MATHS

BOOKS - VIKAS GUPTA MATHS (HINGLISH)

COMPOUND ANGLES

Exercise 1 Single Choice Problems

1. $\left(\cos^4\frac{\pi}{24}-\sin^4\frac{\pi}{24}\right)$ equals :

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

B. $\frac{\sqrt{6}-\sqrt{2}}{4}$

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

D. $\frac{\sqrt{3}+1}{2}$

Answer: C

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2. If $a\sin x + b\cos(c+x) + b\cos(c-x) = \alpha, \alpha > a,$ then the minimum value of $|\cos c|$ is :

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

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

C. $\sqrt{\frac{\alpha^2 - a^2}{3b^2}}$

D. $\sqrt{\frac{\alpha^2 - a^2}{4b^2}}$

Answer: D

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3. If all values of $x \in (a, b)$ satisfy the inequality $\tan x \tan 3x < -1, x \in \left(0, \frac{\pi}{2}\right)$, then the maximum value (b, -a) is :

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

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

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

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

Answer: A

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4. $\sum_{r=1}^{8} \tan(rA)\tan((r+1)A)$ where $A = 36^\circ$ is :

A. $-10 - \tan A$

B. $-10 + \tan A$

C. -10

D. -9

Answer: C

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5. Let $f(x) = 2\cos ec2x + \sec x + \cos ecx$, then the minimum value of $f(x)$ for $x \in \left(0, \frac{\pi}{2}\right)$ is

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

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

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

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

Answer: B

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6. Find the exact value of coses $10^\circ + \text{coses}50^\circ - \text{cosec}70^\circ$

A. 4

B. 5

C. 6

D. 8

Answer: C

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7. 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. $2\left(a^2 + b^2\right)$

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

C. $(a + b)^2$

D. $(a - b)^2$

Answer: D

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8. If $u_n = \sin(n\theta)\sec^n\theta$, $v_n = \cos(n\theta)\sec^n\theta$, $n \in N$, $n \neq 1$, then $\frac{v_n - v_{n-1}}{v_{n-1}} + \frac{1}{n}\left(\frac{u_n}{v_n}\right) =$

A. $-\cos\theta + \frac{1}{n}\tan(n\theta)$

B. $\cot\theta + \frac{1}{n}\tan(n\theta)$

C. $\tan\theta + \frac{1}{n}\tan(n\theta)$

D. $-\tan\theta + \frac{\tan(n\theta)}{n}$

Answer: D

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9. If $\alpha\cos^3\theta + \beta\cos^4\theta = 16\cos^6\theta + 9\cos^2\theta$ is an identity then-

A. $a = 1, b = 24$

B. $a = 3, b = 24$

C. $a = 4, b = 2$

D. $a = 7, b = 18$

Answer: A

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10. Maximum value of $\cos x(\sin x + \cos x)$ is equal to :

A. $\sqrt{2}$

B. 2

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

D. $\sqrt{2}+1$

Answer: C

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11. If $\frac{\sin A}{\sin B} = \frac{\sqrt{3}}{2}$ and $\frac{\cos A}{\cos B} = \frac{\sqrt{5}}{2}, 0 < A, B < \frac{\pi}{2}$ then $\tan A + \tan B$ is equal to :

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

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

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

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

Answer: C

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12. Single Choice Questions: 1.Let $0 \leq \alpha, \beta, \gamma, \delta, \leq \pi$ where β and γ are not complementary such that $2\cos\alpha + 6\cos\beta + 7\cos\gamma + 9\cos\delta = 0$ and $2\sin\alpha - 6\sin\beta + 7\sin\gamma - 9\sin\delta = 0$ if $\frac{\cos(\alpha+\delta)}{\cos(\beta+\gamma)} = \frac{m}{n}$ when m and n are relatively prime positive numbers, then the value of $(m+n)$ is equal to (A)11 (B)10 (C)9 (D)7

A. 11

B. 10

C. 9

D. 2

Answer: B

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13. If $-\pi < \theta < -\frac{\pi}{2}$, then $\left|\sqrt{\frac{1-\sin\theta}{1+\sin\theta}} + \sqrt{\frac{1+\sin\theta}{1-\sin\theta}}\right|$ is equal to :

A. $2\sec\theta$

B. $-2\sec\theta$

C. $2\sec\frac{\theta}{2}$

D. $-\sec\frac{\theta}{2}$

Answer: B

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14. If $A = \sum_{r=1}^{3} \cos\frac{2r\pi}{7}$ and $B = \sum_{r=1}^{3} \cos\frac{2^r\pi}{7}$, then :

A. $A + B = 0$

B. $2A + B = 0$

C. $A + 2B = 0$

D. $A = B$

Answer: D

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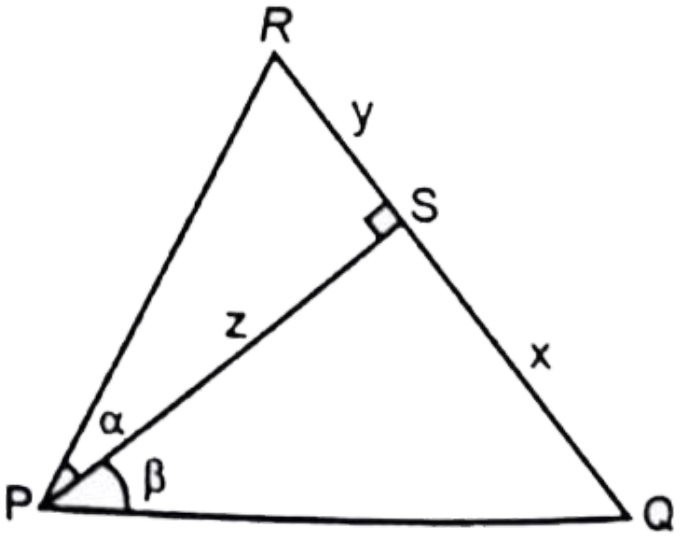
15. In a ΔPQR (as shown in figure) if $x : y : z = 2 : 3 : 6$, then the value of $\angle QPR$ is :



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

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

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

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

Answer: B

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16. If $A = \sum_{r=1}^{3} \cos\frac{2r\pi}{7}$ and $B = \sum_{r=1}^{3} \cos\frac{2^r\pi}{7}$ then :

A. $A + B = 0$

B. $2A + B = 0$

C. $A + 2B = 0$

D. $A - B = 0$

Answer: D

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17. Let $f(x) = \sin x + 2\cos^2 x$, x $\in \left[\frac{\pi}{6}, \frac{2\pi}{3}\right]$, then maximum value of f(x) is

A. 1

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

C. 2

D. $\frac{5}{2}$

Answer: C

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18. In triangle $ABC, \angle C = \frac{2\pi}{3}$ then the value of $\cos^2 A + \cos^2 B - \cos A.\cos B$ is equal

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

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

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

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

Answer: A

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19. The number of solutions of the equation $4\sin^2 x + \tan^2 x + \cot^2 x + \text{cosec}^2 x = 6$ in $[0, 2\pi]$:

A. 1

B. 2

C. 3

D. 4

Answer: D

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

A. 1

B. 2

C. 4

D. none

Answer: A

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21. find the range of function $f(x) = \sin\left(x + \frac{\pi}{6}\right) + \cos\left(x - \frac{\pi}{6}\right)$

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

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

C. $\left[-\frac{\sqrt{3}+1}{\sqrt{2}}, \frac{\sqrt{3}+1}{\sqrt{2}}\right]$

D. $\left[-\frac{\sqrt{3}-1}{\sqrt{2}}, \frac{\sqrt{3}-1}{\sqrt{2}}\right]$

Answer: C

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22. The value of

$\tan(\log_2 6) \cdot \tan(\log_2 3) \cdot \tan 1$ is always equal to :

A. $\tan(\log_2 6) + \tan(\log_2 3) + \tan 1$

B. $\tan(\log_2 6) - \tan(\log_2 3) - \tan 1$

C. $\tan(\log_2 6) - \tan(\log_2 3) + \tan 1$

D. $\tan(\log_2 6) + \tan(\log_2 3) - \tan 1$

Answer: B

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23. In $\Delta ABC, a = 3, b = 4$ and $c = 5$, then value of $\sin A + \sin 2B + \sin 3C$ is

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

B. $\frac{14}{25}$

C. $\frac{64}{25}$

D. none

Answer: B

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24. If $A+B+C=180^\circ$, then $\frac{\cos A\cos C+\cos(A+B)\cos(B+C)}{\cos A\sin C-\sin(A+B)\cos(B+C)}$ simplifies to :

A. $-\cot C$

B. 0

C. $\tan C$

D. $\cot C$

Answer: D

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25. If $\alpha + \gamma = 2\beta$ then the expression $\frac{\sin\alpha - \sin\gamma}{\cos\gamma - \cos\alpha}$ simplifies to:

A. $\tan\beta$

B. $-\tan\beta$

C. $\cot\beta$

D. $-\cot\beta$

Answer: C

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26. The product $\left(\cos\frac{x}{2}\right)\cdot\left(\cos\frac{x}{4}\right)\cdot\left(\cos\frac{x}{8}\right)\cdot\ldots\ldots\ldots\left(\cos\frac{x}{256}\right)$ is equal to :

A. $\frac{\sin x}{128\sin\frac{x}{256}}$

B. $\frac{\sin x}{256\sin\frac{x}{256}}$

C. $\frac{\sin x}{128\sin\frac{x}{128}}$

D. $\frac{\sin x}{512\sin\frac{x}{512}}$

Answer: B

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27. The value of the expression

$\frac{\sin 7\alpha + 6\sin 5\alpha + 17\sin 3\alpha + 12\sin\alpha}{\sin 6\alpha + 5\sin 4\alpha + 12\sin 2\alpha}$, where $\alpha = \frac{\pi}{5}$ is equal to :

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

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

C. $\frac{\sqrt{5}+1}{2}$

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

Answer: C

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28. In a triangle ABC if $\sum \tan^2 A = \sum \tan A \tan B$, then largest angle of the triangle in radian will be :

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

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

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

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

Answer: B

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29. Which one of the following values is not the solution of the equation $\log_{|\sin x|}(|\cos x|) + \log_{|\cos x|}(|\sin x|) = 2$

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

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

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

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

Answer: D

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30. If $f(x) = \sin^6 x + \cos^6 x,$ then range of $f(x)$ is $\left[\frac{1}{4}, 1\right]$ (b) $\left[\frac{1}{4}, \frac{3}{4}\right]$ (c) $\left[\frac{3}{4}, 1\right]$ (d) none of these

A. $\left[\frac{1}{4}, 1\right]$

B. $\left[\frac{1}{4}, \frac{3}{4}\right]$

C. $\left[\frac{3}{4}, 1\right]$

D. $[1, 2]$

Answer: A

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

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

B. y

C. $1-y$

D. $1+y$

Answer: B

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32. If $\frac{\tan^3 A}{1+\tan^2 A}+\frac{\cot^3 A}{1+\cot^2 A}=p\sec A\operatorname{cosec}A+q\sin A\cos A,$ then :

A. $p=2, q=1$

B. $p=1, q=2$

C. $p=1, q=-2$

D. $p = 2, q = -1$

Answer: C

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33. If θ lies in the second quadrant. Then the value of $\sqrt{\frac{1-\sin\theta}{1+\sin\theta}} + \sqrt{\frac{1+\sin\theta}{1-\sin\theta}}$ is equal to :

A. $2\sec\theta$

B. $-2\sec\theta$

C. $2\text{cosec}\theta$

D. 2

Answer: B

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34. The minimum value of $(\sin\theta + cosec\theta)^2 + (\cos\theta + \sec\theta)^2 =$

A. 7

B. 8

C. 9

D. none of these

Answer: C

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35. If $\log_3 \sin x - \log_3 \cos x - \log_3(1 - \tan x) - \log_3(1 + \tan x) = -1$, then $\tan 2x$ is equal to (wherever defined)

A. -2

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

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

D. 6

Answer: C

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36. If $\sin\theta + \cos ec\theta = 2,$ then the value of $\sin^8\theta + \cos ec^8\theta$ is equal to

A. 2

B. 2^4

C. 2^8

D. more than 2^8

Answer: A

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37. If $\tan^3\theta + \cot^3\theta = 52$, then the value of $\tan^2\theta + \cot^2\theta$ is equal to :

A. 14

B. 15

C. 16

D. 17

Answer: A

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38. The maximum value of $(\log)_{20}(3s \in x - 4\cos x + 15) -$ a. 1 b. 2 c. 3 d. 4

A. 1

B. 2

C. 3

D. 4

Answer: A

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39. $x^2 + y^2 = 9 \& 4a^2 + 9b^2 = 16,$ then maximum value of $4a^2x^2 + 9b^2y^2 - 12abxy$ is -

A. 81

B. 100

C. 121

D. 144

Answer: D

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40. If $A = \sqrt{\sin 2 - \sin \sqrt{3}}, B = \sqrt{\cos 2 - \cos \sqrt{3}},$ then which of the following statement is true ?

A. A and B both are real numbers and $A > B$

B. A and B both are real numbers and $A < B$

C. Exactly one of A and B is not real number

D. Both A and B are not real numbers

Answer: D

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41. The number of real values of x such that

$$\left(2^{x}+2^{-x}-2\cos x\right)\left(3^{x+\pi}+3^{-x-\pi}+2\cos x\right)\left(5^{\pi-x}+5^{x-\pi}-2\cos x\right)=$$

is :

A. 1

B. 2

C. 3

D. infinite

Answer: B

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42. The equation $e^{\sin x} - e^{-\sin x} - 4 = 0$ has (A) infinite number of real roots (B) no real roots (C) exactly one real root (D) exactly four real roots

A. infinite number of real roots

B. no real roots

C. exactly one real root

D. exactly four real roots

Answer: B

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43. 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. $2 - 4\cos\alpha$

C. 2

D. $2 - 4\sin\alpha$

Answer: C

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44. $\left(\cos\left(\frac{\pi}{12}\right) - \sin\left(\frac{\pi}{12}\right)\right)\left(\tan\left(\frac{\pi}{12}\right) + \cot\left(\frac{\pi}{12}\right)\right) =$

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

B. $4\sqrt{2}$

C. $\sqrt{2}$

D. $2\sqrt{2}$

Answer: D

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45. $\tan(100^\circ) + \tan(125^\circ) + \tan(100^\circ)\tan(125^\circ) =$

A. 0

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

C. -1

D. 1

Answer: D

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

A. 2

B. 1

C. 3

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

Answer: B

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47. maximum value of $\log_5(3x+4y)$, if $x^2+y^2=25$ is

A. 1

B. 2

C. 3

D. 4

Answer: B

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48. The number of values of θ between $-\pi$ and $\frac{3\pi}{2}$ that satisfies the equation $5\cos 2\theta + 2\cos^2\frac{\theta}{2} + 1 = 0$ is :

A. 3

B. 4

C. 5

D. 6

Answer: C

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49. Given that $\sin\beta = \frac{4}{5}, 0 < \beta < \pi$ and $\tan\beta > 0$, then $((3\sin(\alpha+\beta) - 4\cos(\alpha +$ is equal to :

A. 2

B. 3

C. 4

D. 5

Answer: D

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50. The maximum value of the function $f(x) = \sin\left(x + \frac{\pi}{6}\right) + \cos\left(x + \frac{\pi}{6}\right)$ in the interval $\left(0, \frac{\pi}{2}\right)$ occurs at $\frac{\pi}{12}$ (b) $\frac{\pi}{6}$ (c) $\frac{\pi}{4}$ (d) $\frac{\pi}{3}$

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

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

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

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

Answer: A

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51. The equation $\sin x(\sin x + \cos x) = k$ has real solutions, where k is a real number. Then

A. $1 - \sqrt{2} \leq a \leq 1 + \sqrt{2}$

B. $2 - \sqrt{3} \leq a \leq 2 + \sqrt{3}$

C. $0 \leq a \leq 2 + \sqrt{3}$

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

Answer: D

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52. The value of $\cos 12^\circ \cos 24^\circ \cos 36^\circ \cos 48^\circ \cos 72^\circ \cos 84^\circ$, is

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

B. $\frac{1}{128}$

C. $\frac{1}{256}$

D. $\frac{1}{512}$

Answer: B

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53. The ratio of the maximum value to minimum value of $2\cos^2\theta + \cos\theta + 1$ is :

A. $32:7$

B. $32:9$

C. $4:1$

D. $2:1$

Answer: A

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54. If all values of $x \in (a, b)$ satisfy the inequality $\tan x \tan 3x < -1, x \in \left(0, \frac{\pi}{2}\right)$, then the maximum value of $(b-a)$ is :

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

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

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

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

Answer: A

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55. If a regular polygon of n sides has circum radius R and inradius r then each side of polygon is:

A. $(R+r)\tan\left(\frac{\pi}{2n}\right)$

B. $2(R+r)\tan\left(\frac{\pi}{2n}\right)$

C. $(R+r)\sin\left(\frac{\pi}{2n}\right)$

D. $2(R+r)\cot\left(\frac{\pi}{2n}\right)$

Answer: B

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56. The value of $\cos 12^0 + \cos 84^0 + \cos 156^0 + \cos 132^0$ is $\frac{1}{2}$ $1 - \frac{1}{2}$ $\frac{1}{8}$

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

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

C. 1

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

Answer: B

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57. $\frac{\sin\theta}{\cos(3\theta)} + \frac{\sin(3\theta)}{\cos(9\theta)} + \frac{\sin(9\theta)}{\cos(27\theta)} + \frac{\sin(27\theta)}{\cos(81\theta)} =$

A. $\frac{\sin(81\theta)}{2\cos(80\theta)\cos\theta}$

B. $\frac{\sin(80\theta)}{2\cos(81\theta)\cos\theta}$

C. $\frac{\sin(81\theta)}{\cos(80\theta)\cos\theta}$

D. $\frac{\sin(80\theta)}{2\cos(81\theta)\cos\theta}$

Answer: B

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58. The value of $\left(\sin\frac{\pi}{9}\right)\left(4+\sec\frac{\pi}{9}\right)$ is :

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

B. $\sqrt{2}$

C. 1

D. $\sqrt{3}$

Answer: D

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59. If $\frac{dy}{dx}=\sin\left(\frac{x\pi}{2}\right)\cos(x\pi)$, then y is strictly increasing in :

A. (3, 4)

B. $\left(\frac{5}{2}, \frac{7}{2}\right)$

C. (2, 3)

D. $\left(\frac{1}{2}, \frac{3}{2}\right)$

Answer: B

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60. .Smallest positive value of θ satisfying $8\sin\theta\cos 2\theta\sin 3\theta\cos 4\theta = \cos 6\theta$ is

A. $\frac{\pi}{18}$

B. $\frac{\pi}{22}$

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

D. none of these

Answer: A

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61. If an angle A of a triangle ABC is given by $3\tan A + 1 = 0$, then sinA and cosA are the roots of the equation

A. $10x^2 - 2\sqrt{10}x + 3 = 0$

B. $10x^2 - 2\sqrt{10}x - 3 = 0$

C. $10x^2 + 2\sqrt{10}x + 3 = 0$

D. $10x^2 + 2\sqrt{10}x - 3 = 0$

Answer: D

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62. If θ is an acute angle and $\tan\theta = \frac{1}{\sqrt{7}}$, then the value of $\frac{\cos ec^2\theta - \sec^2\theta}{\cos ec^2\theta + \sec^2\theta}$ is

A. $3/4$

B. $1/2$

C. 2

D. $5/4$

Answer: A

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63. If $2\cos\theta + \sin\theta = 1\left(\theta \neq \frac{\pi}{2}\right)$ then $7\cos\theta + 6\sin\theta$ is equal to

A. 1 or 2

B. 2 or 3

C. 2 or 4

D. 2 or 6

Answer: D

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64. If $\sin\theta + \cos ec\theta = 2,$ then the value of $\sin^8\theta + \cos ec^8\theta$ is equal to

A. 2

B. 2^4

C. 2^8

D. more than 2^8

Answer: A

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65. If $\tan^3\theta + \cot^3\theta = 52,$ then the value of $\tan^2\theta + \cot^2\theta$ is equal to :

A. 14

B. 15

C. 16

D. 17

Answer: A

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66. If ABCD is a cyclic quadrilateral such that $12\tan A - 5 = 0$ and $5\cos B + 3 = 0$ then $\tan C + \tan D$ is equal to :

A. $\frac{21}{12}$

B. $\frac{11}{12}$

C. $-\frac{11}{12}$

D. $-\frac{21}{12}$

Answer: B

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67. If $\frac{\pi}{2} < \theta < \frac{3\pi}{2}$ then $\sqrt{\tan^2\theta - \sin^2\theta}$ is equal to :

A. $\tan\theta\sin\theta$

B. $-\tan\theta\sin\theta$

C. $\tan\theta - \sin\theta$

D. $\sin\theta - \tan\theta$

Answer: B

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68. The value of $\frac{\sin 10^\circ + \sin 20^\circ}{\cos 10^\circ + \cos 20^\circ}$ equals

A. $2 + \sqrt{3}$

B. $\sqrt{2} - 1$

C. $2 - \sqrt{3}$

D. $\sqrt{2} + 1$

Answer: C

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69. The value of the expression $\sin^6\theta + \cos^6\theta + 3\sin^2\theta.\cos^2\theta$ equals

A. 0

B. 1

C. 2

D. 3

Answer: B

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70. $\dfrac{\sin x + \cos x}{\sin x - \cos x} - \dfrac{\sec^2 x + 2}{\tan^2 x - 1} =$, where $x \in \left(0, \dfrac{\pi}{2}\right)$

A. $\dfrac{1}{\tan x + 1}$

B. $\dfrac{2}{1 + \tan x}$

C. $\dfrac{2}{1 + \cot x}$

D. $\frac{2}{1-\tan x}$

Answer: B

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71. If $\frac{\cot\alpha+\cot(270^\circ+\alpha)}{\cot\alpha-\cot(270^\circ+\alpha)}-2\cos(135^\circ+\alpha)\cos(315^\circ-\alpha)=\lambda$, where $\alpha\in\left(0,\frac{\pi}{2}\right)$, then $\lambda=$

A. 0

B. 1

C. 2

D. 4

Answer: C

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72. The expression $\frac{\sin\alpha+\cos\alpha}{\cos\alpha-\sin\alpha}\tan\left(\frac{\pi}{4}+\alpha\right)+1, \alpha\in\left(-\frac{\pi}{4},\frac{\pi}{4}\right)$ simplifies to :

A. $\text{cosec}^2\left(\frac{\pi}{4}-\alpha\right)$

B. $\sec^2\left(\frac{\pi}{4}-\alpha\right)$

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

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

Answer: A

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73. The value of expression $\frac{\tan\alpha+\sin\alpha}{2\cos^2\frac{\alpha}{2}}$ for $\alpha=\frac{\pi}{4}$ is :

A. 4

B. 3

C. 2

D. 1

Answer: D

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74. $\cos 2\alpha - \cos 3\alpha - \cos 4\alpha + \cos 5\alpha$ simplifies to :

A. $-4\sin\frac{\alpha}{2}\sin\alpha\cos\frac{7\alpha}{2}$

B. $4\sin\frac{\alpha}{2}\sin\alpha\cos\frac{7\alpha}{2}$

C. $-4\sin\frac{\alpha}{2}\sin\frac{7\alpha}{2}\cos\alpha$

D. $-4\sin\alpha\cos\frac{\alpha}{2}\sin\frac{7\alpha}{2}$

Answer: A

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75. If $\tan\gamma = \sec\alpha\sec\beta + \tan\alpha\tan\beta, then\cos 2\gamma$ is necessarily (A) ≥ 0 (B) ≤ 0 (C) lt0 (D) gt0

A. -1

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

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

D. 0

Answer: D

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76. If $\cos ecx = \frac{2}{\sqrt{3}}$ and $\cot x = -\frac{1}{\sqrt{3}}$ for x $\in [0, 2\pi]$ then $\cos x + \cos 2x + \cos 3x + ... + \cos 100x$ is

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

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

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

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

Answer: B

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77. The value of $\sum_{r=0}^{10} \frac{\cos^3(r\pi)}{3}$ is equal to $\frac{1}{4}$ (b) $\frac{1}{8}$ (c) $-\frac{1}{4}$ (d) $-\frac{1}{8}$

A. $-\frac{7}{8}$

B. $-\frac{9}{8}$

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

D. $-\frac{1}{8}$

Answer: D

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78. Write the value of the expression $\frac{1-4\sin 10^0 \sin 70^0}{2\sin 10^0}$

A. 1

B. 2

C. $\sqrt{3}$

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

Answer: A

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79. If x,y $\in$ R and satisfy $(x+5)^2+(y-12)^2=14^2$ then the minimum value of x^2+y^2 is

A. 2

B. 1

C. $\sqrt{3}$

D. $\sqrt{2}$

Answer: B

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80. If $\theta_1, \theta_2, \theta_3$ are the three values of $\theta \in [0, 2\pi]$ for which $\tan\theta = \lambda$ then the value of $\frac{\tan(\theta_1)}{3}\frac{\tan(\theta_2)}{3} + \frac{\tan(\theta_2)}{3}\frac{\tan(\theta_3)}{3} + \frac{\tan(\theta_3)}{3}\frac{\tan(\theta_1)}{3}$ is equal to

A. -3

B. -2

C. 2

D. 3

Answer: A

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81. If $\tan\alpha = \frac{b}{a}, a > b > 0$ and if $0 < \alpha < \frac{\pi}{4}$, then $\sqrt{\frac{a+b}{a-b}} + \sqrt{\frac{a-b}{a+b}}$ is equal to :

A. $\frac{2\sin\alpha}{\sqrt{2\alpha}}$

B. $\frac{2\cos\alpha}{\sqrt{\cos 2\alpha}}$

C. $\frac{2\sin\alpha}{\sqrt{\sin 2\alpha}}$

D. $\frac{2\cos\alpha}{\sqrt{\sin 2\alpha}}$

Answer: B

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82. Minimum value of $3\sin\theta + 4\cos\theta$ in the interval $\left[0, \frac{\pi}{2}\right]$ is :

A. -5

B. 3

C. 4

D. $\frac{7}{\sqrt{2}}$

Answer: B

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83. If $f(n) = \prod_{r=1}^{n} \cos r, n \in N$, then

A. $|f(n)| > |f(n+1)|$

B. $f(5) > 0$

C. $f(4) > 0$

D. $|f(n)| < |f(n+1)|$

Answer: A

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84. If $\tan\theta + \sin\theta = m$ and $\tan\theta - \sin\theta = n$,then

A. 16

B. 22

C. 18

D. 42

Answer: A

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85. Let $t_1 = (\sin\alpha)^{\cos\alpha}, t_2 = (\sin\alpha)^{\sin\alpha}, t_3 = (\cos\alpha)^{\cos\alpha}, t_4 = (\cos\alpha)^{\sin\alpha}$, where $\alpha \in \left(0, \frac{\pi}{4}\right)$, then which of the following is correct

A. $t_3 > t_1 > t_2$

B. $t_4 > t_2 > t_1$

C. $t_4 > t_1 > t_2$

D. $t_1 > t_3 > t_2$

Answer: B

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

A. 11

B. -11

C. 12

D. 4

Answer: A

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87. $\cos(\alpha+\beta)+\sin(\alpha-\beta)=0 \text{and} \tan\beta=\frac{1}{2009}$

A. 2

B. 1

C. 3

D. 4

Answer: B

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88. If $2^x = 3^y = 6^{-z}$ find the value of $\left(\frac{1}{x} + \frac{1}{y} + \frac{1}{z}\right)$

A. 0

B. 1

C. 2

D. 3

Answer: A

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89. Let α, β be such that it $\pi < \alpha - \beta < 3\pi$. if $\sin\alpha + \sin\beta = -\frac{21}{65}$ and $\cos\alpha + \cos\beta = -\frac{27}{65}$ then the value of $\cos\left(\frac{\alpha - \beta}{2}\right)$ is

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

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

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

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

Answer: A

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90. 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. $2\left(a^2 + b^2\right)$

B. $(a+b)^2$

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

D. $(a-b)^2$

Answer: D

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91. If $P = \left(\tan\left(3^{n+1}\theta - \tan\theta\right)\right.$

A. $P = 2Q$

B. $P = 3Q$

C. $2P = Q$

D. $3P = Q$

Answer: A

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92. If $270^\circ < \theta < 360^\circ$, then $\sqrt{2 + \sqrt{2 + 2\cos\theta}}$ is equal to

A. $-2\sin\left(\frac{\theta}{4}\right)$

B. $2\sin\left(\frac{\theta}{4}\right)$

C. $\pm 2\sin\frac{\theta}{4}$

D. $2\cos\frac{\theta}{4}$

Answer: B

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93. If $y = (\sin x + \cos x) + (\sin 4x + \cos 4x)^2$, then :

A. $y > 0 \forall x \in R$

B. $y \geq 0 \forall x \in R$

C. $y < 2 + \sqrt{2} \forall x \in R$

D. $y = 2 + \sqrt{2}$ for some $x \in R$

Answer: C

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94. If

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

A. 0

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

C. 2

D. 1

Answer: B

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95. Find the exact value of coses 10° + coses50° − cosec70°

A. 4

B. 5

C. 6

D. 8

Answer: C

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96. If $270^\circ < \theta < 360^\circ$, then $\sqrt{2+\sqrt{2+2\cos\theta}}$ is equal to

A. $-2\sin\left(\frac{\theta}{4}\right)$

B. $2\sin\left(\frac{\theta}{4}\right)$

C. $\pm 2\sin\frac{\theta}{4}$

D. $2\cos\frac{\theta}{4}$

Answer: B

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Exercise 2 One Or More Than One Answer Is Are Correct

1. $\cot 12^\circ \cdot \cot 24^\circ \cdot \cot 28^\circ \cdot \cot 32^\circ \cdot \cot 48^\circ \cdot \cot 88^\circ = \ldots\ldots\ldots$

A. $\tan 45^\circ$

B. 2

C. $2\tan 15^\circ \cdot \tan 45^\circ \cdot \tan 75^\circ$

D. $\tan 15^\circ \cdot \tan 45^\circ \cdot \tan 75^\circ$

Answer: A::D

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2. If the equation $cof^4 x - 2\cos ec^2 x + a^2 = 0$ has at least one solution, then the sum of all possible integral values of a is equal to a. 4 b. 3 c. 2 d. 0

A. -1

B. 0

C. 1

D. 2

Answer: A::B::C

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3. Which of the following is/are true ?

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

B. $\sin 1 > \cos 1$

C. $\tan 1 < \sin 1$

D. $\cos(\cos 1) > \frac{1}{\sqrt{2}}$

Answer: A::B::D

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4. Which of the following is/are +ve ?

A. $\log_{\sin 1} \tan 1$

B. $\log_{\cos 1}(1+\tan 3)$

C. $\log_{\log_{10} 5}(\cos\theta+\sec\theta)$

D. $\log_{\tan 15^\circ}(2\sin 18^\circ)$

Answer: B::D

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5. If $\sin\alpha+\cos\alpha=\frac{\sqrt{3}+1}{2}, 0<\alpha<2\pi$, then possible values $\tan\frac{\alpha}{2}$ can take is/are :

A. $2-\sqrt{3}$

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

C. 1

D. $\sqrt{3}$

Answer: A::B

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6. If $3\sin\beta = \sin(2\alpha + \beta)$ then

A. $(\cot\alpha + \cot(\alpha+\beta))(\cot\beta - 3\cot(2\alpha-\beta)) = 6$

B. $\sin\beta = \cos(\alpha+\beta)\sin\alpha$

C. $\tan(\alpha+\beta) = 2\tan\alpha$

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

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

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7. If $\sin\left(x + 20^0\right) = 2\sin x\cos 40^0, whrex \in \left(0, \frac{\pi}{2}\right)$, then which of the following hold(s) good? $\cos 2x = \frac{1}{2}$ (b) $\cos ec4x = 2$ $\frac{\sec x}{2} = \sqrt{6} - \sqrt{2}$ (d) $\frac{\tan x}{2} = \left(2 - \sqrt{3}\right)$

A. $\sec\frac{x}{2} = \sqrt{6} - \sqrt{2}$

B. $\cot\frac{x}{2} = 2 + \sqrt{3}$

C. $\tan 4x = \sqrt{3}$

D. $\operatorname{cosec} 4x = 2$

Answer: A::B

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8. If $2(\cos(x-y)+\cos(y-z)+\cos(z-x)) = -3$, then :

A. $\cos x \cos y \cos z = 1$

B. $\cos x + \cos y + \cos z = 0$

C. $\sin x + \sin y + \sin z = 1$

D. $\cos 3x + \cos 3y + \cos 3z = 12 \cos x \cos y \cos z$

Answer: B::D

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9. If $0 < x < \frac{\pi}{2}$ and $\sin^n x + \cos^n x \geq 1$, then 'n' may belong to interval :

A. [1, 2]

B. [3, 4]

C. $[-\infty, 2]$

D. [-1, 1]

Answer: A::C::D

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10. If

$x = \sin(\alpha - \beta) \cdot \sin(\gamma - \delta), y = \sin(\beta - \gamma) \cdot \sin(\alpha - \delta), z = \sin(\gamma - \alpha) \cdot$

, then :

A. $x + y + z = 0$

B. $x^3 + y^3 + z^3 = 3xyz$

C. $x + y - z = 0$

D. $x^3 + y^3 - z^3 = 3xyz$

Answer: A::B

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11. If

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

then

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

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

C. $A = 3$

D. $B = -1$

Answer: B::C::D

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12. If $2a = 2\tan 10^\circ + \tan 50^\circ$, $2b = \tan 20^\circ + \tan 50^\circ$

$2c = 2\tan 10^\circ + \tan 70^\circ$, $2d = \tan 20^\circ + \tan 70^\circ$

Then which of the following is/are correct ?

A. $a + d = b + c$

B. $a + b = c$

C. $a > b < c > d$

D. $a < b < c < d$

Answer: A::B::D

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13. Which of the following real numbers when simplified are neither terminating nor repeating decimal ?

A. $\sin 75^\circ \cdot \cos 75^\circ$

B. $\log_2 28$

C. $\log_3 5 \cdot \log_5 6$

D. $8^{-(\log_{27} 3)}$

Answer: B::C

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

A. $\alpha - \beta > 0, \quad \text{for all} \quad x \quad \text{in} \quad \left(0, \frac{\pi}{4}\right)$

B. $\alpha - \beta < 0, \quad \text{for all} \quad x \quad \text{in} \quad \left(0, \frac{\pi}{4}\right)$

C. $\alpha + \beta > 0, \quad \text{for all} \quad x \quad \text{in} \quad \left(0, \frac{\pi}{2}\right)$

D. $\alpha + \beta < 0, \quad \text{for all} \quad x \quad \text{in} \quad \left(0, \frac{\pi}{2}\right)$

Answer: A::C

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15. If $\frac{\pi}{2} < \theta < \pi$, then possible answers of $\sqrt{2+\sqrt{2+2\cos 4\theta}}$ is/are :

A. $2\cos\theta$

B. $2\sin\theta$

C. $-2\sin\theta$

D. $-2\cos\theta$

Answer: B::D

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16. If $\cot^3\alpha + \cot^2\alpha + \cot\alpha = 1$ then which of the following is/are correct :

A. $\cos 2\alpha \tan\alpha = 1$

B. $\cos 2\alpha \cdot \tan\alpha = -1$

C. $\cos 2\alpha - \tan 2\alpha = -1$

D. $\cos 2\alpha - \tan 2\alpha = 1$

Answer: B::D

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

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

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

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

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

Answer: B::C

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18. If $\alpha > \frac{1}{\sin^6 x + \cos^6 x} \forall x \in R$, then α can be

A. 3

B. 4

C. 5

D. 6

Answer: B::D

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19. If $x \in \left(0, \frac{\pi}{2}\right)$ and $\sin x = \frac{3}{\sqrt{10}}$,

Let $k = \log_{10} \sin x + \log_{10} \cos x + 2\log_{10} \cot x + \log_{10} \tan x$ then the value of k satisfies

A. $k = 0$

B. $k + 1 = 0$

C. $k - 1 = 0$

D. $k^2 - 1 = 0$

Answer: B::D

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20. If A, B, C are angles of ΔABC and $\tan A \tan C = 3, \tan B \tan C = 6$, then

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

B. $\tan A \tan B = 2$

C. $\frac{\tan A}{\tan C} = 3$

D. $\tan B = 2 \tan A$

Answer: A::B::D

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21. The value of $\frac{\sin x - \cos x}{\sin^3 x}$ is equal to :

A. $\operatorname{cosec}^2 x(1-\cot x)$

B. $1-\cot x+\cot^2 x-\cot^3 x$

C. $\operatorname{cosec}^2 x-\cot x-\cot^3 x$

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

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

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22. If $f(x)=\sin^2 x+\sin^2\left(x+\dfrac{2\pi}{3}\right)+\sin^2\left(x+\dfrac{4\pi}{3}\right)$ then :

A. $f\left(\dfrac{\pi}{15}\right)=\dfrac{3}{2}$

B. $f\left(\dfrac{15}{\pi}\right)=\dfrac{2}{3}$

C. $f\left(\dfrac{\pi}{10}\right)=\dfrac{3}{2}$

D. $f\left(\dfrac{10}{\pi}\right)=\dfrac{2}{3}$

Answer: A::C

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23. The range of $y = \dfrac{\sin 4x - \sin 2x}{\sin 4x + \sin 2x}$ satisfies

A. $y \in \left(-\infty, \dfrac{1}{3}\right)$

B. $y \in \left(\dfrac{1}{3}, 1\right)$

C. $y \in (1, 3)$

D. $y \in (3, \infty)$

Answer: A::D

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24. If $\sqrt{2}\cos A = \cos B + \cos^3 B$, and $\sqrt{2}\sin A = \sin B - \sin^3 B$ then $\sin(A - B) =$

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

B. $\dfrac{1}{3}$

C. $-\dfrac{1}{2}$

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

Answer: B::D

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25. If $\alpha > \frac{1}{\sin^6 x + \cos^6 x}\ \forall x \in R$, then α can be

A. 3

B. 4

C. 5

D. 6

Answer: C::D

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26. If $\cot^3\alpha + \cot^2\alpha + \cot\alpha = 1$ then which of the following is/are correct :

A. $\cos 2\alpha \tan\alpha = 1$

B. $\cos 2\alpha \cdot \tan\alpha = -1$

C. $\cos 2\alpha - \tan 2\alpha = -1$

D. $\cos 2\alpha - \tan 2\alpha = 1$

Answer: B::D

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Exercise 3 Comprehension Type Problems

1. Let $l = \sin\theta, m = \cos\theta$ and $n = \tan\theta$.

Q. If $\theta = 5$ radian, then :

A. $l > m$

B. $l < m$

C. $l = m$

D. none of these

Answer: B

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2. Let $l = \sin\theta, m = \cos\theta$ and $n = \tan\theta$.

Q. If $\theta = -1042^\circ$, then :

A. $n > 1$

B. $n < 1$

C. $n = 1$

D. nothing can be said

Answer: B

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3. Let $l = \sin\theta, m = \cos\theta$ and $n = \tan\theta$.

Q. If $\theta = 7$ radian, then :

A. $l + m > 0$

B. $l + m < 0$

C. $l + m = 0$

D. nothing can be said

Answer: A

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4. Let a, b,c are respectively the sines and p, q, r are respectively the consines of $\alpha, \alpha + \frac{2\pi}{3}$ and $\alpha + \frac{4\pi}{3}$, then :

Q. The value of $(a + b + c)$ is :

A. 0

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

C. 1

D. none of these

Answer: A

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5. Let a, b,c are respectively the sines and p, q, r are respectively the consines of $\alpha, \alpha + \frac{2\pi}{3}$ and $\alpha + \frac{4\pi}{3}$, then :

Q. The value of $(ab + bc + ca)$ is :

A. 0

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

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

D. -1

Answer: B

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6. Let a, b,c are respectively the sines and p, q, r are respectively the consines of $\alpha, \alpha + \frac{2\pi}{3}$ and $\alpha + \frac{4\pi}{3}$, then :

Q. The value of $(qc - rb)$ is :

A. 0

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

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

D. depends on α

Answer: C

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7. Consider a right angle triangle ABC right angle at B such that $AC = \sqrt{8 + 4\sqrt{3}}$ and $AB = 1$. A line through vertex A meet BC at D such that AB = BC. An arc DE of radius AD is drawn from vertex A to meet

AC at E and another arc DF of radius CD is drawn from vertex C to meet AC at F. On the basis of above information, answer the following questions.

Q. $\sqrt{\tan A + \cot C}$ is equal to :

A. $\sqrt{3}$

B. 1

C. $2 + \sqrt{3}$

D. $\sqrt{3} + 1$

Answer: D

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8. Consider a right angle triangle ABC right angle at B such that $AC = \sqrt{8 + 4\sqrt{3}}$ and $AB = 1$. A line through vertex A meet BC at D such that AB = BC. An arc DE of radius AD is drawn from vertex A to meet AC at E and another arc DF of radius CD is drawn from vertex C to meet AC at F. On the basis of above information, answer the following

questions.

Q. $\log\left(\frac{AE+CF}{CD}\right)$ is equal to :

A. $\sqrt{2}$

B. 1

C. 0

D. -1

Answer: B

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9. Consider a triangle ABC such that $\cot A + \cot B + \cot C = \cot\theta$. Now answer the following :

Q. The possible value of θ is :

A. 60°

B. 25°

C. 35°

D. 45°

Answer: B

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10. Consider a triangle ABC such that $\cot A + \cot B + \cot C = \cot \theta$.

Now answer the following :

Q. $\sin(A-\theta)\sin(B-\theta)\sin(C-\theta) =$:

A. $\tan^3 \theta$

B. $\cot^3 \theta$

C. $\sin^3 \theta$

D. $\cos^3 \theta$

Answer: C

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11. Consider the function $f(x) = \dfrac{\sqrt{1+\cos x}+\sqrt{1-\cos x}}{\sqrt{1+\cos x}-\sqrt{1-\cos x}}$ then

Q. If $x \in (\pi, 2\pi)$ then f(x) is

A. $\cot\left(\dfrac{\pi}{2}+\dfrac{x}{2}\right)$

B. $\tan\left(\dfrac{\pi}{4}+\dfrac{x}{2}\right)$

C. $\cot\left(\dfrac{\pi}{4}-\dfrac{x}{2}\right)$

D. $\tan\left(\dfrac{\pi}{4}-\dfrac{x}{2}\right)$

Answer: D

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12. If the function $f(x) = \dfrac{\sqrt{1+\cos x}+\sqrt{1-\cos x}}{\sqrt{1+\cos x}-\sqrt{1-\cos x}}$ If the value of $f\left(\dfrac{\pi}{3}\right) = a + b\sqrt{c}$ then $a+b+c =$

A. 4

B. 5

C. 6

D. 7

Answer: C

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Exercise 4 Matching Type Problems

1.

	Column-I		Column-II
(A)	If $(1+\tan 5^\circ)(1+\tan 10^\circ)\ldots\ldots(1+\tan 45^\circ)=2^{k+1}$ then 'k' equals	(P)	0
(B)	Sum of positive integral values of 'a' for which $a^2-6\sin x-5a\le 0\ \forall\ x\in R$ is	(Q)	2
(C)	The minimum value of $\dfrac{\left(a+\frac{1}{a}\right)^4-\left(a^4+\frac{1}{a^4}\right)-2}{\left(a+\frac{1}{a}\right)^2+a^2+\frac{1}{a^2}}$ is	(R)	5
(D)	Number of real roots of the equation $\sum_{k=1}^{3}(x-k)^2=0$ is	(S)	4
		(T)	5

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2.

	Column-I		Column-II
(A)	Maximum value of $y = \frac{1-\tan^2(\pi/4-x)}{1+\tan^2(\pi/4-x)}$	(P)	1
(B)	Minimum value of $\log_3\left(\frac{5\sin x - 12\cos x + 26}{13}\right)$	(Q)	0
(C)	Minimum value of $y = -2\sin^2 x + \cos x + 3$	(R)	$\frac{7}{8}$
(D)	Maximum value of $y = 4\sin^2\theta + 4\sin\theta\cos\theta + \cos^2\theta$	(S)	5
		(T)	6

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Exercise 5 Subjective Type Problems

1. Let $P = \dfrac{\sin 80^\circ \sin 65^\circ \sin 35^\circ}{\sin 20^\circ + \sin 50^\circ + \sin 110^\circ}$, then the value of 24P is :

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2. The value of expression $(1 - \cot 23^\circ)(1 - \cot 22^\circ)$ is equal to :

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3. If tanA and tanB the roots of the quadratic equation, $4x^2 - 7x + 1 = 0$ then evaluate $4\sin^2(A+B) - 7\sin(A+B)\cdot\cos(A+B) + \cos^2(A+B)$.

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4. $A_1A_2A_3.\ldots\ldots\ldots A_{18}$ is a regular 18 sided polygon. B is an external point such that A_1A_2B is an equilateral triangle. If $A_{18}A_1$ and A_1B are adjacent sides of a regular n sided polygon, then $n =$

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5. If $10\sin^4\alpha + 15\cos^4\alpha = 6$ then the value of $9\cos ec^4\alpha + 8\sec^4\alpha - 75$ is

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6. The value of $\left(1+\tan\frac{3\pi}{8}\cdot\tan\frac{\pi}{8}\right)+\left(1+\tan\frac{5\pi}{8}\cdot\tan\frac{3\pi}{8}\right)+\left(1+\tan\frac{7\pi}{8}\cdot\tan\frac{5}{8}\right.$

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7. If $\alpha=\frac{\pi}{7}$ then find the value of $\left(\frac{1}{\cos\alpha}+\frac{2\cos\alpha}{\cos 2\alpha}\right)$

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8. Given the for $a, b, c, d \in R$, if a

$\sec(200^\circ)-c\tan(200^\circ)=d$ and $b\sec(200^\circ)+d\tan(200^\circ)=c$,

then find the value of $\left(\frac{a^2+b^2+c^2+d^2}{bd-ac}\right)\sin 20^\circ$.

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9. The expression $2\cos\frac{\pi}{17}\cdot\cos\frac{9\pi}{17}+\cos\frac{7\pi}{17}+\cos\frac{9\pi}{17}$ simplifies to an integer P. Find the value of P.

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10. If the expression $\frac{\sin\theta\sin 2\theta+\sin 3\theta\sin 60\theta+\sin 4\theta\sin 13\theta}{\sin\theta\cos 2\theta+\sin 3\theta\cos 6\theta+\sin 4\theta\cos 13\theta}=\tan k\theta,$ where $k\in N.$ Find the value of k.

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11. Let $a=\sin 10^\circ, b=\sin 50^\circ, c=\sin 70^\circ,$ then $8abc\left(\frac{a+b}{c}\right)\left(\frac{1}{a}+\frac{1}{b}-\frac{1}{c}\right.$ is equal to

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12. If $\sin^3\theta+\sin^3\left(\theta+\frac{2\pi}{3}\right)+\sin^3\left(\theta+\frac{4\pi}{3}\right)=a\sin b\theta.$ Find the value of $\left|\frac{b}{a}\right|.$

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13. If $\sum_{r=1}^{n}\left(\frac{\tan 2^{r-1}}{\cos 2^{r}}\right)=\tan p^{n}-\tan q$, then find the value of $(p+q)$.

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14. If $x=\sec\theta-\tan\theta$ and $y=\operatorname{cosec}\theta+\cot\theta$, then $y-x-xy=$

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15. If $\cos 18^{\circ}-\sin 18^{\circ}=\sqrt{n}\sin 27^{\circ}$, then $n=$

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16. The value of $3(\sin 1-\cos 1)^{4}+6(\sin 1+\cos 1)^{2}+4\left(\sin^{6}1+\cos^{6}1\right)$ is equal to

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17. Q. $x = a$ satisfy the equation $3^{\sin 2x + 2\cos^2 x} + 3^{1 - \sin 2x + 2\sin^2 x} = 28(\sin 2a - \cos 2a)^2 + 8\sin 4a$ is equal to :

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18. The minimum value of $(\sin\theta + cosec\theta)^2 + (\cos\theta + \sec\theta)^2 =$

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19. If $\tan 20^0 + \tan 40^0 + \tan 80^0 - \tan 60^0 = \lambda \sin 40^0$,

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20. If K° lies between 360° and 540° and K° satisfies the equation $1 + \cos 10x \cos 6x = 2\cos^2 8x + \sin^2 8x$, then $\frac{K}{10} =$

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21. If $\cos 20^\circ + 2\sin^2 55^\circ = 1 + \sqrt{2}\sin K^\circ, K \in (0, 90), \quad \text{then} \quad K =$

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22. If the value of $\cos\left(\frac{2\pi}{7}\right) + \cos\left(\frac{4\pi}{7}\right) + \cos\left(\frac{6\pi}{7}\right) + \cos\left(\left(7\frac{\pi}{7}\right)\right) = -\frac{l}{2}$ Find the value of l

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23. Let α be the smallest integral value of x, x>0 such that $\tan 19x = \frac{\cos 96^0 + \sin 96^0}{\cos 96^0 - \sin 96^0}$. The last digit of α is

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24. Find the value of the expression $\frac{\sin 20^\circ (4\cos 20^\circ + 1)}{\cos 20^\circ \cos 30^\circ}$

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25. If the value of $\cos\left(\frac{2\pi}{7}\right)+\cos\left(\frac{4\pi}{7}\right)+\cos\left(\frac{6\pi}{7}\right)+\cos\left(\left(7\frac{\pi}{7}\right)\right)=-\frac{l}{2}$ Find the value of l

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26. If $\cos A=\frac{3}{4}$ and $k\sin\left(\frac{A}{2}\right)\sin\left(\frac{5A}{2}\right)=\frac{11}{8}$. Find k.

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27. Find the least value of the expression $3\sin^2 x+4\cos^2 x$.

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28. Q. If $\tan\alpha$ and $\tan\beta$ are the roots of equation $x^2 - 12x - 3 = 0$, then the value of $\sin^2(\alpha+\beta) + 2\sin(\alpha+\beta)\cos(\alpha+\beta) + 5\cos^2(\alpha+\beta)$ is

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29. The value of $\frac{\cos 24^0}{2\tan 33^0 \sin^2(57^0)} + \frac{\sin 162^0}{\sin 18^0 - \cos 18^0 \tan 9^0} + \cos 162^0$ is equal to

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30. Find the value of $\tan\theta(1+\sec 2\theta)(1+\sec 4\theta)(1+\sec 8\theta)$, when $\theta = \frac{\pi}{32}$

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31. If λ be the minimum value of $y = (\sin x + \operatorname{cosec} x)^2 + (\cos x + \sec x)^2 + (\tan x + \cot x)^2$ where $x \in R$. Find $\lambda - 6$.

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