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India's Number 1 Education App

MATHS

BOOKS - SHRI BALAJI MATHS (ENGLISH)

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. If $A = \frac{\pi}{5}$, then find the value of $\sum_{r=1}^{8} \tan(rA)\tan((r+1)A)$.

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 find the minimum value of $f(x)f$ or $x \in \left(0, \frac{\pi}{2}\right)$.

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. The value of $\text{cosec}10^\circ + \text{cosec}50^\circ - \text{cosec}70^\circ$ is _____

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 the maximum and minimum values of u^2 is given by :

(a) $(a-b)^2$ (b) $2\sqrt{a^2+b^2}$ (c) $(a+b)^2$ (d) $2\left(a^2+b^2\right)$

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 $a\cos^3 3\theta + b\cos^4\theta = 16\cos^6\theta + 9\cos^2\theta$ 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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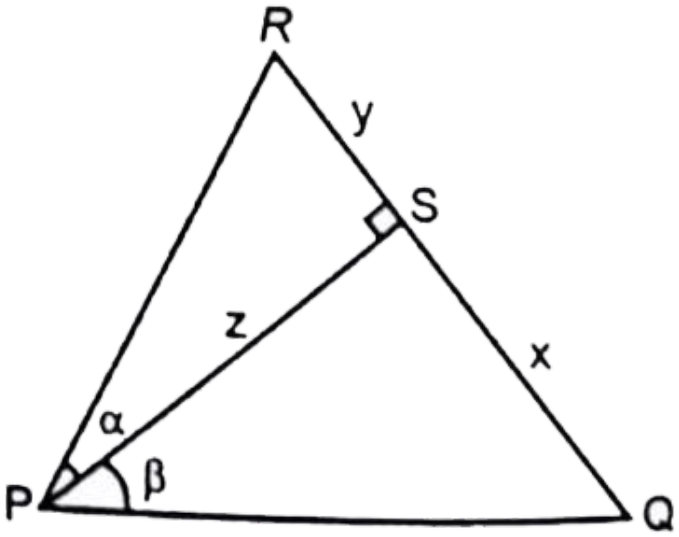
15. In a ΔPQR (as shown in figure) if $x : y : z = 2 : 3 : 6$, then the value of $\angle QPR$ is :



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 $4\sin^2 x + \tan^2 x + \cot^2 x + \text{cosec}^2 x = 6 \text{ in } [0, 2\pi]$:

A. 1

B. 2

C. 3

D. 4

Answer: D

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20. If $\sin A, \cos A \text{ and } \tan A$ 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 $y = \frac{2\sin\alpha}{1 + \cos\alpha + \sin\alpha}$, then $\frac{1 - \cos\alpha + \sin\alpha}{1 + \sin\alpha}$ is equal to :

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 $(\log)_{20}(3\sin x - 4\cos x + 15) -$ 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. Show that the equation $e^{\sin x} - e^{-\sin x} - 4 = 0$ has no real solution.

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 find the value of expression $\sqrt{4\sin^4\alpha + \sin^2 2\alpha} + 4\cos^2\left(\frac{\pi}{4} - \frac{\alpha}{2}\right)$.

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 $\sin x + \sin^2 x = 1, \quad \text{then} \quad \cos^8 x + 2\cos^6 x + \cos^4 x =$

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 (a) $\frac{\pi}{12}$ (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 (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. The area of a regular polygon of n sides is (where r is inradius, R is circumradius, and a is side of the triangle)

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. Find the value of $\cos 12^\circ + \cos 84^\circ + \cos 156^\circ + \cos 132^\circ$

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. $5/4$

A. $3/4$

B. $1/2$

C. 2

D. $5/4$

Answer: A

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63. If $2\cos\theta + \sin\theta = 1 then 7$ 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 $\sin\theta + \text{cosec}\theta = 2$, then the value of $\sin^8\theta + \text{cosec}^8\theta$ 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. $\frac{\sin x + \cos x}{\sin x - \cos x} - \frac{\sec^2 x + 2}{\tan^2 x - 1} =$, where $x \in \left(0, \frac{\pi}{2}\right)$

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

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

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

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 ,D

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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. <0

D. >0

Answer: C

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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. about to only mathematics

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 three values lying in $[0, 3\pi)$ for which $\tan\theta=\lambda$, then the value of $\left|\tan\left(\frac{\theta_1}{3}\right)\tan\left(\frac{\theta_2}{3}\right)+\tan\left(\frac{\theta_2}{3}\right)\tan\left(\frac{\theta_2}{3}\right)+\tan\left(\frac{\theta_3}{3}\right)\tan\left(\frac{\theta_1}{3}\right)\right|$ is

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 cosA=3/4, then 32 sin (A/2) sin ((5A) /2)= ---------- (A) √11 (B) -√11 (C) 11 (D) -11

A. 11

B. -11

C. 12

D. 4

Answer: A

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

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 and β be such that $\pi<\alpha-\beta<3\pi$, If $\sin\alpha+\sin\beta=-\frac{21}{65}$ and $\cos\alpha+\cos\beta=-\frac{27}{65}$, then the value of $\frac{\cos(\alpha-\beta)}{2}is$ (a) $-\frac{3}{\sqrt{130}}$ (b) $\frac{3}{\sqrt{130}}$ (c) $\frac{6}{25}$ (d) $\frac{6}{65}$

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 the maximum and minimum values of u^2 is given by :

(a) $(a-b)^2$ (b) $2\sqrt{a^2+b^2}$ (c) $(a+b)^2$ (d) $2\left(a^2+b^2\right)$

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 $P = \left(\tan\left(3^{n+1}\theta\right) - \tan\theta\right)$ and $Q = \sum_{r=0}^{n} \frac{\sin\left(3^r\theta\right)}{\cos\left(3^{r+1}\theta\right)}$, then

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

Watch Video Solution

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. The value of $\text{cosec}10^\circ + \text{cosec}50^\circ - \text{cosec}70^\circ$ is ____

A. 4

B. 5

C. 6

D. 8

Answer: C

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96. If $270^\circ < \theta < 360^\circ$, then find $\sqrt{2+\sqrt{2(1+\cos\theta)}}$

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.

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

i) tan45

ii) 2tan15.tan45.tan75

iii) 2tan15.tan45.tan75

iv) tan15.tan45.tan75

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 $\cot^4 x - 2\operatorname{cosec}^2 x + a^2 = 0$ 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. $\cos(\cos 1) > \dfrac{1}{\sqrt{2}}$

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. $\text{cosec}4x = 2$

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

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

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

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

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

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

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

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

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

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

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

Answer: A::C

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

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

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

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

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

Answer: A::D

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24. If

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

± 1 (b) $\pm \frac{1}{2}$ (c) $\pm \frac{1}{3}$ (d) $\pm \frac{1}{4}$

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

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

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

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

A. $\sqrt{2}$

B. 1

C. 0

D. -1

Answer: B

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9. In ΔABC, if $\cot\theta = \cot A + \cot B + \cot C$, prove that $\sin^3\theta = \sin(A-\theta)\sin(B-\theta)\sin(C-\theta)$

A. 60°

B. 25°

C. 35°

D. 45°

Answer: B

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10. In ΔABC, if $\cot\theta = \cot A + \cot B + \cot C$, prove that $\sin^3\theta = \sin(A-\theta)\sin(B-\theta)\sin(C-\theta)$

A. $\tan^3\theta$

B. $\cot^3\theta$

C. $\sin^3\theta$

D. $\cos^3\theta$

Answer: C

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11. If `pi

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

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

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

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

Answer: D

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

Q. If the value of $f\left(\frac{\pi}{3}\right) = a + b\sqrt{c}$ where $a, b, c \in N$ then the value of $a + b + c$ is :

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 $(1+\tan 5^\circ)(1+\tan 10^\circ).....(1+\tan 45^\circ) = 2^{k+1}$ 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 $y = \dfrac{1-\tan^2(\pi/4-x)}{1+\tan^2(\pi/4-x)}$	(P)	1
(B)	Minimum value of $\log_3\left(\dfrac{5\sin x - 12\cos x + 26}{13}\right)$	(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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3.

	Column-I		Column-II
(A)	The value of $\frac{\cos 68^\circ}{\sin 56^\circ \sin 34^\circ \tan 22^\circ}$ equals to	(P)	16
(B)	The value of $(\cos 65^\circ + \sqrt{3}\sin 5^\circ + \cos 5^\circ)^2 = \lambda \cos^2 25^\circ$; then value of λ be	(Q)	3

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4.

	Column-I		Column-II
(A)	The value of $\frac{\cos 68^\circ}{\sin 56^\circ \sin 34^\circ \tan 22^\circ}$ equals to	(P)	16
(B)	The value of $(\cos 65^\circ + \sqrt{3}\sin 5^\circ + \cos 5^\circ)^2 = \lambda \cos^2 25^\circ$; then value of λ be	(Q)	3

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5.

	Column-I		Column-II
(A)	The value of $\frac{\cos 68^\circ}{\sin 56^\circ \sin 34^\circ \tan 22^\circ}$ equals to	(P)	16
(B)	The value of $(\cos 65^\circ + \sqrt{3}\sin 5^\circ + \cos 5^\circ)^2 = \lambda \cos^2 25^\circ$; then value of λ be	(Q)	3

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Exercise 5 Subjective Type Problems

1. Let $P = \frac{\sin 80^\circ \sin 65^\circ \sin 35^\circ}{\sin 20^\circ + \sin 50^\circ + \sin 110^\circ}$, 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 that 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. Prove that: $\cos 18^0 - \sin 18^0 = \sqrt{2}\sin 27^0$

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16. $3(\sin x - \cos x)^4 + 6(\sin x + \cos x)^2 + 4\left(\sin^6 x + \cos^6 x\right) = \ldots\ldots$

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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. If $y = (\sin\theta + \operatorname{cosec}\theta)^2 + (\cos\theta + \sec\theta)^2$, then minimum value of y is :

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

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

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22. Prove that $\cos\left(\frac{2\pi}{7}\right) + \cos\left(\frac{4\pi}{7}\right) + \cos\left(\frac{6\pi}{7}\right) = -\frac{1}{2}$

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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 $\cos\left(\frac{2\pi}{7}\right) + \cos\left(\frac{4\pi}{7}\right) + \cos\left(\frac{6\pi}{7}\right) + \cos\left(\frac{7\pi}{7}\right) = -\frac{l}{2}$ 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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