosec A is

A. $12x^2 - 29x + 15 = 0$

B. $12x^2 - 11x - 15 = 0$

C. $12x^2 + 11x - 15 = 0$

D. none of these

Answer: B

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163. If $\frac{\tan\alpha + \tan\beta}{\cot\alpha + \cot\beta} + \{\cos(\alpha - \beta) + 1\}^{-1} = 1, then \tan\alpha\tan\beta$ is equal to

A. 1

B. -1

C. 2

D. -2

Answer: A

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164.

$\cos\left(\frac{\pi}{15}\right)\cos\left(\frac{2\pi}{15}\right)\cos\left(\frac{3\pi}{15}\right)\cos\left(\frac{4\pi}{15}\right)\cos\left(\frac{5\pi}{15}\right)\cos\left(\frac{6\pi}{15}\right)\cos\left(\frac{7\pi}{15}\right) = \frac{1}{2^7}$

A. $1/128$

B. $1/64$

C. $1/16$

D. none of these

Answer: A

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165. The value of $\cos 12^\circ \cos 24^\circ \cos 36^\circ \cos 48^\circ \cos 72^\circ \cos 84^\circ$, is

A. $1/64$

B. $1/32$

C. $1/16$

D. $1/128$

Answer: A

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166. The value of $\sin \frac{15\pi}{32} \sin \frac{7\pi}{16} \sin \frac{3\pi}{8}$, is

A. $\frac{1}{8\sqrt{2}\cos\left(\frac{15\pi}{32}\right)}$

B. $\frac{1}{8\sin\left(\frac{\pi}{32}\right)}$

C. $\frac{1}{4\sqrt{2}}\cos ec\left(\frac{\pi}{16}\right)$

D. none of these

Answer: A

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167. $\sum_{r=1}^{n-1}\cos^2\frac{r\pi}{n}$ is equal to

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

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

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

D. none of these

Answer: C

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168. The value of $\cot\theta - \tan\theta - 2\tan 2\theta - 4\tan 4\theta - 8\cot 8\theta,$ is

A. 0

B. 1

C. -1

D. none of these

Answer: A

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169. If $\cos(x-y), \cos x$ and $\cos(x+y)$ are in H.P., then $\cos x \sec\left(\frac{y}{2}\right)$ equals

A. 1

B. 2

C. $\sqrt{2}$

D. none of these

Answer: C

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170. The value of $\tan 20^\circ + 2\tan 50^\circ - \tan 70^\circ$, is

A. 1

B. 0

C. $\tan 50^\circ$

D. none of these

Answer: B

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171. If $\cos A + \cos B + \cos C = 0, then \cos 3A + \cos 3B + \cos 3C$ is equal to

A. $\cos A \cos B \cos C$

B. $12 \cos A \cos B \cos C$

C. 0

D. $8 \cos^2 A \cos^3 B \cos^3 C$

Answer: B

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172. Minimum value of $\cos 2\theta + \cos \theta$ for all real value of θ is

A. $-9/8$

B. 0

C. -2

D. none of these

Answer: A

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173. $\cos 9^\circ - \sin 9^\circ =$

A. $\frac{5+\sqrt{5}}{4}$

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

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

D. none of these

Answer: B

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174. If $y = \frac{\sin 3\theta}{\sin \theta}, \theta \neq n\pi,$ then

A. $y \in [-1, 3]$

B. $y \in (-\infty, -1]$

C. $y \in (3, \infty)$

D. $y \in [-1, 3)$

Answer: D

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175. If $\tan(\pi \cos\theta) = \cot(\pi \sin\theta), 0 < \theta < \frac{3\pi}{4}, then \sin\left(\theta + \frac{\pi}{4}\right)$ equals

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

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

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

D. $\sqrt{2}$

Answer: C

Watch Video Solution

176. If $\tan(\pi\cos\theta) = \cot(\pi\sin\theta)$, then the value of $\sin\left(\theta + \frac{\pi}{4}\right)$ equals

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

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

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

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

Answer: B

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177. $1 + \sin x + \sin^2 x + \ldots \text{to} \infty = 2\sqrt{3} + 4, \quad \text{if} \quad x = ?$

A. $x = \frac{3\pi}{3}$ or , $\frac{\pi}{3}$

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

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

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

Answer: A

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178. If $\sin(x-y)=\cos(x+y)=\frac{1}{2}$, the value of x and y lyingbetween 0° and 90° are given by

A. $x=15^\circ, y=25^\circ$

B. $x=65^\circ, y=15^\circ$

C. $x=45^\circ, y=45^\circ$

D. $x=45^\circ, y=15^\circ$

Answer: D

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179. If α and β be between 0 and $\frac{\pi}{2}$ and if $\cos(\alpha+\beta)=\frac{12}{13}$ and $\sin(\alpha-\beta)=\frac{3}{5}$, then sin

2 α is equal to

A. $64/65$

B. $56/65$

C. 0

D. $16/15$

Answer: B

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

A. $-\frac{627}{725}$

B. $\frac{627}{725}$

C. -1

D. none of these

Answer: A

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181.

$2x^2 + 3x - \alpha - 0$ has roots -2 and β while the equation $x^2 - 3mx -$

$\Delta PQR, \angle R = \frac{\pi}{2}$. If than $\left(\frac{P}{2}\right)$ and $\tan\left(\frac{Q}{2}\right)$ are the roots of the equ

then which one of the following is correct ?

A. $a + b = c$

B. $b + c = a$

C. $c + a = b$

D. $b = c$

Answer: A

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182. If $A+B+C=0$, then the value of $\sum \cot(B+C-A)\cot(C+A-B)$ is equal to

A. 0

B. 1

C. -1

D. 2

Answer: B

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183. In $(0, \pi/2)\tan^m x + \cot^m x$ attains

A. a minimum value which is independent of m

B. a minimum value which is a function of m

C. the minimum value of 2

D. the minimum value at the some point indiependent of m.

Answer: B

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184. For $-\frac{\pi}{2} < \theta \frac{\pi}{2}, \frac{\sin\theta + \sin 2\theta}{1 + \cos\theta + \cos 2\theta}$ lies in the interval

A. $(-\infty, \infty)$

B. $(-2, 2)$

C. $(0, \infty)$

D. $(-1, 1)$

Answer: A

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185. If $y\tan(A + B + C) = x\tan(A + B - C) = \gamma then \tan 2C =$

A. $\frac{\gamma(x + y)}{\lambda^2 - xy}$

B. $\frac{\lambda(x+y)}{\lambda^2+xy}$

C. $\frac{\lambda(x-y)}{xy-\lambda^2}$

D. $\frac{\lambda(x-y)}{xy+\lambda^2}$

Answer: D

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186. Which of the following is not the qyadratic equation whose roots are $\cos ec^2\theta$ and $\sec^2\theta$?

A. $x^2-2x+2=0$

B. $x^2+5x+5=0$

C. $x^2-4x+4=0$

D. none of these

Answer: C

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187. $\cos\alpha\sin(\beta-\gamma)+\cos\beta\sin(\gamma-\alpha)+\cos\gamma\sin(\alpha-\beta)=$

A. 0

B. $1/2$

C. 1

D. $4\cos\alpha\cos\beta\cos\gamma$

Answer: A

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188. $\sin 47^\circ-\sin 25^\circ+\sin 61^\circ-\sin 11^\circ=$

A. $\cos 7^\circ$

B. $\sin 7^\circ$

C. $2\cos 7^\circ$

D. $2\sin 7^\circ$

Answer: A

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189. $\cos 1 + \cos 2 + \cos 3 + \ldots + \cos 180$

A. 1

B. 0

C. 2

D. -1

Answer: D

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190. The value of $\frac{\tan 70^0 - \tan 20^0}{\tan 50^0} =$

A. 2

B. 1

C. 0

D. 3

Answer: A

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Chapter Test

1. If $\cos\alpha + \cos\beta = 0 = \sin\alpha + \sin\beta, then \cos 2\alpha + \cos 2\beta =$

A. $-2\sin(\alpha+\beta)$

B. $-2\cos(\alpha+\beta)$

C. $2\sin(\alpha+\beta)$

D. $2\cos(\alpha+\beta)$

Answer: B

Watch Video Solution

2. If $\sin\beta$ is the GM between $\sin\alpha$ and $\cos\alpha$, $then\ \cos 2\beta =$

A. $2\sin^2\left(\frac{3\pi}{4}-\alpha\right)$

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

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

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

Answer: C

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3. $\tan\frac{2\pi}{5}-\tan\frac{\pi}{15}-\sqrt{3}\tan\frac{2\pi}{5}\tan\frac{\pi}{15}$ is equal to

A. $-\sqrt{3}$

B. $1/\sqrt{3}$

C. 1

D. $\sqrt{3}$

Answer: D

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4. If $\sin B = \frac{1}{5}\sin(2A + B), then \frac{\tan(A + B)}{\tan A}$ is equal to

A. $5/3$

B. $2/3$

C. $3/2$

D. $3/5$

Answer: C

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5. $\frac{\sin 7\theta + 6\sin 5\theta + 17\sin 3\theta + 12\sin\theta}{\sin 6\theta + 5\sin 4\theta + 12\sin 2\theta}$ is equal to

A. $2\cos\theta$

B. $\cos\theta$

C. $2\sin\theta$

D. $\sin\theta$

Answer: A

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6. If $\frac{\cos(\theta_1-\theta_2)}{\cos(\theta_1+\theta_2)}+\frac{\cos(\theta_3+\theta_4)}{\cos(\theta_3-\theta_4)}=0,$ then $\tan\theta_1\tan\theta_2\tan\theta_3\tan\theta_4=$

A. 1

B. 2

C. -1

D. none of these

Answer: C

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7. $\frac{1+\cos 56^\circ+\cos 58^\circ-\cos 66^\circ}{\cos 28^\circ \cos 29^\circ \sin 33^\circ}=$

A. 2

B. 3

C. 4

D. none of these

Answer: C

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8. α and β are acute angles and $\cos 2\alpha=\frac{3\cos 2\beta-1}{3-\cos 2\beta}$ then $\tan\alpha\cot\beta=$

A. $\sqrt{3}$

B. $\sqrt{2}$

C. 1

D. none of these

Answer: B

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9. If $\cos ec\theta = \frac{p+q}{p-q}, then \cot(\pi, /4+\theta/2) =$

A. $\sqrt{\frac{p}{q}}$

B. $\sqrt{\frac{q}{p}}$

C. $\sqrt{pq}$

D. pq

Answer: B

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10. If $\sin\alpha + \sin\beta = a$ and $\cos\alpha + \cos\beta = b$, *then* $\sin(\alpha+\beta) =$

A. ab

B. $a + b$

C. $\dfrac{2ab}{a^2 - b^2}$

D. $\dfrac{2ab}{a^2 + b^2}$

Answer: D

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11. If $\cos(\alpha+\beta) = \dfrac{4}{5}, \sin(\alpha-\beta) = \dfrac{5}{13}$ and α, β between 0 and $\dfrac{\pi}{4}$, *then* $\tan 2\alpha =$

A. $\dfrac{56}{33}$

B. $\dfrac{33}{56}$

C. $\dfrac{16}{65}$

D. $\dfrac{60}{61}$

Answer: A

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12. The vlaue of $\cos^2 76^\circ + \cos^2 16 - \cos 76^\circ \cos 16^\circ$, is

A. $1/2$

B. 0

C. $-1/4$

D. $3/4$

Answer: D

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13. The value of $\sum_{k=1}^{3} \cos^2(2k-1)\frac{\pi}{12}$, is

A. 0

B. $1/2$

C. $-1/2$

D. $3/2$

Answer: D

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14. If $\frac{a^2+1}{2a} = \cos\theta, then \frac{a^6+1}{2a^3} =$

A. $\cos^2\theta$

B. $\cos^3\theta$

C. $\cos 2\theta$

D. $\cos 3\theta$

Answer: D

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15. The value of $\frac{1}{\cos 290^\circ} + \frac{1}{\sqrt{3}\sin 250^\circ}$ is equal to

A. $\sqrt{3}/4$

B. $\pi/3$

C. $\pi/6$

D. $\pi/2$

Answer: D

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16. If $\tan\alpha = \left(1 + 2^{-x}\right)^{-1}, \tan\beta = \left(1 + 2^{x+1}\right)^{-1} then \alpha + \beta$ equals

A. $\pi/6$

B. $\pi/4$

C. $\pi/3$

D. $\pi/2$

Answer: B

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17. A and B are positive acute angles satisfying the equations $3\cos^2 A + 2\cos^2 B = 4$ and $\frac{3\sin A}{\sin B} = \frac{2\cos B}{\cos A}, then A + 2B$ is equal to

A. $\pi/4$

B. $\pi/3$

C. $\pi/6$

D. $\pi/2$

Answer: D

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18. If $T_n = \cos^n \theta + \sin^n \theta, then 2T_6 - 3T_4 + 1 =$

A. 2

B. 3

C. 0

D. 1

Answer: C

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19. The maximum value of $1 + 8\sin^2 x^2 \cos^2 x^2$ is

A. 3

B. -1

C. -8

D. 9

Answer: A

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20. Let

$\theta \in (0, \pi/4)$ and $t_1 = (\tan\theta)^{\tan\theta}, t_2 = (\tan\theta)^{\cot\theta}, t_3 = (\cot\theta)^{\tan\theta}$ and t_4

Then,

A. $t_1 > t_2 > t_3 > t_4$

B. $t_4 > t_3 > t_1 > t_2$

C. $t_3 > t_1 > t_2 > t_4$

D. $t_2 > t_3 > t_1 > t_4$

Answer: B

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

A. 0

B. 1

C. 3

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

Answer: B

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22. The minimum value of $\frac{1}{3\sin\theta - 4\cos\theta + 7}$, is

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

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

C. $\frac{7}{12}$

D. $\frac{1}{6}$

Answer: B

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23. The maximum value of $\cos^2 A + \cos^2 B - \cos^2 C,$ is

A. 0

B. 1

C. 3

D. 2

Answer: D

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24. If $\cos(\alpha + \beta)\sin(\gamma + \delta) = \cos(\alpha - \beta)\sin(\gamma - \delta)$ then the value of $\cot\alpha \cot\beta \cot\gamma,$ is

A. $\cot\alpha$

B. $\cot\beta$

C. cot delta`

D. $\cot(\alpha + \beta + \gamma + \delta)$

Answer: C

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25. $\cos x\left\{\frac{\cos x}{1-\sin x}+\frac{1-\sin x}{\cos x}\right\}, is$

A. 1

B. 3

C. 2

D. 4

Answer: C

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26. If $\tan x=\frac{b}{a} then \sqrt{\frac{a+b}{a-b}}+\sqrt{\frac{a-b}{a+b}}=$

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

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

C. $\frac{2\cos x}{\sqrt{\sin 2x}}$

D. $\frac{2\sin x}{\sqrt{\cos 2x}}$

Answer: B

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27. In $\tan\theta + \sec\theta = \sqrt{3}, 0 < \theta < \pi, then\theta$ is equal to

A. $5\pi/6$

B. $2\pi/3$

C. $\pi/6$

D. $\pi/3$

Answer: C

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28. If $\sqrt{3}\sin\theta + \cos\theta > 0$, then θ lies in the interval

A. $(-\pi/3, \pi/2)$

B. $(-\pi/6, 5\pi/6)$

C. $(\pi/4, \pi/3)$

D. none of these

Answer: B

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29. Let $0 < x \leq \pi/4$, $(\sec 2x - \tan 2x)$ equals

A. $\tan^2(x + \pi/4)$

B. $\tan(x + \pi/4)$

C. $\tan(\pi/4 - x)$

D. $\tan(x - \pi/4)$

Answer: C

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30. If n is an odd positive interger, then

$$\left(\frac{\cos A+\cos B}{\sin A-\sin B}\right)^n+\left(\frac{\sin A+\sin B}{\cos A-\cos B}\right)^n=$$

A. -1

B. 1

C. 0

D. none of these

Answer: C

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31. If $3\tan(\theta-15^\circ)=\tan(\theta+15^\circ), 0<\theta<\pi, then\theta=$

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

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

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

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

Answer: B

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32. If $\frac{\cos\theta}{a} = \frac{\sin\theta}{b}, then \frac{a}{\sec 2\theta} + \frac{b}{\cos ec 2\theta}$ is equal to

A. a

B. b

C. $\frac{a}{b}$

D. $a + b$

Answer: A

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33. If $a = \tan 27\theta - \tan\theta$ and $b = \frac{\sin\theta}{\cos 3\theta} + \frac{\sin 3\theta}{\cos 9\theta} + \frac{\sin 9\theta}{\cos 27\theta}$, then

A. $a = b$

B. $a = 2b$

C. $b = 2a$

D. $a + b = 2$

Answer: B

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34. Find the no. of integral values of k for which the equation $7\cos x + 5\sin x = 2k + 1$ has atleast one solution.

A. 4

B. 8

C. 10

D. 12

Answer: B

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

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

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

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

D. $a \geq 0$

Answer: C

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36. The minimum value of $f(x) - \sin^4 x + \cos^4 x, 0 \leq x \leq \frac{\pi}{2}$ is

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

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

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

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

Answer: D

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37. The value of $\sin\frac{\pi}{16}\sin\frac{3\pi}{16}\sin\frac{5\pi}{16}\sin\frac{7\pi}{16}$ is

A. $\frac{\sqrt{2}}{16}$

B. $\frac{1}{8}$

C. $\frac{1}{6}$

D. $\frac{\sqrt{2}}{32}$

Answer: A

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38. If $A + B + C = \pi$ then $\sin 2A + \sin 2B + \sin 2C =$

A. $4 \sin A \sin B \sin C$

B. $4 \cos A \cos B \cos C$

C. $4 \cos A \cos B \sin C$

D. $2 \sin A \sin B \sin C$

Answer: A

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39. The expression $\tan^2 \alpha + \cot^2 \alpha$ is

A. ≥ 2

B. ≥ 2

C. ≥ -2

D. none of these

Answer: A

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40. If $\alpha + \beta + \gamma = \pi$, prove that $\sin^2\alpha + \sin^\beta - \sin^2\gamma$ = 2sinalpha sinbeta cosgamma`

A. $2\sin\alpha\sin\beta\cos\gamma$

B. $2\sin\alpha\sin\beta\cos\gamma$

C. $2\cos\alpha\cos\beta\cos\gamma$

D. none of these

Answer: A

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

A. $\alpha + \beta = 0$

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

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

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

Answer: D

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42. The roots of the equation $4x^2 - 2\sqrt{5}x + 1 = 0$ are .

A. $\cos 18^\circ, \cos 36^\circ$

B. $\sin 36^\circ, \cos 18^\circ$

C. $\sin 18^\circ, \cos 18^\circ$

D. $\sin 18^\circ, \sin 36^\circ$

Answer: C

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43. The radius of the circle whose are of length $15\ \pi$ cm makes an angle of $3\pi\ /\ 4$ radius at the centre is $10\ cm$ b. $20\ cm$ c. $11\frac{1}{4}cm$ d. $22\frac{1}{2}cm$

A. $10cm$

B. $20cm$

C. $11\frac{1}{4}cm$

D. $22\frac{1}{2}cm$

Answer: B

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44. If $\frac{\cos A}{\cos B} = n$ and $\frac{\sin A}{\sin B} = m, then\left(m^2 - n^2\right)\sin^2 B =$

A. $1 - n^2$

B. $1 + n^2$

C. $1 - n$

D. $1 + n$

Answer: A

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45. If $\tan\theta + \tan\left(\theta + \frac{\pi}{3}\right) + \tan\left(\theta - \frac{\pi}{3}\right) = k\tan 3\theta$ then k is equal to

A. 1

B. $1/3$

C. 3

D. none of these

Answer: D

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46. If $\cos(\theta+\phi)=m\cos(\theta-\phi)$, then prove that $\tan\theta=\dfrac{1-m}{1+m}\cot\phi$.

A. $\dfrac{1+m}{1-m}\tan\phi$

B. $\dfrac{1-m}{1+m}\tan\phi$

C. $\dfrac{1-m}{1+m}\cot\phi$

D. $\dfrac{1+m}{1-m}\sec\phi$

Answer: C

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47. $\alpha\&\beta$ are solutions of $a\cos\theta+b\sin\theta=c(\cos\alpha\neq\cos\beta)\&(\sin\alpha\neq\sin\beta)$ Then $\tan\left(\dfrac{\alpha+\beta}{2}\right)=?$

A. b/a

B. c/a

C. a/b

D. c/b

Answer: A

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

A. $6 \leq n \leq 8$

B. $4 \leq n \leq 8$

C. $4 \leq n \leq 8$

D. $4 \leq n < 8$

Answer: B

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49. $\cos^4\theta - \sin^4\theta$ is equal to

A. $1 + 2\sin^2\frac{\theta}{2}$

B. $2\cos^2\theta - 1$

C. $1 - 2\sin^2\frac{\theta}{2}$

D. $1 + 2\cos^2\theta$

Answer: B

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50. If $\tan\alpha = \frac{m}{m+1}$ and $\tan\beta = \frac{1}{2m+1}$, then $\alpha + \beta$ is equal to

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

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

C. 0

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

Answer: B

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51. $\tan\alpha + 2\tan 2\alpha + 4\tan 4\alpha + 8\cot 8\alpha$ is equal to

A. $\tan 16\alpha$

B. 0

C. $\cot\alpha$

D. none of these

Answer: A

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52. $If\ \cos\theta - 4\sin\theta = 1, the\ \sin\theta + 4\cos\theta =$

A. ± 1

B. 0

C. ± 2

D. ± 4

Answer: D

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53. If $A + C = 2B, then \frac{\cos C - \cos A}{\sin A - \sin C} =$

A. $\cot B$

B. $\cot 2B$

C. $\tan 2B$

D. $\tan B$

Answer: D

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54. If $A + B = C,$ then

$\cos^2 A + \cos^2 B + \cos^2 C - 2\cos A \cos B \cos C =$

A. 1

B. 2

C. 0

D. 3

Answer: A

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55. If $5\cos x + 12\cos y = 13,$ then the maximum value of $5\sin x + 12\sin y$ is (A) 12 (B) $\sqrt{120}$ (C) $\sqrt{20}$ (D) 13

A. 12

B. $\sqrt{120}$

C. $\sqrt{20}$

D. 13

Answer: B

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56. If $x = \tan 15^\circ, y = \cos ec75^\circ, z = 4\sin 18^\circ$

A. $x < y < z$

B. $y < z < x$

C. $z < x < y$

D. $x < z < y$

Answer: A

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57. For all values $of\theta$, $3 - \cos\theta + \cos\left(\theta + \frac{\pi}{3}\right)$ lie in the interval

A. $[-2, 3]$

B. $[-2, 1]$

C. $[2, 4]$

D. $[1, 5]$

Answer: C

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58. $\frac{\tan 80^\circ - \tan 10^\circ}{\tan 70^\circ}$

A. 0

B. 1

C. 2

D. 3

Answer: C

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59. If $\sin A + \sin B = \sqrt{3}(\cos B - \cos A), then \sin 3A + \sin 3B =$

A. 0

B. 2

C. 1

D. -1

Answer: A

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60. If $\alpha + \beta + \gamma = 2\theta$,then

$\cos\theta + \cos(\theta - \alpha) + \cos(\theta - \beta) + \cos(\theta - \gamma)$ =

A. `4sin""(alpha)/(2)sin""(beta)/(2)sin""(gamma)/(2)

B. `4cos""(alpha)/(2)cos""(beta)/(2)cos""(gamma)/(2)

C. `4sin""(alpha)/(2)sin""(beta)/(2)sin""(gamma)/(2)

D. $4 \sin \alpha \sin \beta \sin \gamma$

Answer: B

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