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MATHS

BOOKS - DEEPTI MATHS (TELUGU ENGLISH)

TRIGONOMETRIC RATIOS AND IDENTITIES

SOLVED EXAMPLE

1. If $\tan 40^\circ = \lambda$, then $\dfrac{\tan 140^\circ - \tan 130^\circ}{1 + \tan 140^\circ \tan 130^\circ} =$

A. $\dfrac{1-\lambda^2}{\lambda}$

B. $\dfrac{1+\lambda^2}{\lambda}$

C. $\dfrac{1+\lambda^2}{2\lambda}$

D. $\dfrac{1-\lambda^2}{2\lambda}$

Answer: D

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2. If $\frac{\sin x + \cos x}{\cos^3 x} = a\tan^3 x + b\tan^2 x + c\tan x + d$ then $a + b + c + d =$

A. 0

B. 2

C. 4

D. -2

Answer: C

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3. If $\tan^2 A + \tan^2 B + \tan^2 C - \tan B\tan c - \tan C\tan A - \tan A\tan B = 0$ then ΔABC is

A. isosceles

B. equilateral

C. right angled

D. right angled isosceles

Answer: B

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4. $\cos 1^{\circ} + \cos 2^{\circ} + \cos 3^{\circ} + \ldots + \cos 179^{\circ} =$

A. 0

B. 1

C. -1

D. 89

Answer: A

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5. IF $x^2 + y^2 = 1$ and $P = \left(3x - 4x^3\right)^2 + \left(3y - 4y^3\right)^2$ then find 'P'.

A. 0

B. 1

C. x+y

D. x6

Answer: B

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6. If A,B,C are qcute angles such that $\sin(B + C - A) = \cos(C + A - B) = \tan(A + B - C) = 1$ then (A,B,C)=

A. $(\pi/8, 3\pi/8, \pi/4)$

B. $(\pi/4, \pi/8, 3\pi/8$

C. $(3\pi/8, \pi/4, \pi/8)$

D. none

Answer: A

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7. If $x = a\cos^3\theta\sin^2\theta, y = a\sin^3\theta\cos^2\theta$ and $\frac{(x^2+y^2)^p}{(xy)^q}(p, q \in N)$ is independent of θ , the

A. 4p=5q

B. 5p=4q

C. p+q=9

D. pq=20

Answer: A

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8. If $\sin\theta$, $\cos\theta$, $\tan\theta$ are in G.P then $\cos^9\theta + \cos^6\theta + 3\cos^5\theta$ - 1=

A. -1

B. 0

C. 1

D. none of these

Answer: B

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9. If $\tan A + \tan B = p$ and $\cot A + \cot B = q$ then $\cot(A + B) =$

A. $\dfrac{p - q}{pq}$

B. $\dfrac{q - p}{pq}$

C. $\dfrac{pq}{p + q}$

D. $\dfrac{pq}{p - q}$

Answer: B

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10. If $\tan A = \dfrac{x\sin B}{1 - x\cos B}$ and $\tan B = \dfrac{y\sin A}{1 - y\cos A}$ then $\dfrac{\sin A}{\sin B} =$

A. x/y

B. y/x

C. $x + y$

D. $x - y$

Answer: A

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11. $1 + \tan A\tan(A/2) =$

A. $\sin A$

B. cos A

C. tan A

D. sec A

Answer: D

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12. $\tan 203^\circ + \tan 22^\circ + \tan 203^\circ \tan 22^\circ =$

A. -1

B. 0

C. 1

D. 2

Answer: C

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13. If $\sin\theta = 1/\sqrt{3}$, then $\cos 2\theta =$

A. $1/2$

B. $1/3$

C. $1/5$

D. $1/8$

Answer: B

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14. If $450^{\circ} < A < 540^{\circ}$, $\sin A = 3/5$, then $\cos A/2 =$

A. $3/\sqrt{10}$

B. $-3/\sqrt{10}$

C. $\frac{1}{\sqrt{10}}$

D. $-1/\sqrt{10}$

Answer: D

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15. $8\sin\theta\cos\theta\cos2\theta\cos4\theta =$

A. $\sin8\theta$

B. $\cos8\theta$

C. $\sin4\theta$

D. $\cos4\theta$

Answer: A

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16. $1 - \frac{3}{4}\sin^2 2A =$

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

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

C. $\frac{1}{4}\left(1 + 2\cos^2 2A\right)$

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

Answer: A

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17. $\sin 10\theta + \sin 2\theta =$

A. $2\sin 6\theta \cos 4\theta$

B. $2\cos 6\theta \cos\theta$

C. $2\cos 4\theta \sin 2\theta$

D. $2\sin 4\theta \cos 2\theta$

Answer: A

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18. $\sin 4\theta \cdot \sin 6\theta =$

A. $\frac{1}{2}[\cos 2\theta - \cos 10\theta]$

B. $\frac{1}{2}[\cos 2\theta + \cos 10\theta]$

C. $\frac{1}{2}[\sin\theta - \cos 10\theta]$

D. $\frac{1}{2}[\sin\theta + \cos 10\theta]$

Answer: A

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19. $\sin 6\theta\left(2\cos^2\theta - 1\right)$

A. $\frac{1}{2}(\sin 8\theta + \sin 4\theta)$

B. $\frac{1}{2}(\sin 8\theta - \sin 4\theta)$

C. $\frac{1}{2}(\cos 8\theta + \cos 4\theta)$

D. $\frac{1}{2}(\cos 8\theta - \cos 4\theta)$

Answer: A

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20. $\sin 85^\circ - \sin 35^\circ - \cos 65^\circ$

A. 0

B. 1

C. 2

D. 3

Answer: A

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21. $\dfrac{\sin 4\theta - \sin 2\theta}{\cos 4\theta + \cos 2\theta} =$

A. $\cot\theta$

B. $\sin\theta$

C. $\cos\theta$

D. $\tan\theta$

Answer: D

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22. If A, B, C are angles in a triangle, then the $\sin^2 A + \sin^2 B - \sin^2 C = 2\sin A \sin B \cos C$

A. $2\cos A \sin B \sin C$

B. $-2\cos A \sin B \sin C$

C. $2\sin A \cos B \sin C$

D. $2\sin A \sin B \cos C$

Answer: D

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23. For $0 < x < \frac{\pi}{2}, \frac{\sin x}{\cos x} \cdot \frac{\sec x}{\operatorname{cosec} x} \cdot \frac{\tan x}{\cot x} = 9$. Then x=

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

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

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

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

Answer: B

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24.

$\left|\left(\sin^2 13^\circ, \sin^2 77^\circ, \tan 135^\circ\right), \left(\sin^2 77^\circ, \tan 135^\circ, \sin^2 13^\circ\right), \left(\tan 135^\circ, \sin^2 13\right.\right.$

A. -1

B. 0

C. 1

D. 2

Answer: B

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

A. Imaginary

B. Real

C. > 1

D. < 1

Answer: B

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26. Given that $\tan\frac{\pi}{9}, x, \tan\frac{5\pi}{18}$ are in A.P. Also given that $\tan\frac{\pi}{9}, y, \tan\frac{7\pi}{18}$ are in A.P. Then we have

A. x=y

B. 2x=y

C. x=2y

D. 2x=3y

Answer: B

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27. $x = \tan 27\theta - \tan\theta, y = \frac{\sin\theta}{\cos 3\theta} + \frac{\sin 3\theta}{\cos 9\theta} + \frac{\sin 9\theta}{\cos 27\theta}$, if

A. x=y

B. x=-y

C. x=2y

D. 2x=y

Answer: C

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28. The period of $3\sin 3x + 5\cos 2x$ is

A. π

B. 2π

C. $\pi/2$

D. 3π

Answer: B

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29. The period of $\sin(\pi x/4) + \cos(\pi x/6)$ is

A. 12

B. 8

C. 16

D. 24

Answer: D

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30. The period of the function $f(x) = \dfrac{\sin 8x \cos x - \sin 6x \cos 3x}{\cos 2x \cos x - \sin 3x \sin 4x}$ is

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

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

C. π

D. $\dfrac{3\pi}{2}$

Answer: B

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31. The minimum value of $\sin 4x + \cos 4x$ is

A. $\sqrt{2}$

B. $1/\sqrt{2}$

C. $-\sqrt{2}$

D. none

Answer: C

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32. The maximum value of $\sqrt{3}\cos x + \sin x$ is

A. 2

B. $\sqrt{2}$

C. -2

D. $-\sqrt{2}$

Answer: A

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EXERCISE 1 A (TRIGONOMETRIC FUNCTIONS)

1. $\cos 225^\circ + \sin 165^\circ =$

A. 0

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

C. $\dfrac{\sqrt{3}-1}{2\sqrt{2}}$

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

Answer: A

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2. $\sin\frac{3\pi}{5} + \sin\frac{4\pi}{5} + \sin\frac{6\pi}{5} + \sin\frac{7\pi}{5} =$

A. 0

B. -1

C. 1

D. 2

Answer: A

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3. $\tan 10^\circ \cdot \tan 20^\circ \cdot \tan 30^\circ \cdot \tan 40^\circ \cdot \tan 50^\circ \cdot \tan 60^\circ \tan 70^\circ \cdot \tan 80^\circ =$

A. 0

B. -1

C. 1

D. 2

Answer: C

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4. Show that

$$\cot.\ \frac{\pi}{20}.\ \cot.\ \frac{3\pi}{20}.\ \cot.\ \frac{5\pi}{20}.\ \cot.\ \frac{7\pi}{20}.\ \cot.\ \frac{9\pi}{20} = 1$$

A. -1

B. 1

C. 0

D. 2

Answer: B

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5. $\cos 690^\circ \cdot \sin 840^\circ + \cos 420^\circ \cdot \sin 1050^\circ =$

A. 0

B. $1/2$

C. $1/5$

D. 1

Answer: B

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6. $\tan 585^{\circ} \cdot \cot 405^{\circ} + \tan 675^{\circ} \cdot \cot 765^{\circ} =$

A. 0

B. $1/2$

C. $1/5$

D. 1

Answer: A

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7. $\sin 420^\circ \cdot \cos 390^\circ - \cos\left(-330^\circ\right) \cdot \sin\left(-300^\circ\right) =$

A. 0

B. 1/2

C. 1/5

D. 1

Answer: A

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8. $\sin 120^\circ \cos 150^\circ - \cos 240^\circ \sin 330^\circ =$

A. 1

B. -1

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

D. $-\frac{\sqrt{3}+1}{4}$

Answer: B

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9. $\cos^2\frac{\pi}{5} + \sin^2\frac{4\pi}{5} =$

A. 0

B. $1/2$

C. $1/5$

D. 1

Answer: D

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10. $\sin^2\frac{2\pi}{3} + \cos^2\frac{5\pi}{6} - \tan^2\frac{3\pi}{4} =$

A. 0

B. $1/2$

C. $1/5$

D. 1

Answer: B

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11. $\cos^2 1^\circ + \cos^2 2^\circ + \cos^2 3^\circ + ... + \cos^2 90^\circ =$

A. 0

B. 1

C. 45

D. $89/2$

Answer: D

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12. $\cos^2\left(80° + \theta\right) + \sin^2\left(100° - \theta\right) =$

A. 0

B. 1

C. -1

D. 2

Answer: B

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13. $\sum_{k=1}^{3} \cos^2\left((2k-1)\frac{\pi}{12}\right) =$

A. 0

B. 1/2

C. -1/2

D. 3/2

Answer: D

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14. $\tan\left(45^\circ + \theta\right) \cdot \tan\left(45^\circ - \theta\right) =$

A. 0

B. 1

C. -1

D. 2

Answer: B

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15. $\cos A + \sin\left(270^\circ + A\right) - \sin\left(270^\circ - A\right) + \cos\left(180^\circ - A\right) =$

A. $\sin\theta$

B. 0

C. $\cos\theta$

D. 1

Answer: B

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16. $\text{cosec}(270^\circ - A) + \text{cosec}(90^\circ - A) + \sec(90^\circ - A) + \sec(270^\circ - A) =$

A. $\sin\theta$

B. 0

C. $\cos\theta$

D. 1

Answer: B

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17. If $\text{cosec}(\pi/2+\theta)+x\cos\theta\cot(\pi/2-\theta)=\sin(\pi/2+\theta)$, then x =

A. $\cot\theta$

B. $\sin\theta$

C. $-\tan\theta$

D. $\cos\theta$

Answer: C

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18. In ΔABC, $\cos\left(\frac{3A+2B+C}{2}\right)+\cos\left(\frac{A-C}{2}\right)=$

A. 0

B. 1

C. -1

D. 2

Answer: A

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19. In $\Delta ABC, \cos\left(\frac{B+2C+3A}{2}\right)+\cos\left(\frac{A-B}{2}\right)=$

A. -1

B. 0

C. 1

D. 2

Answer: B

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20. In $\Delta ABC, \tan\left(\frac{A+B}{2}\right)\cdot\tan\frac{C}{2}=$

A. $\sin 2A$

B. 1

C. $\tan 2A$

D. 0

Answer: B

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21. If A,B,C,D are the angles of a cyclic quadrilateral then $\sin A + \sin B =$

A. $\sin C + \sin D$

B. 1

C. -1

D. 2

Answer: A

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22. If A,B,C,D are the angles of a cyclic quadrilateral then $\cos A + \cos B + \cos C + \cos D =$

A. 4

B. 1

C. 0

D. -1

Answer: C

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23. If A,B,C,D are the angles of a quadrilateral then $\tan\left(\frac{A+B}{4}\right) =$

A. $\cos\left(\frac{C-D}{4}\right)$

B. $\cot\left(\frac{C-D}{4}\right)$

C. $\cos\left(\frac{C+D}{4}\right)$

D. $\cot\left(\frac{C+D}{4}\right)$

Answer: D

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24. If A, B, C, D are the angles of a quadrilateral then $\cos\left(\frac{A+B}{2}\right)+\cos\left(\frac{C+D}{2}\right)=$

A. 0

B. 1

C. -1

D. 2

Answer: A

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25. $\dfrac{\sin(-660^\circ)\tan(1050^\circ)\sec(-420^\circ)}{\cos(225^\circ)\operatorname{cosec}(315^\circ)\cos(510^\circ)} =$

A. $\sqrt{3}/4$

B. $\sqrt{3}/2$

C. $2/\sqrt{3}$

D. $4/\sqrt{3}$

Answer: C

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26. $\dfrac{\cos(180^\circ - A)\cdot\cot(90^\circ + A)\cdot\cos(-A)}{\tan(180^\circ + A)\tan(270^\circ + A)\cdot\sin(360^\circ - A)} =$

A. cos A

B. cosec A

C. sin A

D. tan A

Answer: A

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27. $\dfrac{\sin(15\pi/9)\cdot\tan(4\pi/3)\cdot\sec(-7\pi/3)}{\cot(-3\pi/4)\cdot\cos(7\pi/6)\cdot\operatorname{cosec}(-7\pi/4)}=$

A. $\sqrt{2/3}$

B. $\sqrt{3}$

C. 6

D. $\sqrt{6}$

Answer: D

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28. $\dfrac{\tan(35\pi/6)\cdot\sin(-11\pi/3)\cdot\sec(-7\pi/3)}{\cot(5\pi/4)\cdot\text{cosec}(7\pi/4)\cdot\cos(17\pi/6)} =$

A. $\sqrt{2/3}$

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

C. $\sqrt{3/2}$

D. $\sqrt{3}/2$

Answer: B

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29.

$$\sin\left(\frac{\pi}{2}+\theta\right)\cdot\cos(\pi-\theta)\cdot\cot\left(\frac{3\pi}{2}+\theta\right)-\sin\left(\frac{\pi}{2}-\theta\right)\cdot\sin\left(\frac{3\pi}{2}-\theta\right)\cdot\cot\left(\frac{\pi}{2}+\theta\right)=$$

A. 1

B. 0

C. -1

D. 2

Answer: B

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30. If $\tan 20^{\circ} = \lambda$, then $\dfrac{\tan 250^{\circ} + \tan 340^{\circ}}{\tan 200^{\circ} - \tan 110^{\circ}} =$

A. $\dfrac{1+\lambda^2}{1-\lambda^2}$

B. $\dfrac{1-\lambda^2}{1+\lambda^2}$

C. $\dfrac{1+\lambda^2}{2\lambda}$

D. $\dfrac{1-\lambda^2}{2\lambda}$

Answer: B

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31. If $\tan 20^{\circ} = \lambda$ then show that $\dfrac{\tan 160^{\circ} - \tan 110^{\circ}}{1+\tan 160^{\circ} . \tan 110^{\circ}} = \dfrac{1-\lambda^2}{2\lambda}$.

A. $\frac{1-\lambda^2}{2\lambda}$

B. $\frac{1+\lambda^2}{2\lambda}$

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

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

Answer: A

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32. If α, β are complementary angles , then $\sin^2\alpha + \sin^2\beta$ =

A. 1

B. -1

C. 2

D. 0

Answer: A

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33. If α, β are supplementary angles , then $\cos^2\alpha + \sin^2\beta$=

A. 1

B. -1

C. 2

D. 0

Answer: A

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34. If x= sin 1 , $y = \sin 1^\circ$ then

A. $x = y$

B. $x < y$

C. $x > y$

D. none

Answer: C

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35. If $x = \cos 1, y = \cos 1^{\circ}$ then

A. $x = y$

B. $x < y$

C. $x > y$

D. none

Answer: B

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36. If $x = \tan 1, y = \tan 1^{\circ}$ then

A. $x = y$

B. $x < y$

C. $x > y$

D. none

Answer: C

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37. If $\tan\theta = -4/3$ then $\sin\theta =$

A. $-4/5$ but not 4/5

B. $-4/5$ or 4/5

C. 4/5 but not -4/5

D. none

Answer: B

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38. If $\cot\theta = 15/8$ and θ is not in the first quadrant then $\sin\theta =$

A. $5/12$

B. $8/17$

C. $-5/12$

D. $-8/17$

Answer: D

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39. If α, β are complementary angles , $\sin\alpha = 3/5$, then $\sin\alpha\cos\beta - \cos\alpha\sin\beta$ =

A. $7/25$

B. $-7/25$

C. $25/7$

D. $-25/7$

Answer: B

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40. If $180^\circ < \theta < 270^\circ$ and $\sin\theta = -5/13$ then $5\cot^2\theta + 12\tan\theta + 13\operatorname{cosec}\theta =$

A. 0

B. -1

C. 1

D. 2

Answer: A

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41. If $\cot\theta = -3/4$ and θ is not in the second quadrant, then $5\sin\theta + 10\cos\theta + 9\sec\theta + 16\ \text{cosec}\theta - 4\cot\theta =$

A. 0

B. -1

C. 1

D. 2

Answer: A

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42. If $\tan\theta = -4/3$ and θ is not in the fourth quadrant, then the value of $5\sin\theta + 10\cos\theta + 9\sec\theta + 16\ \text{cosec}\theta + 4\cot\theta =$

A. 0

B. 1

C. -1

D. 2

Answer: A

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43. If θ is acute and $(1 - a^2)\sin\theta = (1 + a^2)\cos\theta$, then $\sin\theta =$

A. $\dfrac{1 - a^2}{\sqrt{2(1 + a^4)}}$

B. $\dfrac{1 + a^2}{\sqrt{2(1 + a^4)}}$

C. $\dfrac{\sqrt{2(1 + a^4)}}{1 - a^2}$

D. $\dfrac{\sqrt{2(1 + a^4)}}{1 + a^2}$

Answer: B

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44. If $\sin\theta = k, 0 < k < 1$ and $'\theta'$ does not lie in the first quadrant , then $\tan\theta =$

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

B. $\sqrt{1-k^2}$

C. $\dfrac{-\sqrt{1-k^2}}{k}$

D. $\dfrac{1}{\sqrt{1+k^2}}$

Answer: A

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45. If $270^\circ < \theta < 360^\circ$ and $\cos\theta = \dfrac{5}{13}$ then $\dfrac{13\sin\theta + 5\tan\theta}{12\cot\theta - 5\sec\theta} =$

A. $-4/3$

B. $3/4$

C. $4/3$

D. $-3/4$

Answer: C

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46. If $\sin\theta = -\frac{7}{25}$ and θ is not in the fourth quadrant, then $\frac{7\cot\theta - 24\tan\theta}{7\cot\theta + 24\tan\theta} =$

A. $17/31$

B. $-17/31$

C. $31/17$

D. $-31/17$

Answer: A

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47. If $\tan\theta = \frac{1}{\sqrt{7}}$ and θ is an acute angle, then $\frac{\operatorname{cosec}^2\theta - \sec^2\theta}{\operatorname{cosec}^2\theta + \sec^2\theta} =$

A. $3/4$

B. $1/2$

C. 2

D. $5/4$

Answer: A

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48. If $\tan\alpha = \frac{q}{p}$ and $\alpha < 90^\circ$, then $\frac{q\sin\alpha - p\cos\alpha}{q\sin\alpha + p\cos\alpha} =$

A. $\frac{q^2 - p^2}{p^2 + q^2}$

B. $\frac{q^2 + p^2}{p^2 - q^2}$

C. $\frac{p^2 - q^2}{p^2 + q^2}$

D. none

Answer: A

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49. If θ lies in the first quadrant and $5\tan\theta = 4$, then $\frac{5\sin\theta - 3\cos\theta}{\sin\theta + 2\cos\theta} =$

A. $5/14$

B. $3/14$

C. $1/14$

D. 0

Answer: A

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50. If $\cot\theta = \frac{b}{a}$ then $\frac{a\sin\theta - b\cos\theta}{a\sin\theta + b\cos\theta} =$

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

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

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

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

Answer: B

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51. If $\sec\alpha = \frac{13}{5}$ where $\alpha < 90^\circ$, then the value of $\frac{2 - 3\cot\alpha}{4 - 9\tan\alpha} =$

A. $-15/352$

B. $15/352$

C. $13/352$

D. none

Answer: A

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52. If $\cot\theta = \sqrt{7}$ and θ does not lie the first quadrant , then $\dfrac{\operatorname{cosec}^2\theta - \sec^2\theta}{\operatorname{cosec}^2\theta + \sec^2\theta} =$

A. 4/3

B. 3/4

C. -4/3

D. -3/4

Answer: B

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53. If $\cos\theta = \dfrac{3}{5}$ and θ is not in the first quadrant , then $\dfrac{5\tan(\pi + \theta) + 4\cos(\pi - \theta)}{5\sec(2\pi - \theta) - 4\cot(2\pi + \theta)} =$

A. 4/5

B. -4/5

C. 5/4

D. -5/4

Answer: B

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54. If $\tan\theta = -\frac{5}{12}$ and θ is not in the fourth quadrant then

$$\frac{\tan(90^\circ + \theta) - \sin(180^\circ - \theta)}{\sin(270^\circ - \theta) + \operatorname{cosec}(360^\circ - \theta)} =$$

A. $\frac{109}{131}$

B. $-\frac{109}{131}$

C. $\frac{131}{109}$

D. $-\frac{131}{109}$

Answer: D

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55. If

$90^\circ < A < 180^\circ, 180^\circ < B < 270^\circ$ and $\cos A = -\frac{\sqrt{3}}{2}, \sin B = -\frac{3}{5}$ then $\frac{2\tan B +}{\cot^2 A}$

A. $5/22$

B. $-5/22$

C. $22/5$

D. $-22/5$

Answer: A

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56. If $180^\circ < A < 270^\circ, 270^\circ < B < 360^\circ$ and $\sin A = -5/13, \sec B = 5/4$,

then $\sin A \cos B + \cos A \sin B =$

A. $16/65$

B. $-16/65$

C. $65/16$

D. $-65/16$

Answer: A

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57. If

$13\sin A = 12, \pi/2 < A < \pi$ and $3\sec B = 5, 3\frac{\pi}{2} < B < 2\pi$ then $5\tan A + 3\tan^2 8$

=

A. $20/3$

B. $-20/3$

C. $22/3$

D. $-22/3$

Answer: B

Watch Video Solution

58. $3\left[\sin^4(3\pi/2 - \alpha) + \sin^4(3\pi + \alpha)\right] - 2\left[\sin^6(\pi/2 + \alpha) + \sin^6(5\pi - \alpha)\right] =$

A. 0

B. 1

C. 3

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

Answer: B

Watch Video Solution

59. If $\sin(\alpha + \beta) = 1, \sin(\alpha - \beta) = 1/2$ then $\tan(\alpha + 2\beta)\tan(2\alpha + \beta)$=

A. 1

B. -1

C. 0

D. none

Answer: A

Watch Video Solution

60. $(\sin\theta + \operatorname{cosec}\theta)^2 + (\cos\theta + \sec\theta)^2 =$

A. $\tan^2\theta + \cot^2\theta + 7$

B. $\sin^2\theta + \cos^2\theta + 7$

C. $\sec^2\theta + \operatorname{cosec}^2\theta + 7$

D. $\cos^2\theta + \cot^2\theta + 7$

Answer: A

Watch Video Solution

61. $(\cos\theta + \sin\theta)^2 + (\cos\theta - \sin\theta)^2 =$

A. 0

B. 1

C. 2

D. $\sqrt{2}$

Answer: C

Watch Video Solution

62. $(\tan\alpha + \operatorname{cosec}\beta)^2 - (\cot\beta - \sec\alpha)^2 =$

A. $2\tan\alpha\cot\beta(\operatorname{cosec}\alpha + \sec\beta)$

B. $2\sec\alpha\operatorname{cosec}\beta(\cot\alpha + \tan\beta)$

C. $2\cot\alpha\tan\beta(\sec\alpha + \operatorname{cosec}\beta)$

D. $2\operatorname{cosec}\alpha\sec\beta(\tan\alpha + \cot\beta)$

Answer: A

Watch Video Solution

63. $(\sec\alpha \cdot \sec\beta + \tan\alpha\tan\beta)^2 - (\sec\alpha \cdot \tan\beta + \tan\alpha \cdot \sec\beta)^2 =$

A. 0

B. 1

C. -1

D. $\sqrt{2}$

Answer: B

Watch Video Solution

64. $(\sec A + \tan A - 1)(\sec A - \tan A + 1) =$

A. $2\sin A$

B. $2\cos A$

C. $2\sec A$

D. $2\tan A$

Answer: D

Watch Video Solution

65. $(\operatorname{cosec}\ \theta - \sin\theta)(\sec\theta - \cos\theta)(\tan\theta + \cot\theta) =$

A. $4\cos\theta\sin\theta$

B. $4\sec\theta\tan\theta$

C. $4\ \operatorname{cosec}\ \theta\cot\theta$

D. 1

Answer: D

Watch Video Solution

66. $2\left(\sin^6 x + \cos^6 x\right) - 3\left(\sin^4 x + \cos^4 x\right) + 1 =$

A. 0

B. -1

C. 1

D. 2

Answer: A

Watch Video Solution

67. $3(\sin x + \cos x)^4 + 6(\sin x - \cos x)^2 + 4\left(\sin^6 x + \cos^6 x\right) =$

A. 10

B. 11

C. 12

D. 13

Watch Video Solution

68. $\sin A(\cot A + 3(3\cot A + 1) - 1 \text{ cosec } A - 10\cos A =$

A. 0

B. 1

C. -1

D. $\sqrt{2}$

Answer: A

View Text Solution

69. $a\sin^2\theta + b\cos^2\theta = c \Rightarrow \tan^2\theta =$

A. $\dfrac{b - c}{a - c}$

B. $\dfrac{c - b}{a - c}$

C. $\dfrac{a - c}{b - c}$

D. $\dfrac{a - c}{c - b}$

Answer: B

Watch Video Solution

70. $\sec^4\theta\left(1 - \sin^4\theta\right) - \tan^2\theta =$

A. $\sin^2\theta$

B. $\tan^2\theta$

C. $\sec^2\theta$

D. $\cos^2\theta$

Answer: C

Watch Video Solution

71. $\operatorname{cosec}^2\theta \cdot \cot^2\theta - \sec^2\theta \cdot \tan^2\theta - \left(\cot^2\theta - \tan^2\theta\right)\left(\sec^2\theta \cdot \operatorname{cosec}^2\theta - 1\right) =$

A. 1

B. 0

C. 2

D. -1

Answer: B

Watch Video Solution

72. $\sec^2 A \tan^2 B - \tan^2 A \sec^2 B =$

A. $\tan^2 B - \tan^2 A$

B. $\sec^2 B - \sec^2 A$

C. $\tan^2 B - \sec^2 A$

D. $\sec^2 B - \tan^2 A$

Answer: A

Watch Video Solution

73. $2\sec^2\theta - \sec^4\theta - 2\text{cosec}^2\theta + \text{cosec}^4\theta =$

A. $\cot^4\theta - \tan^4\theta$

B. $\sec^4\theta - \text{cosec}^4\theta$

C. $\sin^4\theta - \cos^4\theta$

D. $\sec^4\theta - \cot^4\theta$

Answer: A

Watch Video Solution

74. $\sin^2\alpha \cdot \tan\alpha + \cos^2\alpha \cdot \cot\alpha + 2\sin\alpha\cos\alpha =$

A. $\tan\alpha + \cot\alpha$

B. $\sec\alpha + \text{cosec}\,\alpha$

C. $\sin\alpha + \cos\alpha$

D. $\tan\alpha + \sec\alpha$

Answer: A

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75. If $(\sin\alpha + \operatorname{cosec}\alpha)^2 + (\cos\alpha + \sec\alpha)^2 = k + \tan^2\alpha + \cot^2\alpha$ then k=

A. 9

B. 7

C. 5

D. 3

Answer: B

Watch Video Solution

76. $\sin^2 A\cos^2 B + \cos^2 A\sin^2 B + \sin^2 A\sin^2 B + \cos^2 A\cos^2 B =$

A. 0

B. 1

C. -1

D. 2

Answer: B

Watch Video Solution

77. If $\sin A$, $\cos A$ and $\tan A$ are in G.P. then $\cot^6 A - \cot^2 A =$

A. 0

B. -1

C. 1

D. 2

Answer: C

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78. $\dfrac{\sec\theta + \tan\theta - 1}{\tan\theta - \sec\theta + 1}$

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

B. $\tan\theta - \sec\theta$

C. $\sec\theta + \tan\theta$

D. 1

Answer: C

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79. $\dfrac{\cot\theta + \operatorname{cosec}\theta - 1}{\cot\theta - \operatorname{cosec}\theta + 1} =$

A. $\dfrac{1 + \cos\theta}{\sin\theta}$

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

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

D. $\dfrac{1 - \sin\theta}{\cos\theta}$

Answer: A

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80. $\cot^2\theta\left(\frac{\sec\theta - 1}{1 + \sin\theta}\right) + \sec^2\theta\left(\frac{\sin\theta - 1}{1 + \sec\theta}\right) =$

A. 0

B. 1

C. -4

D. 2

Answer: A

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81. $\frac{2\sin\theta \cdot \tan\theta(1 - \tan\theta) + 2\sin\theta\sec^2\theta}{(1 + \tan\theta)^2} =$

A. $\frac{2\sin\theta\cos\theta}{\cos\theta + \sin\theta}$

B. $\dfrac{2\sec\theta\ \operatorname{cosec}\ \theta}{\operatorname{cosec}\ \theta + \sec\theta}$

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

D. $\dfrac{2\cos\theta\cot\theta}{\cot\theta + \cos\theta}$

Answer: A

Watch Video Solution

82. $\left(\dfrac{1 + \sin\theta - \cos\theta}{1 + \sin\theta + \cos\theta}\right)^2 =$

A. $\dfrac{1 + \cos\theta}{1 - \cos\theta}$

B. $\dfrac{1 - \cos\theta}{1 + \cos\theta}$

C. $\dfrac{1 + \sin\theta}{1 - \sin\theta}$

D. $\dfrac{1 - \sin\theta}{1 + \sin\theta}$

Answer: B

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83. $\frac{1}{\sec\alpha - \tan\alpha} - \frac{1}{\cos\alpha} =$

A. $\frac{1}{\sin\alpha} - \frac{1}{\operatorname{cosec}\ \alpha + \cot\alpha}$

B. $\frac{1}{\cos\alpha} - \frac{1}{\sec\alpha + \tan\alpha}$

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

D. $\frac{1}{\cot\alpha} - \frac{1}{\sec\alpha + \sin\alpha}$

Answer: B

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84. $\frac{1}{\sec^4\alpha} + \frac{1}{\operatorname{cosec}^4\alpha} + \frac{2}{\sec^2\alpha + \operatorname{cosec}^2\alpha} =$

A. 0

B. 1

C. $\sin^2\alpha$

D. $\cos^2\alpha$

Answer: B

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85. $\dfrac{\cos A}{1+\sin A}+\dfrac{\cos A}{1-\sin A}=$

A. $2\sin A$

B. $2\cos A$

C. $2\sec A$

D. $2\tan A$

Answer: C

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86. $\dfrac{\tan\theta}{\sec\theta-1}-\dfrac{\tan\theta}{\sec\theta+1}=$

A. $2\sec\theta$

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

C. $2\tan\theta$

D. $2\cot\theta$

Answer: D

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

A. $\tan A + \cot A$

B. $\sec A + \text{ cosec } A$

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

D. $\sec A \text{ cosec } A + 1$

Answer: D

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88. $\frac{\cos\theta}{\sec\theta + \tan\theta} + \frac{\cos\theta}{\sec\theta - \tan\theta} =$

A. 0

B. $\sqrt{2}$

C. 1

D. 2

Answer: D

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89. $\frac{\tan A + \tan B}{\cot A + \cot B} + \frac{1 - \tan A \tan B}{1 - \cot A \cot B} =$

A. 0

B. $\sqrt{2}$

C. 1

D. 2

Answer: A

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90. $\frac{\sec\theta + \tan\theta}{\operatorname{cosec}\ \theta + \cot\theta} - \frac{\sec\theta - \tan\theta}{\operatorname{cosec}\theta - \cot\theta} =$

A. $2(\sec\theta - \operatorname{cosec}\ \theta)$

B. $2(\cos\theta - \tan\theta)$

C. $2(\sec\theta - \cot\theta)$

D. $2(\sin\theta - \cos\theta)$

Answer: A

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

A. $2\sin\theta$

B. $2\cos\theta$

C. $2\sec\theta$

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

Answer: D

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

A. $1 + \tan\theta \cdot \cot\theta$

B. $1 + \sin\theta \cdot \cos\theta$

C. $1 + \sec\theta \cdot \ \text{cosec} \ \theta$

D. $1 + \cos\theta \cdot \tan\theta$

Answer: B

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93. $\dfrac{\cos^3\theta}{1+\sin\theta}+\dfrac{\sin^3\theta}{1-\cos\theta}=$

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

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

C. $\cos\theta+\sec\theta$

D. $\cos\theta+\sin\theta$

Answer: 4

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94. $\dfrac{\tan^3\theta}{1+\tan^2\theta}+\dfrac{\cot^3\theta}{1+\cot^2\theta}=$

A. $\sec\theta\cdot\ \operatorname{cosec}\ \theta-2\tan\theta\cot\theta$

B. $\sec\theta\cdot\ \operatorname{cosec}\ \theta-2\sin\theta\cos\theta$

C. sin theta * cos theta - 2 sec theta " cosec " theta `

D. $\tan\theta\cdot\cot\theta-2\sec\theta\ \operatorname{cosec}\ \theta$

Answer: B

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95. $\dfrac{\cos^3 A + \sin^3 A}{\cos A + \sin A} + \dfrac{\cos^3 A - \sin^3 A}{\cos A - \sin A} =$

A. 0

B. -1

C. 1

D. 2

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96. $1 - \dfrac{\sin^2 y}{1 + \cos y} + \dfrac{1 + \cos y}{\sin y} - \dfrac{\sin y}{1 - \cos y} =$

A. 0

B. 1

C. cos y

D. sin y

Answer: C

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97. $\left(\dfrac{\sqrt{3}+2\cos A}{1-2\sin A}\right)^{-3}+\left(\dfrac{1+2\sin A}{\sqrt{3}-2\cos A}\right)^{-3}=$

A. 1

B. $\sqrt{3}$

C. 0

D. -1

Answer: C

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98. $\sin^4\theta + 2\sin^2\theta\left(1 - \frac{1}{\operatorname{cosec}^2\theta}\right) + \cos^4\theta =$

A. 0

B. $\sqrt{2}$

C. 1

D. 2

Answer: C

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99. If $\operatorname{cosec}\theta + \cot\theta = -3/2$, then $\operatorname{cosec}\theta =$

A. 0

B. $13/12$

C. 1

D. $-13/12$

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100. If $\operatorname{cosec} \theta - \cot\theta = 1/3$ then θ lies in the quadrant

A. I

B. II

C. III

D. IV

Answer: A

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101. If $\sec\theta - \tan\theta = 4/3$, then $\sin\theta =$

A. $7/5$

B. $-7/25$

C. $6/25$

D. none

Answer: B

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102. If $\cos\theta - \sin\theta = \sqrt{2}\sin\theta$ then $\cos\theta + \sin\theta =$

A. 0

B. $\pm\sqrt{2}\cos\theta$

C. $\pm\sqrt{2}\sin\theta$

D. 1

Answer: B

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103. $\cos\theta - 4\sin\theta = 1 \Rightarrow \sin\theta + 4\cos\theta =$

A. ± 1

B. 0

C. ± 2

D. ± 4

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104. If $\tan\theta + \cot\theta = 2, \ \text{then} \ \sin\theta =$

A. $\pm 1/2$

B. $1/\sqrt{2}$

C. $\pm 1/3$

D. none

Answer: B

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105. If $\sec\theta + \tan\theta = p(p \neq 0)$, then $\sin\theta =$

A. $\dfrac{p^2 + 1}{p^2 - 1}$

B. $\dfrac{p^2 - 1}{p^2 + 1}$

C. $\dfrac{p + 1}{p - 1}$

D. $\dfrac{p - 1}{p + 1}$

Answer: B

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106. If $a = \sin\theta + \cos\theta, b = \sin^3\theta + \cos^3\theta$, then

A. $a^3 - 3a + 2b = 0$

B. $a^3 + 3a + 2b = 0$

C. $a^3 - 3a - 2b \equiv 0$

D. $a^3 + 3a - 2b = 0$

Answer: A

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107. $\sin\theta + \cos\theta = p, \sin^3\theta + \cos^3\theta = q \Rightarrow p\left(p^2 - 3\right) =$

A. q

B. 2q

C. $-q$

D. $-2q$

Answer: D

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108. If $\sin\theta + \cos\theta = a$ then $\sin^4\theta + \cos^4\theta =$

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

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

C. $1 + \frac{1}{2}\left(a^2 + 1\right)^2$

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

Answer: B

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109. If $a\cos\theta + b\sin\theta = c$ then $(a\sin\theta - b\cos\theta)^2 =$

A. $c^2 - a^2 - b^2$

B. $c^2 - a^2 + b^2$

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

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

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110. If $x = a(\text{ cosec } \alpha + \cot\alpha)$ and $y = \dfrac{b(1 - \cos\alpha)}{\sin\alpha}$, then

A. $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$

B. $\dfrac{x^2}{a} + \dfrac{y^2}{b} = 1$

C. $xy = ab$

D. $x^2y^2 = ab$

Answer: C

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111. If $\sec\theta + \cos\theta = 1, \text{ then } \sec^3\theta + \cos^3\theta =$

A. 2

B. -2

C. 3

D. -3

Answer: B

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112. If $\sin\alpha + \text{cosec}\alpha = 2$, find value of $\sin^n\alpha + \text{cosec}^n\alpha, n \in Z$.

A. 3

B. 2

C. 1

D. 0

Answer: B

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113. If $\tan^2\theta = \left(1 - e^2\right)$ show that $\sec\theta + \tan^3 . \operatorname{cosec}\theta = \left(2 - e^2\right)^{3/2}$.

A. $\left(2 + e^2\right)^{3/2}$

B. $\left(1 + e^2\right)^{3/2}$

C. $\left(2 - e^2\right)^{3/2}$

D. $(1 - e)^{3/2}$

Answer: C

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114. If $\sin\theta + \sin^2\theta = 1, \ \text{then} \ \cos^2\theta + \cos^4\theta =$

A. 0

B. $\sqrt{2}$

C. 1

D. 2

Answer: C

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

A. 0

B. -1

C. 1

D. 2

Answer: C

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116. If $\cos x + \cos^2 x = 1$, then $\sin^{12} x + 3\sin^{10} x + 3\sin^8 x + \sin^6 x =$

A. 0

B. $\sqrt{2}$

C. 1

D. 2

Answer: C

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117. If $\cos\alpha + \cos\beta + \cos\gamma = 3$, then $\sin\alpha + \sin\beta + \sin\gamma =$

A. 3

B. 2

C. 1

D. 0

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118. 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

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119. If $\sin\theta, \cos\theta$ are ther roots of the equation $ax^2 - bx + c = 0$, then the relation among a,b,c is

A. $a^2 - b^2 + 2ac = 0$

B. $a^2 + b^2 - 2ac = 0$

C. $a^2 - b^2 - 2ac = 0$

D. $a^2 + b^2 + 2ac = 0$

Answer: A

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120. If

$k = (1 + \sin A)(1 + \sin B)(1 + \sin C) = (1 - \sin A)(1 - \sin B)(1 - \sin C)$ then $k =$

A. $\pm \sin A \sin B \sin C$

B. $\pm \cos A \cos B \cos C$

C. 1

D. 0

Answer: B

Watch Video Solution

121. If

$k = (\sec A + \tan A)(\sec B + \tan B)\sec C + \tan C) = (\sec A - \tan A)(\sec B - \tan B)(\sec C - \text{ta}$

A. 0

B. ± 1

C. ± 3

D. ± 4

Answer: B

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122. If $\sec\theta = a + \frac{1}{4a}$ then $\sec\theta + \tan\theta =$

A. a

B. 2a

C. 3a

D. 4a

Answer: B

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123. If $\operatorname{cosec}\theta = p + \frac{1}{4p}$, then $\operatorname{cosec}\theta + \cot\theta =$

A. 2p

B. 3p

C. 4p

D. 5p

Answer: A

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124. If $\operatorname{cosec}^2\theta = \frac{4xy}{(x+y)^2}$, then

A. x=y

B. x=-y

C. y=1/x

D. none

Answer: A

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125. If $a\sin x = b\cos x = \dfrac{2c\tan x}{1 - \tan^2 x}$ then $\dfrac{\left(a^2 - b^2\right)^2}{a^2 + b^2} =$

A. c^2

B. $2c^2$

C. $3c^2$

D. $4c^2$

Watch Video Solution

126. If $\dfrac{2\sin\theta}{1 + \cos\theta + \sin\theta} = x$, find the value of $\dfrac{1 - \cos\theta + \sin\theta}{1 + \sin\theta}$

A. x

B. $-x$

C. 1/x

D. 1+x

Answer: A

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127. $\sqrt{1 - \sin^2 100^\circ} \cdot \sec 100^\circ =$

A. 0

B. -1

C. 1

D. 2

Answer: C

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128. $\sqrt{\dfrac{1 + \sin A}{1 - \sin A}} =$

A. $\pm(\sin A + \tan A)$

B. $\pm(\sec A + \tan A)$

C. $\pm(\operatorname{cosec} A - \cot A)$

D. $\pm(\sin A - \cot A)$

Answer: B

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129. If $\sqrt{\dfrac{1 + \cos\theta}{1 - \cos\theta}} = \operatorname{cosec}\ \theta + \cot\theta$ then θ lies in the quadrants

A. I,II

B. II,III

C. I,III

D. I,IV

Answer: A

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130. If $x = a\cos^3\theta, y = a\sin^3\theta$ then

A. $x^{2/3} + y^{2/3} = a^{2/3}$

B. $x^2 + y^2 = a^2$

C. $x^{3/2} + y^{3/2} = a^{3/2}$

D. $y^2 = 4ax$

Answer: A

Watch Video Solution

131. If $x = a\cos^4\theta, y = b\sin^4\theta$, then $\sqrt{x/a} + \sqrt{y/b} =$

A. 0

B. -1

C. 1

D. 2

Answer: C

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132. If $x\cos\theta + y\sin\theta = a, x\sin\theta - y\cos\theta = b$ then

A. $a^2 + b^2 = x^2 + y^2$

B. $x^2/a^2 + y^2/b^2 = 2$

C. xy=ab

D. none

Answer: A

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133. If $\sin\theta + \cos\theta = m$ and $\sec\theta + \operatorname{cosec}\theta = n$ then

A. $n\left(m^2 - 1\right) = 2m$

B. $n\left(m^2 + 1\right) = 2m$

C. $2n\left(m^2 + 1\right) = m$

D. $n\left(m^2 - 1\right) = m$

Answer: A

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134. If $\frac{x}{a}\cos\theta + \frac{y}{b}\sin\theta = 1, \frac{x}{a}\sin\theta - \frac{y}{b}\cos\theta = 1$ then

A. $a^2 + b^2 = x^2 + y^2$

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

C. xy=ab

D. none

Answer: B

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135. If $x = a(\text{cosec}\theta + \cot\theta)$, $y = b(\text{ cosec } \theta - \cot\theta)$, then

A. $x + y = ab$

B. $x - y = ab$

C. $xy = ab$

D. xy=0

Answer: C

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136. If $x\sec\theta + y\tan\theta = a$, $x\tan\theta + y\sec\theta = b$ then $a^2 - b^2 =$

A. $x^2 + y^2$

B. $x^2 - y^2$

C. $x + y$

D. $x - y$

Answer: B

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137. By eleminating θ from the equation $a_1 \text{cosec } \theta + b_1 \cot\theta + c_1 = 0$ and $a(2)$ cosec $\theta + b(2)\cot\theta + c(2) = 0$ then $\left(b_1 c_2\right.$

A. $\left(a_1 b_1 - a_2 b_2\right)^2$

B. $\left(a_1 b_1 + a_2 b_2\right)^2$

C. $\left(a_1 b_2 - a_2 b_1\right)^2$

D. $\left(a_1 b_2 + a_2 b_1\right)^2$

Answer: C

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138. If $x = a(\sec\theta + \tan\theta)^2, y = b(\sec\theta - \tan\theta)^2$ then $x^2y^2 =$

A. $ab\sec\theta$

B. $a^2b^2\tan\theta$

C. a^2b^4

D. a^2b^2

Answer: D

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139. If $\tan\theta + \sin\theta = m, \tan\theta - \sin\theta = n$ then $\left(m^2 - n^2\right)^2 =$

A. 16mn

B. 4mn

C. 32mn

D. 8mn

Answer: A

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140. If $x = \cot\theta + \cos\theta, y = \cot\theta - \cos\theta,$ then $\left(x^2 - y^2\right)^2 =$

A. 16xy

B. 4xy

C. 8xy

D. 32xy

Answer: A

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141. If $\cot\theta + \tan\theta = m, \sec\theta - \cos\theta = n$ then $\left(m^2n\right)^{2/3} - \left(mn^2\right)^{2/3}$

A. 0

B. 1

C. -1

D. 2

Answer: B

Watch Video Solution

142. If $\text{cosec }\theta - \sin\theta = m, \sec\theta - \cos\theta = n,$ then $\left(m^2n\right)^{2/3} + \left(mn^2\right)^{2/3}$ =

A. 0

B. 1

C. 2

D. -1

Answer: B

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143. If $a = x\cos^2\alpha + y\sin^2\alpha$ then $(x - a)(y - a) + (x - y)^2\sin^2\alpha\cos^2\alpha =$

A. 0

B. 1

C. - 1

D. 2

Answer: A

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144. If $x = a\cos^2\theta\sin\theta$ and $y = a\sin^2\theta\cos\theta$, then $\dfrac{\left(x^2 + y^2\right)^3}{x^2y^2} =$

A. a

B. a^3

C. a^2

D. none

Answer: C

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145. If $x = r\cos\theta\cos\phi$, $y = r\cos\theta\sin\phi$ and $z = r\sin\theta$, then $x^2 + y^2 + z^2 =$

A. 1

B. r^2

C. r^4

D. none

Answer: B

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146. If

$x = r\cos\alpha\cos\beta\cos\gamma, y = \cos\alpha\cos\beta\sin\gamma, z = r\sin\alpha\cos\beta, \mu = r\sin\beta$ then $x^2 + y^2 + z^2 +$

A. 1

B. 0

C. r

D. r^2

Answer: D

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147. Let $f_k(x) = \frac{1}{k}\left(\sin^k x + \cos^k x\right)$ where $x \in R$ 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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EXERCISE 1 B (COMPOUNDS ANGLES)

1. $\cos(\theta + \alpha) \cdot \cos(\theta - \alpha) + \sin(\theta + \alpha) \cdot \sin(\theta - \alpha) =$

A. $\cos 2\alpha$

B. $\sin 2\alpha$

C. $\cot 2\alpha$

D. $\tan 2\alpha$

Answer: A

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2. $\cos(n+1)\alpha \cdot \cos(n-1)\alpha + \sin(n+1)\alpha \cdot \sin(n-1)\alpha =$

A. $\cos 2n\alpha$

B. $\sin 2n\alpha$

C. $\cos 2\alpha$

D. $\sin 2\alpha$

Answer: C

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3. $\cos\left(\frac{\pi}{4}+A\right)\cos\left(\frac{\pi}{4}-B\right)+\sin\left(\frac{\pi}{4}+A\right)\cdot\sin\left(\frac{\pi}{4}-B\right)=$

A. $\cos(A+B)$

B. $\cos(A-B)$

C. $\sin(A+B)$

D. $\sin(A-B)$

Answer: A

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4. $\sec 255^{\circ} =$

A. $\sqrt{6} - \sqrt{2}$

B. $-\sqrt{6} + \sqrt{2}$

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

D. $-\sqrt{6} - \sqrt{2}$

Answer: D

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5. $\cos 15^{\circ} - \cos 75^{\circ} =$

A. $\sqrt{3/2}$

B. $\sqrt{3}/2$

C. $1/2$

D. $1/\sqrt{2}$

Answer: D

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6. $\tan 15^\circ + \tan 75^\circ =$

A. 1

B. 2

C. 3

D. 4

Answer: D

Watch Video Solution

7. $\tan 75^\circ - \cot 75^\circ =$

A. $2\sqrt{3}$

B. $3\sqrt{2}$

C. 3

D. 1

Answer: A

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8. $\mathrm{cosec}\,15^\circ + \sec 15^\circ =$

A. $2\sqrt{2}$

B. $\sqrt{6}$

C. $2\sqrt{6}$

D. $\sqrt{6} + \sqrt{2}$

Answer: C

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9. $\tan 70^{\circ} - \tan 20^{\circ} =$

A. $\tan 50^{\circ}$

B. $2\tan 50^{\circ}$

C. $\tan 60^{\circ}$

D. $2\tan 60^{\circ}$

Answer: B

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10. $\cos^2 45^{\circ} - \sin^2 15^{\circ} =$

A. 0

B. $1/\sqrt{2}$

C. $\sqrt{3}/2$

D. $\sqrt{3}/4$

Answer: D

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11. Find the value of $\cos^2 52\frac{1}{2}^\circ - \sin^2 22\frac{1}{2}^\circ$

A. $\dfrac{\sqrt{3}+1}{4\sqrt{2}}$

B. $\dfrac{\sqrt{3}-1}{4\sqrt{2}}$

C. $\dfrac{3+\sqrt{3}}{4\sqrt{2}}$

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

Answer: A

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12. $\cos^2\left(\frac{\pi}{4}+x\right)-\sin^2\left(\frac{\pi}{4}-x\right)=$

A. 0

B. -1

C. 1

D. 2

Answer: A

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13. $\cos^2\left(\frac{\pi}{6}+\theta\right)-\sin^2\left(\frac{\pi}{6}-\theta\right)=$

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

B. 0

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

D. -1

Answer: A

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14. The value of $\dfrac{\sin\theta}{\sin^2(\pi/8+\theta/2)-\sin^2(\pi/8-\theta/2)}=$

A. 2

B. $1/2$

C. $\sqrt{2}$

D. none

Answer: C

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15. $\sum \dfrac{\sin(A-B)}{\cos A\cos B}=$

A. 0

B. 1

C. 2

D. $1/2$

Answer: A

Watch Video Solution

16. $\sum \dfrac{\sin(A+B)\sin(A-B)}{\sin^2 A \sin^2 B} =$

A. 0

B. 1

C. 2

D. $1/2$

Answer: A

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17. Evaluate $\sum \frac{\sin(A+B)\sin(A-B)}{\cos^2 A\cos^2 B}$: if non of $\cos A$, $\cos B$, $\cos C$ is zero.

A. 0

B. 1

C. 2

D. $1/2$

Answer: A

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18. $\cos\alpha \cdot \sin(\beta - \gamma) + \cos\beta \cdot \sin(\gamma - \alpha) + \cos\gamma \cdot \sin(\alpha - \beta) =$

A. 0

B. $1/2$

C. 1

D. $4\cos\alpha\cos\beta\cos\gamma$

Answer: A

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19. Find $\tan 20^\circ + \tan 40^\circ + \sqrt{3}\tan 20^\circ \tan 40^\circ$.

A. 1

B. $1/\sqrt{3}$

C. $\sqrt{3}$

D. 0

Answer: C

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20. $\tan 75^\circ - \tan 30^\circ - \tan 75^\circ \cdot \tan 30^{\cdot}(\circ) =$

A. 1

B. $1/\sqrt{3}$

C. $\sqrt{3}$

D. 0

Answer: A

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21. The value of $\dfrac{\tan 80^\circ - \tan 10^\circ}{\tan 70^\circ}$

A. 0

B. 1

C. 2

D. 3

Answer: C

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22. If $\tan 69^\circ + \tan 66^\circ - \tan 69^\circ \tan 66^\circ = 2k$, then the value of k is

A. -1

B. $1/2$

C. $-1/2$

D. none

Answer: C

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23. $\tan A \cot(A/2) - 1 =$

A. cos A

B. sin A

C. sec A

D. cosec A

Answer: C

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24. $\tan 5x - \tan 3x - \tan 2x =$

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

B. $\sin 5x \sin 3x \sin 2x$

C. $\cos 5x \cos 3x \cos 2x$

D. none

Answer: A

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25. $\cos^2(A - B) + \cos^2 B - 2\cos(A - B)\cos A \cos B =$

A. $\sin^2 A$

B. $\sin^2 B$

C. $\cos^2 A$

D. $\cos^2 B$

Answer: A

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26. Prove that $\sin^2\alpha + \cos^2(\alpha + \beta) + 2\sin\alpha\sin\beta\cos(\alpha + \beta)$ is independent of α

.

A. $\sin^2\alpha$

B. $\sin^2\beta$

C. $\cos^2\alpha$

D. $\cos^2\beta$

Answer: D

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27. $\dfrac{\cos 15^\circ + \sin 15^\circ}{\cos 15^\circ - \sin 15^\circ} =$

A. 1

B. $\sqrt{3}$

C. $1/\sqrt{3}$

D. $2+\sqrt{3}$

Answer: B

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28. $\dfrac{\tan\left(45^\circ + \alpha\right) + \tan\left(45^\circ - \alpha\right)}{\cot\left(45^\circ + \alpha\right) + \cot\left(45^\circ - \alpha\right)} =$

A. 1

B. 2

C. 3

D. 4

Answer: A

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29. $\dfrac{\tan 23^\circ + \tan 22^\circ}{1 - \tan 23^\circ \cdot \tan 22^\circ} =$

A. 2

B. -1

C. 1

D. 0

Answer: C

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30. If $\dfrac{1 - \tan 2^\circ \cot 62^\circ}{\tan 152^\circ - \cot 88^\circ} = k\sqrt{3}$, then value of k is

A. 1

B. -1

C. 1/2

D. -1/2

Answer: B

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31. $\dfrac{\left(1 + \tan 32^\circ\right)\left(1 + \tan 13^\circ\right)}{\left(1 + \tan 23^\circ\right)\left(1 + \tan 22^\circ\right)} =$

A. 1

B. 2

C. 3

D. 4

Answer: A

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32. The value of $\dfrac{\tan 80^\circ - \tan 10^\circ}{\tan 70^\circ}$

A. 2

B. -2

C. 4

D. -4

Answer: A

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33. $\dfrac{\tan\alpha + \tan\beta}{\tan(\alpha + \beta)} + \dfrac{\tan\alpha - \tan\beta}{\tan(\alpha - \beta)} =$

A. 0

B. 1

C. 2

D. $1/2$

Answer: C

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34. If $\sin(\theta + \alpha) = \cos(\theta + \alpha)$, then $\tan\theta =$

A. $\dfrac{1 + \tan\alpha}{1 - \tan\alpha}$

B. $\dfrac{1 - \tan\alpha}{1 + \tan\alpha}$

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

D. $\dfrac{\tan\alpha}{1 - \tan\alpha}$

Answer: B

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35. If $\tan(A+B)=m, \tan(A-B)=n, \text{ then } \tan 2A=$

A. $\dfrac{m+n}{1-mn}$

B. $\dfrac{m-n}{1-mn}$

C. $\dfrac{m+n}{1+mn}$

D. $\dfrac{m-n}{1+mn}$

Answer: A

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36. If $\tan(A+B)=p, \tan(A-B)=q, \text{ then } \cot 2B=$

A. $\dfrac{1+pq}{p-q}$

B. $\dfrac{1+pq}{p+q}$

C. $\dfrac{1-pq}{p-q}$

D. $\dfrac{1 - pq}{p + q}$

Answer: A

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37. If $\tan\theta_1 = k\cot\theta_2$ then $\dfrac{\cos(\theta_1 - \theta_2)}{\cos(\theta_1 + \theta_2)} =$

A. $\dfrac{1 + k}{1 - k}$

B. $\dfrac{1 - k}{1 + k}$

C. $\dfrac{k + 1}{k - 1}$

D. $\dfrac{k - 1}{k + 1}$

Answer: A

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38. If $\tan A = 18/17, \tan B = 1/35 then \tan(A - B) =$

A. 0

B. 1

C. -1

D. 2

Answer: B

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39. If $\tan(\pi/4 + \theta) + \tan(\pi/4 - \theta) = 3, \text{ then } \tan^2(\pi/4 + \theta) + \tan^2(\pi/4 - \theta) =$

A. 6

B. 4

C. 7

D. 5

Answer: C

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40. If $\tan\left[\frac{\pi}{4} + \theta\right] + \tan\left[\frac{\pi}{4} - \theta\right] = a$ then $\tan^3\left[\frac{\pi}{4} + \theta\right] + \tan^3\left[\frac{\pi}{4} - \theta\right] =$

A. 0

B. a

C. $3a$

D. $a^3 - 3a$

Answer: D

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41. If $\cos\alpha + \cos\beta = 0 = \sin\alpha + \sin\beta$ then $\cos(\alpha - \beta) =$

A. 0

B. 1

C. -1

D. 2

Answer: C

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42. If $\tan\theta = \dfrac{\cos 12^\circ + \sin 12^\circ}{\cos 12^\circ - \sin 12^\circ}$ then $\theta =$

A. 54°

B. 57°

C. 60°

D. 19°

Answer: B

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43. If $\tan 20^\circ = p$, then $\dfrac{\tan 160^\circ - \tan 110^\circ}{1 + \tan 160^\circ \tan 110^\circ} =$

A. $\dfrac{2p}{1 + p^2}$

B. $\dfrac{1 - p^2}{2p}$

C. $\dfrac{1 - p^2}{1 + p^2}$

D. $\dfrac{2p}{1 - p^2}$

Answer: B

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44. If $0 < \theta < \pi/2$ and $2\sin\theta = \sqrt{3}\cos 10^\circ + \sin 10^\circ$, then $\theta =$

A. 70°

B. 50°

C. 60°

D. none

Answer: A

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45. If $A + B = \pi/2$ then $\tan B + 2\tan(A - B) =$

A. sin A

B. cos A

C. tan A

D. cot A

Answer: C

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46. If $A + B = 135^\circ$ then $(1 + \cot A)(1 + \cot B) =$

A. 0

B. 1

C. -1

D. 2

Answer: D

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47. If $A+B=45^\circ$, then prove that $(i)(1+\tan A)(1+\tan B)=2(ii)(\cot A-1)(\cot B-1)=2$

A. 0

B. 1

C. -1

D. 2

Answer: D

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48. If $A + B = 225^{\circ}$ than prove that $\frac{\cot A}{1 + \cot A} \cdot \frac{\cot B}{1 + \cot B} = \frac{1}{2}$

A. 0

B. $1/2$

C. $1/4$

D. $3/4$

Answer: B

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49. If $\alpha + \beta = 3\pi/4$ then $(1 - \tan\alpha)(1 - \tan\beta) =$

A. 0

B. 1

C. -1

D. 2

Answer: D

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50. If A, B are acute angles, sin A =4/5 , tan B=5/12 , then sin (A+B)=

A. $\frac{63}{65}$

B. $\frac{65}{56}$

C. $\frac{65}{63}$

D. $\frac{56}{65}$

Answer: A

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51. If A,B are acute angle , sin 4/5 , tan B=5/12 , then cos (A-B)=

A. $\frac{63}{65}$

B. $\frac{65}{56}$

C. $\frac{65}{63}$

D. $\frac{56}{65}$

Answer: D

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52. If A,B are acute angle, tan A=5/12 , cos B=3/5 , then cos (A+B)=

A. $\frac{16}{65}$

B. $\frac{65}{16}$

C. $\frac{65}{63}$

D. $\frac{56}{65}$

Answer: A

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53. If A,B are acute angle , $\tan A = \frac{n}{n+1}, \tan B = \frac{1}{2n+1},$ then $A + B =$

A. $\pi/2$

B. $\pi/3$

C. $\pi/4$

D. $\pi/5$

Answer: C

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54. If $\sin A = 1/\sqrt{10}, \sin B = 1/\sqrt{5}$ where A and B are positive and acute , then A +B=

A. $\pi/2$

B. $\pi/4$

C. $\pi/3$

D. none

Answer: B

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55. If A,B,C are acute angles , $\tan A=\frac{1}{2}, \tan B=1/5, \tan C=1/8, \text{ then } A+B+C=$

A. $\pi/2$

B. $\pi/3$

C. $\pi/4$

D. $\pi/5$

Answer: C

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56. If B,A+B are acute angle , sin(A+B)=12/13, sin B=5/13 then sin A =

A. $\frac{119}{169}$

B. $-\frac{119}{169}$

C. $\frac{169}{119}$

D. $-\frac{169}{119}$

Answer: A

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57. If

$\cos A = -3/5, \sin B = 7/25$ and $90^\circ < A < 180^\circ, 0^\circ < B < 90^\circ$, then $\tan(A + B$

A. $3/4$

B. $-3/4$

C. $3/5$

D. $-3/5$

Answer: B

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58. If

$270^\circ < A < 360^\circ, 90^\circ < B < 180^\circ, \cos A = 5/13, \tan B = -15/8$ then $\cos(A +$

A. $\frac{140}{221}$

B. $\frac{171}{221}$

C. $\frac{140}{171}$

D. $\frac{221}{171}$

Answer: B

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59. If

$270^\circ < A < 360^\circ, 90^\circ < B < 180^\circ, \cos A = 5/13, \tan B = -15/8$ then $\cos(A +$

A. $\frac{140}{221}$

B. $\frac{171}{221}$

C. $\frac{140}{171}$

D. $\frac{221}{171}$

Answer: A

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60. If $\cos\alpha = -12/13, \cot\beta = 24/7, 90^\circ < \alpha < 180^\circ$ and $180^\circ < \beta < 270^\circ$, then the quadrant in which $\alpha + \beta$ lies

A. I

B. II

C. III

D. IV

Answer: B

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61. If $0 < \alpha, \beta < \pi/4$, $\cos(\alpha + \beta) = 4/5$, $\sin(\alpha - \beta) = 5/13$ then $\tan 2\alpha =$

A. $33/56$

B. $56/33$

C. $16/63$

D. none

Answer: B

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62. If $\tan(\pi\cos\theta) = \cot(\pi\sin\theta)$, then prove that $\cos\left(\theta - \frac{\pi}{4}\right) = \pm\frac{1}{2\sqrt{2}}$

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

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

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

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

Answer: A

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63. If $\tan(A - B) = 7/24, \tan A = 4/3$ where A,B are acute , then $A + B =$

A. $\pi/2$

B. $\pi/3$

C. $\pi/4$

D. $\pi/5$

Answer: A

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64. If $\cos(A - B) = 3/5$ and $\tan A \tan B = 2$, then which one of the following is true ?

A. $\sin(A + B) = 1/5$

B. $\sin(A + B) = -1/5$

C. $\cos(A - B) = 1/5$

D. $\cos(A + B) = -1/5$

Answer: D

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65. If $\cot\theta = 8/15$ and θ does not lie in the first quadrant , then $\cos\left(30^\circ + \theta\right) + \sin\left(45^\circ - \theta\right) + \cos\left(120^\circ + \theta\right) =$

A. $\frac{1}{34}\left(23 + 7\sqrt{3} + 7\sqrt{2}\right)$

B. $\frac{1}{34}\left(23 + 7\sqrt{3} - 7\sqrt{2}\right)$

C. $\frac{1}{34}\left(23 - 7\sqrt{2} + 7\sqrt{3}\right)$

D. $\frac{1}{34}\left(23 - 7\sqrt{3} - 7\sqrt{2}\right)$

Answer: A

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66. If $2\tan A + \cot A = \tan B$, then $\cot A + 2\tan(A - B) =$

A. -1

B. 1

C. 0

D. $1/2$

Answer: C

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67. If $\tan\beta = \frac{n\tan\alpha}{1 + (1 - n)\tan^2\alpha}$, then $\tan(\alpha - \beta) =$

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

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

C. $-(1 + n)\tan\alpha$

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

Answer: B

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68. If $x = \tan A - \tan B, y = \cot B - \cot A$ then $\frac{1}{x} + \frac{1}{y} =$

A. $\cot(A - B)$

B. $\cot(B - A)$

C. $\tan(A - B)$

D. $\tan(B - A)$

Answer: A

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

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

B. $\sin(\alpha + \beta) = -p$

C. $\tan(\alpha + \beta) = p/(q - 1)$

D. none

Answer: C

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70. If an angle α is divided into two parts A and B such that A-B=x and tan A: tan B=k:1 , then the value of sin x is

A. $\dfrac{k+1}{k-1}\sin\alpha$

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

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

D. none

Answer: C

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71. In a ΔPQR , if 3 sin P+4 cos Q=6 and 4 sin Q+3 cos P=1 , then the angle R is equal to

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

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

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

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

Answer: D

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72. If $\tan\beta = 2\sin\alpha\sin\gamma \ \text{cosec} \ (\alpha + \gamma)$, then $\cot\alpha, \cot\beta$ and $\cot\gamma$ are in

A. A.P.

B. G.P.

C. H.P.

D. none

Answer: A

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73. $\cos\theta + \cos\left(120^\circ + \theta\right) + \cos\left(120^\circ - \theta\right) =$

A. 0

B. 1

C. $1/4$

D. $3/4$

Answer: A

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74. $\cos\theta + \cos\left(240^{\circ} + \theta\right) + \cos\left(240^{\circ} - \theta\right) =$

A. 0

B. 1

C. $1/4$

D. 3//4`

Answer: A

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75. $\sin\theta + \sin\left(120^{\circ} + \theta\right) + \sin\left(\theta - 120^{\circ}\right) =$

A. 0

B. 1

C. $1/4$

D. $3/4$

Answer: A

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76. $\cos\theta - \cos\left(60^{\circ} + \theta\right) - \cos\left(60^{\circ} - \theta\right) =$

A. 0

B. 1

C. $1/4$

D. $3/4$

Answer: A

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77. $\cos 20^\circ + \cos 100^\circ + \cos 140^\circ =$

A. -1

B. 1

C. 0

D. 1/2

Answer: C

Watch Video Solution

78. $\sin 40^\circ - \sin 80^\circ + \sin 160^\circ =$

A. 0

B. -1

C. 1

D. 1/2

Answer: A

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79. If A+B+C=0 , then tan A+ tan B+ tan C=

A. sin A sin B sin C

B. cos A cos B cos C

C. tan A tan B tan C

D. cot A cot B cot C

Answer: C

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80. If A+B+C=0 , then cot A cotB + cot B cot C+ cot C cot A =

A. 0

B. 1

C. -1

D. 2

Answer: B

Watch Video Solution

81. If A+C=B then $\tan A \cdot \tan B \cdot \tan C =$

A. tan A + tan B + tan C

B. tan B- tan C- tan A

C. tan A + tan B-tan C

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

Answer: B

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82. If $A+B+C=\pi/2$, then tanA tanB + tanB tanC+ tan A tan C=

A. 1

B. -1

C. 0

D. 2

Answer: A

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83. If $A=35^{\circ}, B=15^{\circ}$ and $C=40^{\circ}$, then $\tan A \cdot \tan B+\tan B \cdot \tan C+\tan C \cdot \tan A=$

A. 0

B. 1

C. 2

D. 3

Answer: B

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84. If ABC are angle of a triangle then prove that $\cot A \cot B + \cot B \cot C + \cot C \operatorname{cost} A = 1$

A. -1

B. 0

C. 1

D. 2

Answer: C

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85. If $A + B + C = \pi/2$, then $\tan 2A + \tan 2B + \tan 2C =$

A. $\sin 2A \cdot \sin 2B \cdot \sin 2C$

B. $\cos 2A \cdot \cos 2B \cdot \cos 2C$

C. $\tan 2A \cdot \tan 2B \cdot \tan 2C$

D. $\cot 2A \cdot \cot 2B \cdot \cot 2C$

Answer: C

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86. If $A + B + C = \pi/2$ then show that $\cot A + \cot B + \cot C = \cot A \cot B \cot C$

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

B. $\cos A \cos B \cos C$

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

D. $\cot A \cot B \cot C$

Answer: D

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87. If $A+B+C=\pi/2$ then show that $\cot A+\cot B+\cot C=\cot A\cot B\cot C$

A. 1

B. -1

C. 0

D. 2

Answer: A

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88. If $A+B+C=\frac{\pi}{2}, \text{ then } \sum \frac{\cos(B+C)}{\cos B\cos C}=$

A. 1

B. 2

C. 3

D. 4

Answer: B

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89. In ΔABC, $\cos A + \cos(B - C) =$

A. $2\sin B\sin C$

B. $\cos B\sin C$

C. $2\sin B\cos C$

D. $2\cos B\cos C$

Answer: A

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90. In ΔABC, $\sin A + \sin(B - C) =$

A. $2\sin B \sin C$

B. $2\cos B \sin c$

C. $2\sin B \cos C$

D. $2\cos B \cos C$

Answer: C

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91. In $\Delta ABC, \quad \text{if} \quad \tan A + \tan B + \tan C = 3\sqrt{3}$, then the triangle is

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

B. $\cos A \cos B \cos C$

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

D. $\cot A \cot B \cot C$

Answer: C

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92. In ΔABC, $\tan 2A + \tan 2B + \tan 2C =$

A. $\sin 2A \cdot \sin 2B \cdot \sin 2C$

B. $\cos 2A \cdot \cos 2B \cdot \cos C$

C. $\tan 2A \cdot \tan 2B \cdot \tan 2C$

D. $\cot 2A \cdot \cot 2B \cdot \cot 2C$

Answer: C

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93. If ABC are angle of a triangle then prove that $\cot A \cot B + \cot B \cot C + \cot C \operatorname{cost} A = 1$

A. 0

B. 1

C. -1

D. 2

Answer: B

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94. In $\Delta ABC, \tan\frac{A}{2}\cdot\tan\frac{B}{2}+\tan\frac{B}{2}\cdot\tan\frac{C}{2}+\tan\frac{C}{2}\cdot\tan\frac{A}{2}=$

A. 0

B. 1

C. -1

D. 2

Answer: B

Watch Video Solution

95. In $\Delta ABC, \cot\frac{A}{2}+\cot\frac{B}{2}+\cot\frac{C}{2}=$

A. $\sin\frac{A}{2}\cdot\sin\frac{B}{2}\sin\frac{C}{2}$

B. $\cos\frac{A}{2}\cdot\cos\frac{B}{2}\cos\frac{C}{2}$

C. $\tan\frac{A}{2}\cdot\tan\frac{B}{2}\tan\frac{C}{2}$

D. $\cot\frac{A}{2}\cdot\cot\frac{B}{2}\cot\frac{C}{2}$

Answer: D

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96. In ΔABC, $\cos\frac{A}{2}+\sin\left(\frac{B-C}{2}\right)=$

A. $2\cos\frac{B}{2}\cos\frac{C}{2}$

B. $2\sin\frac{B}{2}\cos\frac{C}{2}$

C. $2\cos\frac{B}{2}\sin\frac{C}{2}$

D. $2\sin\frac{B}{2}\sin\frac{C}{2}$

Answer: B

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97. In ΔABC, sin(A)/(2) + $\cos\left(\frac{B - C}{2}\right) =$

A. $2\cos\frac{B}{2}\cos\frac{C}{2}$

B. $2\sin\frac{B}{2}\cos\frac{C}{2}$

C. $2\cos\frac{B}{2}\sin\frac{C}{2}$

D. $2\sin\frac{B}{2}\sin\frac{C}{2}$

Answer: A

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98. In a triangle ABC, If $\cot A + \cot B + \cot C = \sqrt{3}$, then show that the triangle is equilateral.

A. equilateral triangle

B. right angled triangle

C. isosceles

D. none

Answer: A

Watch Video Solution

99. If $A+B+C=180^{\circ}$ then $\sum \frac{\cot A+\cot B}{\tan A+\tan B}=$

A. -1

B. 0

C. 1

D. 2

Answer: C

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100. In $\Delta ABC, \sum \frac{\cos(B - C)}{\sin B \sin C} =$

A. 1

B. 2

C. 3

D. 4

Answer: D

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101. $\sum \frac{\sin(A - B)}{\cos A \cos B} =$

A. 0

B. 1

C. 2

D. $1/2$

Answer: A

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102. In ΔABC, if $\tan\frac{A}{2}=\frac{5}{6}, \tan\frac{B}{2}=\frac{20}{37}$ then $\tan\frac{C}{2}=$

A. $5/2$

B. $2/5$

C. $3/2$

D. $2/3$

Answer: B

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103. In ΔABC, A is an obtuse angle , $\sin A=3/5, \sin B=5/13$ then $\sin C=$

A. $16/65$

B. $-16/65$

C. $65/16$

D. $-65/16$

Answer: A

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104. If $A+B+C=360^{\circ}$ then $\tan\frac{A}{2}+\tan\frac{B}{2}+\tan\frac{C}{2}=$

A. $\sin\frac{A}{2}\cdot\sin\frac{B}{2}\sin\frac{C}{2}$

B. $\cos\frac{A}{2}\cdot\cos\frac{B}{2}\cos\frac{C}{2}$

C. $\tan\frac{A}{2}\cdot\tan\frac{B}{2}\tan\frac{C}{2}$

D. $\cot\frac{A}{2}\cdot\cot\frac{B}{2}\cot\frac{C}{2}$

Answer: C

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105. If $A+B+C=360^{\circ}$ then $\cot\frac{A}{4}+\cot\frac{B}{4}+\cot\frac{C}{4}=$

A. $\sin\frac{A}{4}\cdot\sin\frac{B}{4}\sin\frac{C}{4}$

B. $\cos\frac{A}{4}\cdot\cos\frac{B}{4}\cos\frac{C}{4}$

C. $\tan\frac{A}{4}\cdot\tan\frac{B}{4}\tan\frac{C}{4}$

D. $\cot\frac{A}{4}\cdot\cot\frac{B}{4}\cot\frac{C}{4}$

Answer: D

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106. If $A+B+C=720^{\circ}$ then $\tan A+\tan B+\tan C=$

A. tan A tan B tan C

B. tan 2A+ tan 2B+ tan 2C

C. tan 2A tan 2B tan 2C

D. none

Answer: A

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EXERCISE 1 C (MULTIPLE AND SUBMULTIPLE ANGLES)

1. $\frac{\sin 2\theta}{1 + \cos 2\theta} =$

A. $\sin\theta$

B. $\cos\theta$

C. $\tan\theta$

D. $\cot\theta$

Answer: C

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2. Prove that $\frac{\sin\theta + \sin 2\theta}{1 + \cos 0 + \cos 2\theta} = \tan\theta$

A. $\tan\theta/2$

B. $\cot\theta/2$

C. $\tan\theta$

D. $\cot\theta$

Answer: C

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3. $\frac{\sin 3\theta}{\sin\theta} - \frac{\cos 3\theta}{\cos\theta} =$

A. 2

B. $\sqrt{3}$

C. $\sqrt{2}$

D. 1

Answer: A

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

A. $2\sin\theta$

B. $2\cos\theta$

C. $2\tan 2\theta$

D. $2\cot 2\theta$

Answer: C

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5. $\frac{\cos 3\theta - \sin 3\theta}{\cos\theta + \sin\theta} =$

A. $1 + 2\sin 2\theta$

B. $1 - 2\sin 2\theta$

C. $1 + 2\sin 2\theta$

D. $1 - 2\cos 2\theta$

Answer: B

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6. $\dfrac{3\cos\theta + \cos 3\theta}{3\sin\theta - \sin 3\theta} =$

A. $1 + \cot^2\theta$

B. $\cot^4\theta$

C. $\cot^3\theta$

D. $2\cot\theta$

Answer: C

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7. $\dfrac{\sin^3 A + \sin 3A}{\sin A} + \dfrac{\cos^3 A - \cos 3A}{\cos A} =$

A. 0

B. 1

C. 2

D. 3

Answer: D

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8. Show that $\sin A = \dfrac{\sin 3A}{1 + 2\cos 2A}$. Hence find the value of $\sin 15^{\circ}$.

A. $\sin A$

B. $\cos A$

C. $\tan A$

D. $\cot A$

Answer: A

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9. $\frac{1 - \sec 8\theta}{1 - \sec 4\theta} =$

A. $\sin 8\theta 2\theta$

B. $\tan 8\theta \cot 2\theta$

C. $\sec 8\theta \cot 2\theta$

D. none

Answer: B

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10. $\left(\frac{\sin 2A}{\sec A - 1}\right)\left(\frac{\sec 2A}{\sec 2A + 1}\right) =$

A. $\sin A/2$

B. $\cos A/2$

C. $\tan A/2$

D. $\cot A/2$

Answer: D

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11. $\sqrt{2}\cdot \operatorname{cosec} 20^\circ \sec 20^\circ =$

A. 2

B. $2\sin 20^\circ \cdot \operatorname{cosec} 40^\circ$

C. 4

D. $4\sin 45^\circ \cdot \operatorname{cosec} 40^\circ$

Answer: D

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12. $\dfrac{\tan 3x}{\tan x} =$

A. $\dfrac{2\cos 2x + 1}{2\cos 2x - 1}$

B. $\dfrac{2\sin 2x + 1}{2\sin 2x - 1}$

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

D. $\dfrac{2\sec 2x + 1}{2\sec 2x - 1}$

Answer: A

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13. $\dfrac{\tan 3A}{\tan A} = a \Rightarrow \dfrac{\sin 3A}{\sin A} =$

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

B. $\dfrac{2a}{a - 1}$

C. $\dfrac{a}{a + 1}$

D. $\dfrac{a}{a - 1}$

Answer: B

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14. $\frac{2\sin x}{\sin 3x}+\frac{\tan x}{\tan 3x}=$

A. 2

B. $\sqrt{3}$

C. $\sqrt{2}$

D. 1

Answer: D

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15. $\frac{\cot x}{\cot x - \cot 3x}+\frac{\tan x}{\tan x - \tan 3x}=$

A. 0

B. 1

C. 2

D. 3

Answer: B

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16. $\frac{1}{\tan 3x - \tan x} - \frac{1}{\cot 3x - \cot x} =$

A. sin 2x

B. cos 2x

C. tan 2x

D. cot 2x

Answer: D

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17. $3\sin x + 4\cos x = 5 \Rightarrow 6\tan\frac{x}{2} - 9\tan^2\frac{x}{2} =$

A. 0

B. 1

C. 3

D. 4

Answer: B

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18. If $A = 2\sin^2\theta - \cos 2\theta$, then

A. $-1 \leq A \leq 3$

B. $1 \leq A \leq 2$

C. $-2 \leq A \leq 4$

D. none

Answer: A

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19. If $A = \sin^2\theta + \cos^4\theta$, then for all values of θ , where

A. $1 \le A \le 2$

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

C. $0 \le A \le 1$

D. $\frac{1}{4} \le A \le \frac{1}{2}$

Answer: B

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20. If $90^\circ < \theta < 180^\circ$, $\cos\theta = -12/13$, then $\sin2\theta =$

A. $\frac{120}{169}$

B. $-\frac{120}{169}$

C. $\frac{169}{120}$

D. $-\frac{169}{120}$

Answer: B

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21. If $180^\circ < \theta < 270^\circ, \tan\theta = 5/12, \text{ then } \cos 3\theta =$

A. $\frac{828}{2197}$

B. $-\frac{828}{2179}$

C. $\frac{10296}{11753}$

D. $-\frac{10296}{11753}$

Answer: B

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22. If $\cos\theta + \sin\theta = a, \text{ then } \sin 2\theta =$

A. $a^2 + 1$

B. $a^2 - 1$

C. a^2

D. 1

Answer: B

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23. If θ is an acute angle , $\cos\theta = 7/25$, then $\tan 3\theta =$

A. $\frac{828}{2179}$

B. $-\frac{828}{2197}$

C. $\frac{10296}{11753}$

D. $-\frac{10296}{11753}$

Answer: C

Watch Video Solution

24. If $180^\circ < \theta < 270^\circ$, $\sin\theta = -3/5$, then $\cos\theta/2 =$

A. $-1/\sqrt{10}$

B. $1/\sqrt{10}$

C. $1/10$

D. 10

Answer: A

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25. If $180^\circ < \theta < 270^\circ$, $\sin\theta = -4/5$, then $\tan\theta/2 =$

A. $\sqrt{2}$

B. $-1/\sqrt{5}$

C. $2/\sqrt{5}$

D. -2

Answer: D

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26. If $630^{\circ} < A < 720^{\circ}, |\tan A| = 12/5, \text{ then } \tan A/2 =$

A. $2/3$

B. $3/2$

C. $-2/3$

D. $-3/2$

Answer: C

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

A. $3/5$

B. $-3/5$

C. $4/5$

D. $-4/5$

Answer: C

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28. $\cot A + \tan A =$

A. $2\sin 2A$

B. $2\cos 2A$

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

D. $2\sec 2A$

Answer: C

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29. $\tan A + \cot 2A =$

A. sin 2A

B. cos 2A

C. cosec 2A

D. sec 2A

Answer: C

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30. $\tan\alpha + 2\tan 2\alpha + 4\tan 4\alpha + 8\cot 8\alpha =$

A. $\sin\alpha$

B. $\cos\alpha$

C. $\tan\alpha$

D. $\cot\alpha$

Answer: D

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31. $\tan\theta + 2\tan 2\theta + 4\tan 4\theta + 8\tan 8\theta + 16\tan 16\theta + 32\cot 32\theta =$

A. $\sin\theta$

B. $\cos\theta$

C. $\tan\theta$

D. $\cot\theta$

Answer: D

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32. $\tan\left(\frac{5\pi}{32}\right) + 2\tan\left(\frac{5\pi}{16}\right) + 4\tan\left(\frac{5\pi}{8}\right) - \cot\left(\frac{5\pi}{32}\right) =$

A. 4

B. -4

C. 8

D. -8

Answer: D

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33. $\left(1 + \sec 20^\circ\right)\left(1 + \sec 40^\circ\right)\left(1 + \sec 80^\circ\right) =$

A. 0

B. 1

C. -1

D. 2

Answer: B

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34. $(2\cos\theta - 1)(2\cos2\theta - 1)(2\cos4\theta - 1)(2\cos8\theta - 1) =$

A. 0

B. 1

C. $\dfrac{2\cos8\theta + 1}{2\cos8 + 1}$

D. $\dfrac{2\cos160\theta + 1}{2\cos\theta + 1}$

Answer: D

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35. $\tan2A - \sec A\sin A =$

A. $\sin A \cdot \tan2A$

B. $\tan A \cdot \sec2A$

C. $\sec A - \sin2A$

D. $\cos A - \cot 2A$

Answer: B

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36. $\sin 2\alpha - \cos 2\alpha \tan \alpha =$

A. $-\tan \alpha$

B. $\tan \alpha$

C. $\sin 2\alpha$

D. $\cos 2\alpha$

Answer: B

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37. $(\sin 3A + \sin A)\sin A + (\cos 3A - \cos A)\cos A =$

A. 0

B. 1

C. 2

D. 3

Answer: A

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38. If $\dfrac{\cos 3A + \sin 3A}{\cos A - \sin A} = 1 - k \sin 2A$, the value of k is

A. -2

B. 2

C. 3

D. 4

Answer: A

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39. $\sin 3\theta \cdot \cos^3\theta + \cos 3\theta \cdot \sin^3\theta =$

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

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

C. $\frac{3}{4}\tan 4\theta$

D. $\frac{3}{4}\cot 4\theta$

Answer: A

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40. If $\cos^6\theta + \sin^6\theta + k\sin^2 2\theta = 1$, then $k =$

A. $3/2$

B. $3/4$

C. $1/4$

D. none

Answer: B

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41. The value of $\cos^2 A\left(3 - 4\cos^2 A\right)^2 + \sin^2 A\left(3 - 4\sin^2 A\right)^2$ is

A. 2

B. 4

C. 1

D. none

Answer: C

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42. $\dfrac{\cos 2\alpha}{\cos^4\alpha - \sin^4\alpha} - \dfrac{\cos^4\alpha + \sin^4\alpha}{2 - \sin^2 2\alpha} =$

A. 0

B. 1

C. $1/2$

D. 2

Answer: C

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43. $2\sin^2\beta + 4\cos(\alpha + \beta)\sin\alpha\sin\beta + \cos(2\alpha + 2\beta) =$

A. $\sin 2\alpha$

B. $\cos 2\alpha$

C. $\tan 2\alpha$

D. $\cot 2\alpha$

Answer: B

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

A. $\cos 2A$

B. $8\cos 2A$

C. $1/8\cos 2A$

D. none

Answer: B

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45. If A is in the III quadrant , $3\tan A - 4 = 0$ then $5\sin 2A + 3\sin A + 4\cos A =$

A. 0

B. $-24/5$

C. $24/5$

D. $5/24$

Answer: A

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46. If 'θ' is in the III quadrant then $\sqrt{4\sin^4\theta + \sin^2 2\theta} + 4\cos^2\left(\frac{\pi}{4} - \frac{\theta}{2}\right) =$

A. 2

B. -2

C. 0

D. 1

Answer: A

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47. If $2A + B = \frac{\pi}{2}$ then $\sqrt{\frac{1 + \sin B}{1 - \sin B}} =$

A. tan A

B. cot A

C. tan B

D. cot B

Answer: B

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48. 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. $\frac{2\cos x}{\sqrt{2x}}$

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

Answer: B

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49. If $\tan(\pi/4+\theta)+\tan(\pi/4-\theta)=k\sec 2\theta$, then the value of k is .

A. 3

B. 4

C. 1

D. 2

Answer: D

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

A. $2\sin 3\theta$

B. $2\cos 3\theta$

C. $2\tan 3\theta$

D. $2\cot 3\theta$

Answer: B

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51. If $\frac{\sin\alpha}{a} = \frac{\cos\alpha}{b}$, then $a\sin 2\alpha + b\cos 2\alpha =$

A. a

B. b

C. $a + b$

D. ab

Answer: B

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52. If $x = \sqrt{\frac{1 - \cos\theta}{1 + \cos\theta}}, \text{ then } \frac{2x}{1 - x^2} =$

A. $\sin\theta$

B. $\cos\theta$

C. $\tan\theta$

D. $\cot\theta$

Answer: C

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53. If $\tan\theta = 3/4$, then the value of $\tan 2\theta + \sec 2\theta$ is

A. 6

B. 5

C. 7

D. none

Answer: C

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54. If $\cos x = \tan y, \cot y = \tan z, \cot z = \tan x$ then sin x=

A. $\sin 18^\circ$

B. $\frac{1}{2}\sin 18^\circ$

C. $2\sin 18^\circ$

D. $3\sin 18^\circ$

Answer: C

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55. If $\cos x = \tan y, \cot y = \tan z, \cot z = \tan x$ then sin x=

A. $\sin x = \sin y = \sin z = \sin 18^\circ$

B. $\sin x = \sin y = \sin z = 2\sin 18^\circ$

C. $\sin x = \sin y = \sin z = \sin 36^\circ$

D. $\sin x = \sin y = \sin z = 2\sin 36^\circ$

Answer: B

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56. If $\cos x = \tan y, \cot y = \tan z$ and $\cot z = \tan x$, then $\sin x$=

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

B. $\dfrac{\sqrt{5}+1}{2}$

C. $\dfrac{\sqrt{5}-1}{2}$

D. $\dfrac{\sqrt{5}+1}{4}$

Answer: C

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57. If $\text{cosec}\theta = \left[\dfrac{\tan^2[(\alpha - \pi)/4] - 1}{\tan^2[(\alpha - \pi/4)] + 1} + \cos\dfrac{\alpha}{2}\cot 4\alpha\right]\sec\dfrac{9\alpha}{2}$ then$\theta =$

A. α

B. 2α

C. $\pi/2 - 2\alpha$

D. 4α

Answer: D

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58. If $\cos\theta = \dfrac{1}{2}\left(a + \dfrac{1}{a}\right)$, then $\cos 2\theta =$

A. $\dfrac{1}{2}\left(a^2 + \dfrac{1}{a^2}\right)$

B. $\dfrac{1}{2}\left(a^2 - \dfrac{1}{a^2}\right)$

C. $\left(a^2 + \frac{1}{a^2}\right)$

D. $\left(a^2 - \frac{1}{a^2}\right)$

Answer: A

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59. If $0 < \theta < \pi/4, \text{ then } \sqrt{2 + \sqrt{2 + 2\cos 4\theta}} =$

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

B. $2\cos\theta$

C. $2\cos 2\theta$

D. $2\cos 4\theta$

Answer: B

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60. If $0 < x < \pi$, and $\cos x + \sin x = 1/2$, then $\tan x =$

A. $-\left(4 + \sqrt{7}\right)/3$

B. $\left(1 + \sqrt{7}\right)/4$

C. $\left(1 - \sqrt{7}\right)/4$

D. $\left(4 - \sqrt{7}\right)/4$

Answer: A

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61. If $x\cos\alpha = y\cos(2\pi/3 + \alpha) = z\cos(4\pi/3 + \alpha)$, then $xy + yz + zx =$

A. 0

B. 1

C. -1

D. 2

Answer: A

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62. If $\dfrac{x}{\tan(\theta + \alpha)} = \dfrac{y}{\tan(\theta + \beta)} = \dfrac{z}{\tan(\theta + \gamma)}$, then $\sum \dfrac{x + y}{x - y} \sin^2(\alpha - \beta) =$

A. 1

B. -1

C. 0

D. none

Answer: C

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63. If $\dfrac{x}{\cos\theta} = \dfrac{y}{\cos(\theta - 2\pi/3)} = \dfrac{z}{\cos(\theta + 2\pi/3)}$, then $x + y + z =$

A. 1

B. 0

C. -1

D. none

Answer: B

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64. If $\log_2(\sin x) - \log_2(\cos x) - \log_2(1 - \tan x) - \log_2(1 + \tan x) = -1$ then $\tan 2x =$

A. -1

B. 1

C. $1/2$

D. 4

Answer: B

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65. $\tan x + \tan\left(x + \frac{\pi}{3}\right) + \tan\left(x + \frac{2\pi}{3}\right) = 3 \Rightarrow \tan 3x =$

A. 3

B. 2

C. 1

D. 0

Answer: C

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66. If $\tan\theta + \tan\left(\theta + \frac{\pi}{3}\right) + \tan\left(\theta + \frac{2\pi}{3}\right) = 3$, then which of the following is equal to 1 ?

A. $\tan 2\theta$

B. $\tan 3\theta$

C. $\tan^2\theta$

D. $\tan^3\theta$

Answer: B

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67. If $\tan 35^\circ = k$, then the value of $\dfrac{\tan 145^\circ - \tan 125^\circ}{1 + \tan 145^\circ \tan 125^\circ} =$

A. $\dfrac{2k}{1 - k^2}$

B. $\dfrac{2k}{1 + k^2}$

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

D. $\dfrac{1 - k^2}{1 + k^2}$

Answer: C

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68. If $\operatorname{cosec}\theta = \dfrac{p+q}{p-q}$ then $\cot\left(\dfrac{\pi}{4} + \dfrac{\theta}{2}\right) =$

A. $\sqrt{p/q}$

B. $\sqrt{q/p}$

C. $\sqrt{pq}$

D. pq

Answer: B

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69. If $\sec(\theta - \alpha), \sec\theta, \sec(\theta + \alpha)$ are in A.P. then $\cos\theta =$

A. $\cos\alpha$

B. $\cos\alpha/2$

C. $2\cos\alpha/2$

D. $\sqrt{2}\cos\alpha/2$

Answer: D

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70. If $A = 340^\circ$ then $\sqrt{1 - \sin A} - \sqrt{1 + \sin A} =$

A. $2\cos A/2$

B. $2\sin A/2$

C. $-2\cos A/2$

D. $-2\sin A/2$

Answer: B

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71. If $\tan^2 A = 2\tan^2 B + 1, then 2\cos 2A + 1 =$

A. $\cos 2A$

B. $\sin 2A$

C. $\cos 2B$

D. $\sin 2B$

Answer: C

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72. If $\tan^2 A = 2\tan^2 B + 1$, then $\cos 2A + \sin^2 B =$

A. 0

B. 1

C. 2

D. 3

Answer: A

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73. If $2\tan A = 3\tan B$, then $\tan(A - B) =$

A. $\dfrac{\sin 2B}{5 + \cos 2B}$

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

C. $\dfrac{\cos 2B}{5 + \sin 2B}$

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

Answer: B

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74. If $\tan A = 1/2$, $\tan B = 1/3$ then $\cos 2A =$

A. $\sin B$

B. $\sin 2B$

C. $\sin 3B$

D. $\sin 4B$

Answer: B

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75. If $\cos\alpha = \frac{3}{5}, \cos\beta = \frac{5}{13}$, then $\cos^2\left(\frac{\alpha - \beta}{2}\right) =$

A. $64/65$

B. $1/65$

C. $65/64$

D. 65

Answer: A

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76. $\cos\frac{2\pi}{15}\cos\frac{4\pi}{15}\frac{\cos(8\pi)}{15}\cos\frac{16\pi}{15} =$

A. $1/4$

B. $1/8$

C. $1/16$

D. $1/32$

Answer: C

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77. Prove that $\cos.\ \frac{\pi}{11}.\ \cos.\ \frac{2\pi}{11}.\ \cos.\ \frac{3\pi}{11}\cos.\ \frac{4\pi}{11}.\ \cos.\ \frac{5\pi}{11} = \frac{1}{32}$

A. $1/4$

B. $1/8$

C. $1/16$

D. $1/32$

Answer: D

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78. $\cos 10^{\circ} \cos 30^{\circ} \cos 50^{\circ} \cos 70^{\circ} =$

A. $3/2$

B. $3/4$

C. $3/8$

D. $3/16$

Answer: D

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79. $\cos 24^{\circ} \cos 48^{\circ} \cos 96^{\circ} \cos 192^{\circ} =$

A. $1/4$

B. $1/8$

C. $1/16$

D. $1/32$

Answer: C

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80. $\cos A \cos 2A \cos 4A \ldots\ldots \cos^{2^{n-1}} A =$

A. $\dfrac{\sin 2^n A}{2^n \sin A}$

B. $\dfrac{2^n \sin 2^n A}{\sin A}$

C. $\dfrac{2^n \sin A}{\sin 2^n A}$

D. $\dfrac{\sin A}{2^n \sin 2^n A}$

Answer: A

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81. $\sin 12^\circ \cdot \sin 24^\circ \cdot \sin 48^\circ \cdot \sin 84^\circ =$

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

B. $\sin 20^{\circ} \sin 40^{\circ} \sin 60^{\circ} \sin 80^{\circ}$

C. $3/15$

D. none

Answer: A

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82. $\sin 10^{\circ} \sin 30^{\circ} \sin 50^{\circ} \sin 70^{\circ} \sin 90^{\circ} =$

A. $1/4$

B. $1/8$

C. $1/16$

D. $1/32$

Answer: C

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83. $\tan 20^\circ \tan 40^\circ \tan 60^\circ \tan 80^\circ =$

A. $\sqrt{3}$

B. 3

C. $1/\sqrt{3}$

D. $1/3$

Answer: B

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84. $\cos 36^\circ - \cos 72^\circ =$

A. 1

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

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

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

Answer: B

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85. $\cos^2 36^\circ + \cos^2 72^\circ =$

A. 1

B. 2/3

C. -2/3

D. 3/4

Answer: D

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86. $\cos^2 \frac{3\pi}{5} + \cos^2 \frac{4\pi}{5} =$

A. 4/5

B. $5/2$

C. $5/4$

D. $3/4$

Answer: D

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87. $\sec 72^\circ - \sec 36^\circ =$

A. 1

B. $2/3$

C. $-2/3$

D. 2

Answer: D

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88. Evaluate $6\sin 20^{\circ} - 8\sin^{3} 20^{\circ}$.

A. 2

B. $\sqrt{3}$

C. $\sqrt{2}$

D. 1

Answer: B

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89. $\tan 9^{\circ} - \tan 27^{\circ} - \tan 63^{\circ} + \tan 81^{\circ} =$

A. 4

B. 3

C. 2

D. 1

Answer: A

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90. Find the value of $\sin^2 42^\circ - \sin^2 12^\circ$.

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

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

C. $\frac{\sqrt{5}-1}{8}$

D. $\frac{\sqrt{5}+1}{8}$

Answer: D

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91. Find the value of $\cos^2 72^\circ - \sin^2 54^\circ$.

A. $5/4$

B. $\sqrt{5}/4$

C. $-\sqrt{5}/4$

D. none

Answer: C

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92. $8\cos^3 10^\circ - 6\cos 10^\circ =$

A. 2

B. $\sqrt{3}$

C. $\sqrt{2}$

D. 1

Answer: B

Watch Video Solution

93. $8\cos^3 20^\circ - 6\cos 20^\circ =$

A. 2

B. $\sqrt{3}$

C. $\sqrt{2}$

D. 1

Answer: D

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94. $4\left(\cos^3 20^\circ + \cos^3 40^\circ\right) =$

A. $3\left(\cos 20^\circ + \cos 40^\circ\right)$

B. $3\left(\cos 10^\circ + \sin 20^\circ\right)$

C. $3\left(\cos 20^\circ + \sin 40^\circ\right)$

D. $3\left(\cos 10^\circ + \cos 20^\circ\right)$

Answer: A

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95. $4\left(\cos^3 10^\circ + \sin^3 20^\circ\right) =$

A. $3\left(\cos 20^\circ + \cos 40^\circ\right)$

B. $3\left(\cos 10^\circ + \sin 20^\circ\right)$

C. $3\left(\cos 20^\circ + \sin 40^\circ\right)$

D. $3\left(\cos 10^\circ + \cos 20^\circ\right)$

Answer: B

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96. if $\dfrac{\cos^3 20^\circ + \cos^3 40^\circ}{\cos 20^\circ + \cos 40^\circ} = k$,then the value of k is

A. $4/3$

B. $3/4$

C. $3/2$

D. $2/3$

Answer: B

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97. $\cos\theta\cos\left(60^\circ + \theta\right)\cdot\cos\left(60^\circ - \theta\right) =$

A. $\frac{1}{4}\sin 3\theta$

B. $\frac{1}{4}\cos 3\theta$

C. $\frac{1}{4}\tan 3\theta$

D. $\frac{1}{4}\cot 3\theta$

Answer: B

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98. $\sin^2\theta + \sin^2\left(60^\circ + \theta\right) + \sin^2\left(60^\circ - \theta\right) =$

A. $3/2$

B. $1/2$

C. $3/18$

D. $1/4$

Answer: A

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99. $\cos^2 A + \cos^2\left(120^\circ + A\right) + \cos^2\left(120^\circ - A\right) =$

A. $3/2$

B. $1/2$

C. $3/18$

D. $1/4$

Answer: A

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100. $\cos^3\theta + \cos^3\left(120^\circ + \theta\right) + \cos^3\left(120^\circ - \theta\right) =$

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

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

C. $\frac{3}{4}\tan 3\theta$

D. $\frac{3}{4}\cot 3\theta$

Answer: B

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101. $\sin^2 20^\circ + \sin^2 100^\circ + \sin^2 140^\circ =$

A. $1/2$

B. $3/2$

C. $\sqrt{3}/2$

D. $1/\sqrt{2}$

Answer: B

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102. $\cos^3 20^\circ + \cos^3 100^\circ + \cos^3 140^\circ =$

A. $3/4$

B. $3/8$

C. $3\sqrt{3}/8$

D. $\sqrt{3}/2$

Answer: B

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103. $\cos^2\left(\theta - 45^\circ\right) + \cos^2\left(\theta + 15^\circ - \cos^2\left(\theta - 15^\circ\right) =$

A. $1/2$

B. $1/3$

C. $1/\sqrt{2}$

D. $1/\sqrt{3}$

Answer: A

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104. If $4\sin\left(60^\circ + \theta\right)\sin\left(60^\circ - \theta\right) - 1 = k\cos 2\theta$, the value of k is

A. 3

B. 1

C. 2

D. none

Answer: C

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105. Show that $\sin^4 . \frac{\pi}{8} + \sin^4 . \frac{3\pi}{8} \sin^4 . \frac{5\pi}{8} + \sin^4 . \frac{7\pi}{8} = \frac{3}{2}$

A. $1/4$

B. $3/2$

C. $3/4$

D. $3/8$

Answer: B

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106. Show that $\cos^4 \frac{\pi}{8} + \cos^4 \frac{3\pi}{8} + \cos^4 \frac{5\pi}{8} + \cos^4 \frac{7\pi}{8} = \frac{3}{2}$

A. $1/4$

B. 3/2

C. 3/4

D. 3/8

Answer: B

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107. $\tan 7\frac{1}{2}^{\circ} =$

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

B. $\dfrac{1+\sqrt{3}}{1-\sqrt{3}}$

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

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

Answer: A

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108. $\tan 82\frac{1}{2}^{\circ} =$

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

B. $\sqrt{2} + \sqrt{3} - \sqrt{4} + \sqrt{6}$

C. $\sqrt{2} - \sqrt{3} + \sqrt{4} - \sqrt{6}$

D. $\sqrt{2} - \sqrt{3} - \sqrt{4} + \sqrt{6}$

Answer: A

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109. If $\sin 18^{\circ} = \frac{\sqrt{5} - 1}{4}$, then $\sin 81^{\circ} =$

A. $\frac{\sqrt{5} + 1}{4\sqrt{2}} + \frac{\sqrt{10 - 2\sqrt{5}}}{4\sqrt{2}}$

B. $\frac{\sqrt{5} + 1}{4\sqrt{2}} / \frac{\sqrt{10 + 2\sqrt{5}}}{4\sqrt{2}}$

C. $\frac{\sqrt{5} - 1}{4\sqrt{2}} + \frac{\sqrt{10 + 2\sqrt{5}}}{4\sqrt{2}}$

D. $\dfrac{\sqrt{5}-1}{4\sqrt{2}}+\dfrac{\sqrt{10-2\sqrt{5}}}{4\sqrt{2}}$

Answer: A

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110. Prove that $\dfrac{1}{\cos 290^\circ}+\dfrac{1}{\sqrt{3}\sin 250^\circ}=\dfrac{4}{\sqrt{3}}$

A. $1/\sqrt{3}$

B. $4/\sqrt{3}$

C. 4

D. 1

Answer: B

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111. Show that $\frac{1}{\sin 10^{\circ}} - \frac{\sqrt{3}}{\cos 10^{\circ}} = 4.$

A. 1

B. 2

C. 3

D. 4

Answer: D

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112. Prove that $\sqrt{3}\csc 20^{\circ} - \sec 20^{\circ} = 4$

A. 4

B. 3

C. 2

D. 1

Answer: A

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113. A quadratic equation whose roots are $\sin^2 18°, \cos^2 36°$ are

A. $16x^2 - 12x + 1 = 0$

B. $x^2 - 12x + 1 = 0$

C. $16x^2 - 12x - 1 = 0$

D. none

Answer: A

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114. Prove that $\left(1 + \cos\frac{\pi}{10}\right)\left(1 + \cos\frac{3\pi}{10}\right)\left(1 + \cos\frac{7\pi}{10}\right)\left(1 + \cos\frac{9\pi}{10}\right) = \frac{1}{16}$

A. $1/2$

B. $1/4$

C. $1/8$

D. $1/16$

Answer: D

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115. If $x+y+z=xyz$, then $\sum \frac{2x}{1-x^2}=$

A. $\Pi\left(\frac{2x}{1+x^2}\right)$

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

C. $\Pi\left(\frac{1+x^2}{2x}\right)$

D. $\Pi\left(\frac{1-x^2}{2x}\right)$

Answer: B

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116. If $x + y + z = xyz,\ \ \text{then}\ \sum \frac{3x - x^3}{1 - 3x^2} =$

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

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

C. $\Pi\left(\frac{3x + x^3}{1 + 3x^2}\right)$

D. $\Pi\left(\frac{3x - x^2}{1 + 3x^2}\right)$

Answer: A

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117. If $xy + yz + zx = 1$, then $\sum \frac{x + y}{1 - xy} =$

A. $1/xyz$

B. xyz

C. $-1/xyz$

D. $-xyz$

Answer: A

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118. If $xy + yz + zx = 1$, then $\sum \frac{2x -}{1 - x^2} =$

A. $\Pi\left(\frac{2x}{1+x^2}\right)$

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

C. $\Pi\left(\frac{1+x^2}{2x}\right)$

D. $\Pi\left(\frac{1-x^2}{2x}\right)$

Answer: B

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EXERCISE 1 D (TRANSFORMATIONS)

1. $\sin A + \sin 3A + \sin 5A + \sin 7A =$

A. $4\sin A\cos 2A\cos 4A$

B. $4\cos A\sin 2A\sin 4A$

C. $4\cos A\cos 2A\sin 4A$

D. $4\sin A\cos 2A\cos 4A$

Answer: C

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2. $1 + \cos 2\theta + \cos 4\theta + \cos 6\theta =$

A. $4\sin\theta \cdot \sin 2\theta \cdot \sin 3\theta$

B. $4\cos\theta \cdot \cos 2\theta \cdot \cos 3\theta$

C. $4\tan\theta \cdot \tan 2\theta \cdot \tan 3\theta$

D. $4\cot\theta \cdot \cot 2\theta \cdot \cot 3\theta$

Answer: B

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3. $1 + \cos 2x + \cos 4x + \cos 6x - 4\cos x \cos 2x \cos 3x =$

A. 1

B. -1

C. 2

D. 0

Answer: D

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4. $\cos\alpha + \cos\beta + \cos\gamma + \cos(\alpha + \beta + \gamma) =$

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

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

C. $4\sin\left(\frac{\alpha + \beta}{2}\right) \cdot \sin\left(\frac{\beta + \gamma}{2}\right) \cdot \sin\left(\frac{\gamma + \alpha}{2}\right)$

D. $4\cos\left(\frac{\alpha + \beta}{2}\right) \cdot \cos\left(\frac{\beta + \gamma}{2}\right) \cdot \sin\left(\frac{\gamma + \alpha}{2}\right)$

Answer: B

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5. $\sin 2\alpha + \sin 2\beta + \sin 2\gamma - \sin 2(\alpha + \beta + \gamma) =$

A. $4\sin(\alpha + \beta)\sin(\beta + \gamma)\sin(\gamma + \alpha)$

B. $4\cos(\alpha + \beta)\sin(\beta - \gamma)\sin(\gamma + \alpha)$

C. $4\cos(\alpha + \beta)\cos(\beta - \gamma)\cos(\gamma + \alpha)$

D. $4\sin(\alpha + \beta)\sin(\beta - \gamma)\sin(\gamma + \alpha)$

Answer: A

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6. $\cos(B + C - A) - \cos(C + A - B) + \cos(A + B - C) - \cos(A + B + C) =$

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

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

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

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

Answer: B

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7. $\sin(A + B + C) + \sin(A - B - C) + \sin(A + B - C) + \sin(A - B + C) =$

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

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

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

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

Answer: A

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8. $\cos(\alpha + \beta + \gamma) + \cos(\alpha - \beta - \gamma) + \cos(\beta - \gamma - \alpha) + \cos(\gamma - \alpha - \beta) =$

A. $2\cos\alpha\cos\beta\cos\gamma$

B. $3\cos\alpha\cos\beta\cos\gamma$

C. $4\cos\alpha\cos\beta\cos\gamma$

D. $6\cos\alpha\cos\beta\cos\gamma$

Answer: C

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9. $4\sin 5\theta \cos 3\theta \sin 2\theta$

A. $1 + \cos 4\theta + \cos 6\theta - \cos 10\theta$

B. $1 - \cos 4\theta + \cos 6\theta - \cos 10\theta$

C. $1 - \cos 4\theta + \cos 6\theta + \cos 10\theta$

D. $1 + \cos 4\theta + \cos 6\theta + \cos 10\theta$

Answer: B

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10. $4\cos 6\theta \cos 4\theta \cos 2\theta =$

A. $\cos 12\theta + \cos 8\theta + \cos 4\theta + 1$

B. $\cos 12\theta + \cos 8\theta - \cos 4\theta + 1$

C. $\cos 12\theta - \cos 8\theta + \cos 4\theta + 1$

D. $\cos 12\theta - \cos 8\theta - \cos 4\theta - 1$

Answer: A

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11. $\sin\frac{3\theta}{2}\cos\frac{\theta}{2}\cos\theta =$

A. $\frac{1}{4}[\sin\theta + \sin 2\theta + \sin 3\theta]$

B. $\frac{1}{4}[\sin\theta - \sin 2\theta + \sin 3\theta]$

C. $\frac{1}{4}[\sin\theta + \sin 2\theta - \sin 3\theta]$

D. $\frac{1}{4}[\sin\theta - \sin 2\theta - \sin 3\theta]$

Answer: A

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12. $4\sin\frac{5\theta}{2}\cos\frac{3\theta}{2}\cos 3\theta =$

A. $\sin 7\theta + \sin 4\theta + \sin 2\theta + \sin\theta$

B. $\sin 7\theta + \sin 4\theta - \sin 2\theta + \sin\theta$

C. $\sin 7\theta - \sin 4\theta - \sin 2\theta + \sin\theta$

D. $\sin 7\theta + \sin 4\theta + \sin 2\theta - \sin\theta$

Answer: B

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13. $\sin\frac{\theta}{2} \cdot \sin\frac{7\theta}{2} + \sin\frac{3\theta}{2} \cdot \sin\frac{11\theta}{2} - \sin 2\theta \sin 5\theta =$

A. 0

B. 1

C. -1

D. 2

Answer: A

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14. $\left(2\cos^2 3\theta - 1\right)\cos 5\theta =$

A. $\frac{1}{2}[\cos 11\theta + \cos\theta]$

B. $\frac{1}{2}[\sin 11\theta + \sin\theta]$

C. $\frac{1}{2}[\sin 11\theta + \cos\theta]$

D. $\frac{1}{2}[\cos 11\theta + \sin\theta]$

Answer: A

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15. $2\left(1 - 2\sin^2\theta\right)\cos 4\theta =$

A. $\sin 6\theta + \cos 2\theta$

B. $\sin 6\theta + \sin 3\theta$

C. $\cos 6\theta + \cos 2\theta$

D. $\cos 6\theta + \sin 2\theta$

Answer: C

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16. $\cos 70^\circ + \sin 40^\circ =$

A. $\sin 10^\circ$

B. $\cos 10^\circ$

C. $\tan 10^\circ$

D. $\cot 10^\circ$

Answer: B

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17. $\sin 75^\circ + \sin 15^\circ =$

A. $1/2$

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

C. $\sqrt{3}/2$

D. $3/\sqrt{2}$

Answer: B

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18. $\cos 25^\circ - \cos 65^\circ =$

A. $\sqrt{2}\cos 20^\circ$

B. $\sqrt{2}\sin 20^\circ$

C. $\sqrt{3}\cos 20^\circ$

D. $\sqrt{3}\sin 20^\circ$

Answer: B

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19. $\sin 70^\circ - \cos 40^\circ =$

A. $\sin 10^\circ$

B. $\cos 10^\circ$

C. $\tan 10^\circ$

D. $\cot 10^\circ$

Answer: A

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20. $\cos 40^\circ + \cos 80^\circ + \cos 160^\circ =$

A. 0

B. 1

C. 2

D. 3

Answer: A

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21. $\sin 78^\circ - \sin 18^\circ + \cos 132^\circ =$

A. 0

B. 1

C. 2

D. 3

Answer: A

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22. $\sin 47^\circ - \sin 25^\circ + \sin 61^\circ - \sin 11^\circ =$

A. $\cos 7^\circ$

B. $\sin 7^{\circ}$

C. $2\cos 7^{\circ}$

D. $2\sin 7^{\circ}$

Answer: A

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23. $\cos 12^{\circ} + \cos 84^{\circ} + \cos 132^{\circ} + \cos 156^{\circ} =$

A. 1

B. $1/2$

C. $-1/2$

D. 0

Answer: C

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24. $\sin 10^\circ + \sin 20^\circ + \sin 40^\circ + \sin 50^\circ - \sin 70^\circ - \sin 80^\circ =$

A. 1

B. 1/2

C. -1/2

D. 0

Answer: D

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25. $\sin 21^\circ \cos 9^\circ - \cos 84^\circ \cos 6^\circ =$

A. 1/2

B. -1/2

C. 1/4

D. -1/4

Answer: C

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26. $\cot 16^\circ \cot 44^\circ + \cot 44^\circ \cot 76^\circ - \cot 76^\circ \cot 16^\circ =$

A. 0

B. 1

C. 3

D. 4

Answer: C

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27. $\sin 48^\circ \cdot \sin 12^\circ =$

A. $\dfrac{1+\sqrt{2}}{8}$

B. $\dfrac{1 - \sqrt{5}}{8}$

C. $\dfrac{\sqrt{5} + 1}{8}$

D. $\dfrac{\sqrt{5} - 1}{8}$

Answer: D

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28. $2\cos 54^{\circ} \cdot \sin 66^{\circ} =$

A. $\dfrac{\sqrt{3}}{2} + \sin 12^{\circ}$

B. $\dfrac{\sqrt{3}}{2} - \sin 12^{\circ}$

C. $\dfrac{\sqrt{3}}{2} + \cos 12^{\circ}$

D. $\dfrac{\sqrt{3}}{2} - \cos 12^{\circ}$

Answer: A

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29. $\cos 6^{\circ} \sin 24^{\circ} \cos 72^{\circ} =$

A. $-1/8$

B. $-1/4$

C. $1/8$

D. $1/4$

Answer: C

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30. $\sin 12^{\circ} \cdot \sin 24^{\circ} \cdot \sin 48^{\circ} \cdot \sin 84^{\circ} =$

A. $1/16$

B. $3/16$

C. $1/32$

D. $1/8$

Answer: A

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31. $\sin 20^\circ \cdot \sin 40^\circ \cdot \sin 60^\circ \cdot \sin 80^\circ =$

A. $1/16$

B. $3/16$

C. $1/32$

D. $1/8$

Answer: B

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32. $\cos 20^\circ \cdot \cos 40^\circ \cdot \cos 60^\circ \cdot \cos 80^\circ =$

A. $1/16$

B. $3/16$

C. $1/32$

D. $1/8$

Answer: A

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33. $\cos 6^\circ \cdot \cos 42^\circ \cdot \cos 60^\circ \cdot \cos 66^\circ \cdot \cos 78^\circ =$

A. $1/16$

B. $3/16$

C. $1/32$

D. $1/8$

Answer: C

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34. $\sin 10^\circ \sin 30^\circ \sin 50^\circ \sin 70^\circ \sin 90^\circ =$

A. $1/16$

B. $3/16$

C. $1/32$

D. $1/8$

Answer: A

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35. Prove that $\cos^2 76^\circ + \cos^2 16^\circ - \cos 76^\circ \cos 16^\circ = \frac{3}{4}$

A. $1/2$

B. 0

C. $-1/4$

D. $3/4$

Answer: D

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36. $\cos^2(45^\circ - \alpha) + \cos^2(15^\circ + \alpha) - \cos^2(15^\circ - \alpha) =$

A. 0

B. 1

C. $1/2$

D. $3/4$

Answer: C

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37. $2\cos\theta - \cos3\theta - \cos5\theta - 16\cos^3\theta\sin^2\theta =$

A. 2

B. 1

C. 0

D. - 1

Answer: C

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38. $4\sin\left(420^{\circ} - \alpha\right)\cos\left(60^{\circ} + \alpha\right) =$

A. $\sqrt{3} + 2\sin 2\alpha$

B. $\sqrt{3} - 2\sin 2\alpha$

C. $\sqrt{3} + 2\cos 2\alpha$

D. $\sqrt{3} - 2\cos 2\alpha$

Answer: B

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39. $\dfrac{\sin A+\sin 5A+\sin 9A}{\cos A+\cos 5A+\cos 9A}=$

A. $\tan 2A$

B. $\tan 3A$

C. $\tan 4A$

D. $\tan 5A$

Answer: D

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40. $\dfrac{\sin 2\theta+2\sin 4\theta+\sin 6\theta}{\sin 4\theta+2\sin 6\theta+\sin 8\theta}=$

A. $\dfrac{\sin 4\theta}{\sin 6\theta}$

B. $\dfrac{\sin 2\theta}{\sin 6\theta}$

C. $\dfrac{\sin 2\theta}{\sin 4\theta}$

D. $\dfrac{\sin 4\theta}{\sin 8\theta}$

Answer: A

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41. $\dfrac{\cos 6x + 6\cos 4x + 15\cos 2x + 10}{\cos 5x + 5\cos 3x + 10\cos x} =$

A. $\cos x$

B. $\sin x$

C. $2\sin x$

D. $2\cos x$

Answer: D

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42. $\dfrac{\cos A + \cos 3A + \cos 5A + \cos 7A}{\sin A + \sin 3A + \sin 5A + \sin 7A} =$

A. $\sin 4A$

B. $\cos 4A$

C. $\tan 4A$

D. $\cot 4A$

Answer: D

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43. If none of A,B, A+B is an integral multiple of π, then prove that

$$\frac{1 - \cos A + \cos B - \cos(A+B)}{1 + \cos A - \cos B - \cos(A+B)} = \tan.\frac{A}{2}\cot.\frac{B}{2}$$

A. $\sin\frac{A}{2}\cdot\cos\frac{B}{2}$

B. $\tan\frac{A}{2}\cdot\cot\frac{B}{2}$

C. $\sec\frac{A}{2}\cdot\operatorname{cosec}\frac{B}{2}$

D. none

Answer: B

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44. $\dfrac{\sin(n+1)\alpha - \sin(n-1)\alpha}{\cos(n+1)\alpha + 2\cos n\alpha + \cos(n-1)\alpha} =$

A. $\tan\alpha$

B. $\cot\alpha$

C. $\tan\alpha/2$

D. $\cot\alpha/2$

Answer: C

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45. $\dfrac{(\cos\theta - \cos3\theta)(\sin8\theta + \sin2\theta)}{(\sin5\theta - \sin\theta)(\cos4\theta - \cos6\theta)} =$

A. 0

B. 1

C. 2

D. 4

Answer: B

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46. $\frac{\sin 8\alpha \cdot \cos\alpha - \sin 6\alpha \cdot \cos 3\alpha}{\cos 2\alpha \cos\alpha - \sin 3\alpha \cdot \sin 4\alpha} =$

A. $\sin 2\alpha$

B. $\cos 2\alpha$

C. $\tan 2\alpha$

D. $\cot 2\alpha$

Answer: C

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47. $\dfrac{\sin\alpha\sin 3\alpha + \sin 3\alpha\sin 7\alpha + \sin 5\alpha\sin 15\alpha}{\sin\alpha\cos 3\alpha + \sin 3\alpha\cos 7\alpha + \sin 5\alpha\cos 15\alpha} =$

A. $\sin(11\alpha)$

B. $\cos(11\alpha)$

C. $\tan(11\alpha)$

D. $\cot(11\alpha)$

Answer: C

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48. $\dfrac{\sin 4A\sin 3A - \sin 5A\sin 2A + \sin 7A\sin 4A}{\cos 2A\cos 3A - \cos 2A\cdot\cos 7A + \cos A\cdot\cos 10A} =$

A. $\tan 4A\cdot\tan 5A$

B. $\tan 5A\cdot\tan 6A$

C. $\tan 4A\cdot\tan 6A$

D. $\tan 5A\cdot\tan 2A$

Answer: B

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49. $\dfrac{\sin 65^\circ + \sin 25^\circ}{\cos 65^\circ + \cos 25^\circ} =$

A. 0

B. 1

C. 2

D. 4

Answer: B

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50. $\dfrac{\sin 70^\circ + \cos 40^\circ}{\cos 70^\circ + \sin 40^\circ} =$

A. 3

B. $\sqrt{3}$

C. $1/\sqrt{3}$

D. $1/2$

Answer: B

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51. $\dfrac{\sin 75^\circ - \sin 15^\circ}{\cos 15^\circ - \cos 75^\circ} =$

A. 0

B. 1

C. 2

D. 4

Answer: B

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52. $\dfrac{\cos^2 33^\circ - \cos^2 57^\circ}{\sin 21^\circ - \cos 21^\circ} =$

A. $1/\sqrt{2}$

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

C. $1/2$

D. $-1/2$

Answer: B

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53. $\dfrac{1 + \cos 56^\circ + \cos 58^\circ - \cos 66^\circ}{\cos 28^\circ \cos 29^\circ \sin 33^\circ} =$

A. 0

B. 2

C. 4

D. 1

Answer: C

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54. $\dfrac{\cos\left(45^{\circ}+A\right)-\cos\left(45^{\circ}-A\right)}{\sin\left(120^{\circ}+A\right)-\sin\left(120^{\circ}-A\right)}=$

A. 2

B. $\sqrt{2}$

C. $2\sqrt{2}$

D. $\pm\sqrt{2}$

Answer: B

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55. $A+C=2B \Rightarrow \dfrac{\cos C-\cos A}{\sin A-\sin C}=$

A. $\cot B$

B. $\cot 2B$

C. $\tan 2B$

D. $\tan B$

Answer: D

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56. $x = \cos 55^\circ, y = \cos 65^\circ, z = \cos 175^\circ$ then $xy + yz + zx =$

A. -3/4

B. 3/4

C. 1/2

D. 3/2

Answer: A

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57. $\cot\left(A+15^\circ\right)-\tan\left(A-15^\circ\right)=$

A. $\dfrac{4\cos 2A}{1+2\cos 2A}$

B. $\dfrac{4\cos 2A}{1-2\sin 2A}$

C. $\dfrac{4\cos 2A}{1+2\sin 2A}$

D. $\dfrac{4\cos 2A}{1-2\cos 2A}$

Answer: C

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58. $\cot\left(15^\circ-A\right)+\tan\left(15^\circ+A\right)=$

A. $\dfrac{4\cos 2A}{1+2\cos 2A}$

B. $\dfrac{4\cos 2A}{1-2\sin 2A}$

C. $\dfrac{4\cos 2A}{1+2\sin 2A}$

D. $\frac{4\cos 2A}{1 - 2\cos 2A}$

Answer: B

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59. If $m \cdot \tan\left(\theta - 30^\circ\right) = n \cdot \tan\left(\theta + 120^\circ\right)$, then $\cos 2\theta =$

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

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

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

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

Answer: A

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60. If $\sin\alpha = \sin\beta$ and $\cos\alpha = \cos\beta$ then

A. $\sin\left(\frac{\alpha+\beta}{2}\right)=0$

B. $\cos\left(\frac{\alpha+\beta}{2}\right)=0$

C. $\sin\left(\frac{\alpha-\beta}{2}\right)=0$

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

Answer: C

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61. In $\Delta ABC,\ \text{ if } \cos A=\frac{\sin B}{2\sin C}$, then the triangle is

A. isosceles

B. right angled

C. equilateral

D. scalane

Answer: A

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62. If $\sec(\theta + \alpha), \sec\theta, \sec(\theta - \alpha)$ are in A.P. Then $\cos\theta\sec\alpha/2 =$

A. $-\sqrt{2}$

B. $\sqrt{2}$

C. $\pm\sqrt{2}$

D. 1

Answer: C

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63. If $\cos(x - y), \cos x, \cos(x + y)$ are three distinct numbers which are in harmonic progression and $\cos x \neq \cos y$, then $1 + \cos y =$

A. $\cos^2 x$

B. $-\cos^2 x$

C. $\cos^2 x - 1$

D. $\cos^2 x - 2$

Answer: A

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64. If $\sin(y + z - x), \sin(z + x - y), \sin(x + y - z)$ are in A. P , then prove that $x, \tan y, \tan z$ are also in A.P.

A. A.P.

B. G.P.

C. H.P.

D. A.G.P

Answer: A

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65. If $\cos 2B = \dfrac{\cos(A + C)}{\cos(A - C)}$, then tan A , tan B , tan C are in

A. A.P.

B. G.P.

C. H.P.

D. none

Answer: B

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66. If $a \cdot \cos(\theta + \alpha) = b\cos(\theta - \alpha)$, then $(a + b)\tan\theta =$

A. $(a + b)\cot\alpha$

B. $(a - b)\cot\alpha$

C. $(a + b)\cot\beta$

D. $(a - b)\cot\beta$

Answer: B

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67. If $\frac{\sin(x+y)}{\sin(x-y)} = \frac{a+b}{a-b}$ then $\frac{\tan x}{\tan y} =$

A. a/b

B. b/a

C. 1

D. 0

Answer: A

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68. If $\cos(A+B)\sin(C+D) = \cos(A-B)\cdot\sin(C-D)$, then cot A cot B cot C =

A. cot A

B. cot B

C. cot C

D. cot D

Answer: D

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69. If $\tan(\alpha + \theta) = n \cdot \tan(\alpha - \theta)$, then $(n + 1)\sin 2\theta =$

A. $(n + 1)\sin 2\alpha$

B. $(n - 1)\sin 2\alpha$

C. $(n + 1)\sin 2\beta$

D. $(n - 1)\sin 2\beta$

Answer: B

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70. If $\cos(x - y) = 3 \cdot \cos(x + y)$, then $\cot x \cdot \cot y =$

A. 0

B. 1

C. 2

D. 3

Answer: C

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71. If $\sin\theta = n\sin(\theta + 2\alpha)$, then $(1 - n)\tan(\theta + \alpha) =$

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

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

C. $(n + 1)\tan\beta$

D. $(n - 1)\tan\beta$

Answer: A

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72. If $m\sin\theta = n\sin(2\alpha + \theta), \text{ then } (m + n)\tan\alpha =$

A. $(m + n)\tan(\alpha + \theta)$

B. $(m - n)\tan(\alpha + \theta)$

C. $(m - n)\tan(\alpha - \theta)$

D. $(m + n)\tan(\alpha - \theta)$

Answer: B

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73. If $\cos\theta = \cos\alpha\cos\beta, \text{ then } \cot^2\frac{\beta}{2} =$

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

B. $\cot\left(\frac{\theta + \alpha}{2}\right)\cot\left(\frac{\theta + \alpha}{2}\right)$

C. $\cot\left(\frac{\theta - \alpha}{2}\right)\cot\left(\frac{\theta - \alpha}{2}\right)$

D. none

Answer: A

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74. If $\frac{\sin(\theta + \alpha)}{\cos(\theta - \alpha)} = \frac{1 - m}{1 + m}$, then $\tan\left(\frac{\pi}{4} - \theta\right) =$

A. $m\sin\left(\frac{\pi}{4} - \alpha\right)$

B. $m\cos\left(\frac{\pi}{4} + \alpha\right)$

C. $m\tan((\pi)/(4) + \alpha)$

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

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75. $\dfrac{\cos x}{\cos(x-2y)} = \lambda \Rightarrow \tan(x-y)\tan y =$

A. $\dfrac{1+\lambda}{1-\lambda}$

B. $\dfrac{1-\lambda}{1+\lambda}$

C. $\dfrac{\lambda}{1+\lambda}$

D. $\dfrac{\lambda}{1-\lambda}$

Answer: B

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76. If $\dfrac{\cos(\theta_1-\theta_2)}{\cos(\theta_1+\theta_2)} + \dfrac{\cos(\theta_3+\theta_4)}{\cos(\theta_3-\theta_4)} = 0$, then $\tan\theta_1, \tan\theta_2 \tan thet_3 \tan\theta_4 =$

A. 1

B. 2

C. -1

D. none

Answer: C

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77. If $\tan\left(\frac{\theta}{2}\right) = \sqrt{\left[\frac{1-e}{1+e}\right]}\tan\left(\frac{\alpha}{2}\right)$ then $\cos\alpha =$

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

B. $\frac{\cos thea + e}{1 - e\cos\theta}$

C. $\frac{\cos\theta - e}{1 + e\cos\theta}$

D. $\frac{\cos\theta + e}{1 + e\cos\theta}$

Answer: A

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78. If $\cos\theta = \dfrac{\cos\alpha - \cos\beta}{1 - \cos\alpha\cos\beta}$ then $\tan^2\left(\dfrac{\theta}{2}\right)\tan^2\left(\dfrac{\beta}{2}\right) =$

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

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

C. $\cot\dfrac{\alpha}{2}$

D. $\cot^2\dfrac{\alpha}{2}$

Answer: B

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79. $\cos A = \dfrac{3}{4} \Rightarrow 32\sin\left(\dfrac{A}{2}\right)\sin\left(\dfrac{5A}{2}\right) =$

A. 7

B. 8

C. 13

D. 11

Answer: D

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80. If $xy + yz + zx = 1, \ \text{then} \ \frac{x}{1+x^2} + \frac{y}{1+y^2} + \frac{z}{1+z^2} =$

A. $\frac{2}{\sqrt{(1+x^2)(1+y^2)(1+z^2)}}$

B. $\frac{2}{\sqrt{(1-x^2)(1+y^2)(1+z^2)}}$

C. $\frac{2}{\sqrt{(1+x^2)(1-y^2)(1+z^2)}}$

D. $\frac{2}{\sqrt{(1+x^2)(1-y^2)(1-z^2)}}$

Answer: A

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81. If $\sin\alpha + \sin\beta = a, \cos\alpha + \cos\beta = b then \sin(\alpha + \beta) =$

A. ab

B. $a + b$

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

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

Answer: D

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82. If $\sin\alpha + \sin\beta = a, \cos\alpha + \cos\beta = b then \cos(\alpha + \beta) =$

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

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

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

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

Answer: D

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83. If $\cos\alpha + \cos\beta = a, \sin\alpha + \sin\beta = b$ and θ is the arithmetic mean between α and β then $\sin 2\theta + \cos 2\theta$ is equal to

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

B. $(a-b)^2 / \left(a^2 + b^2\right)$

C. $\left(a^2 - b^2\right) / \left(a^2 + b^2\right)$

D. none of these

Answer: D

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84. If $\cos x + \cos y = 1/3, \sin x + \sin y = 1/4$ then $\cos(x+y) =$

A. $7/25$

B. $24/25$

C. $25/24$

D. 25/7

Answer: A

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85. If x and y are acute angles such that $\cos x + \cos y = \frac{3}{2}$ and $\sin x + \sin y = \frac{3}{4}$ then $\sin(x + y) =$

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

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

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

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

Answer: C

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86. If $\sin x + \sin y = \frac{1}{4}$, $\sin x - \sin y = \frac{1}{5}$, then $4\cot\left(\frac{x-y}{2}\right) =$

A. $5\cot\left(\frac{x-y}{2}\right)$

B. $5\cot\left(\frac{x+y}{2}\right)$

C. $5\tan\left(\frac{x-y}{2}\right)$

D. $5\tan\left(\frac{x+y}{2}\right)$

Answer: B

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87. If $\cos x + \cos y = \frac{4}{5}$ and $\cos x - \cos y = \frac{2}{7}$, then the value of $14\tan\left(\frac{x-y}{2}\right) + 5\cot\left(\frac{x+y}{2}\right)$

A. 0

B. $1/4$

C. $3/4$

D. $5/4$

Answer: A

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88. Let α, 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 $\cos\frac{\alpha - \beta}{2}$ is

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

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

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

D. $\frac{3}{\sqrt{13}}$

Answer: A

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89. $\sin A + \sin B = \sqrt{3}(\cos B - \cos A) \Rightarrow \sin 3A + \sin 3B =$

A. 0

B. 2

C. 1

D. -1

Answer: A

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

A. 1

B. -1

C. 0

D. none

Answer: A

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91. If n is an odd integer than $\left(\frac{\cos A + \cos B}{\sin A - \sin B}\right)^n + \left(\frac{\sin A + \sin B}{\cos A - \cos B}\right)^n =$

A. 0

B. $2\cot^n \frac{A + B}{2}$

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

D. $2\tan^n\left(\frac{A + B}{2}\right)$

Answer: A

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92. If $\left(1 + \sqrt{1 + a}\right)\tan\alpha = 1 + \sqrt{1 - \alpha}$ then `sin 4 alpha =

A. 0

B. 1

C. -1

D. a

Answer: D

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93. If $\sin^3 x \sin 3x = \sum_{m=0}^{n} C_m \cos^m x$ where $C_0, C_1, \ldots\ldots\ldots .., C_n$ are constant and $C_n \neq 0$, then n=

A. 0

B. -3

C. 3

D. \`0

Answer: D

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

then show that

(i) $xyz = xy + z$ (ii) $xyz = x + y + z$

A. $xyz = xz + y$

B. $xyz = xy + z$

C. $xyz = yz + x$

D. none

Answer: B

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EXERCISE 1 E (TRIGONOMETRIC IDENTITIES)

1. If $A+B+C=180^{\circ}$, then show that $\sin 2A+\sin 2B+\sin 2C=4\sin A\sin B\sin C$.

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

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

C. $3\sin A\sin B\sin C$

D. $2\sin A\sin B\sin C$

Answer: B

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2. If A, B, C are angles of a triangle , prove that $\sin 2A+\sin 2B-\sin 2C=4\cos A\cos B\sin C$

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

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

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

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

Answer: C

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3. If $A+B+C=180^{\circ}$, then $\dfrac{\sin 2A-\sin 2B-\sin 2C}{\sin 2B-\sin 2A-\sin 2C}=$

A. $\tan A\cdot\cot B$

B. $\cot A\cdot\tan B$

C. $2\tan A\cdot\cot B$

D. $2\cot A\cdot\tan B$

Answer: A

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4. If $A+B+C=180^{\circ}$ then $\cos 2A+\cos 2B+\cos 2C+1=$

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

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

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

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

Answer: B

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5. If A, B, C are angles of a triangle , prove that $\cos 2A - \cos 2B + \cos 2C = 1 - 4\sin A \cos B \sin C$

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

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

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

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

Answer: D

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6. If $A+B+C=180^{\circ}$ then $\sin A+\sin B+\sin C=$

A. $4\sin\frac{A}{2}\sin\frac{B}{2}\cos\frac{C}{2}$

B. $4\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

C. $4\sin\frac{A}{2}\cdot\cos\frac{B}{2}\cdot\cos\frac{C}{2}$

D. $4\sin\frac{A}{2}\cos\frac{B}{2}\sin\frac{C}{2}$

Answer: B

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7. If $A+B+C=180^{\circ}$ then $\sin A+\sin B-\sin C=$

A. $4\sin\frac{A}{2}\sin\frac{B}{2}\cos\frac{C}{2}$

B. $4\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

C. $4\sin\frac{A}{2}\cdot\cos\frac{B}{2}\cdot\cos\frac{C}{2}$

D. $4\sin\frac{A}{2}\cos\frac{B}{2}\sin\frac{C}{2}$

Answer: A

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8. In $\Delta ABC, \dfrac{\sin 2A + \sin 2B + \sin 2C}{\sin A + \sin B + \sin C} =$

A. $4\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

B. $4\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

C. $8\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

D. $1 + 4\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

Answer: C

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9. If $A + B + C = 180^\circ$ then $\cos A + \cos B + \cos C =$

A. $1+4\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

B. $1+4\cos\frac{A}{2}\cos\frac{B}{2}\sin\frac{C}{2}$

C. $1+4\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

D. $1+4\cos\frac{A}{2}\sin\frac{B}{2}\cos\frac{C}{2}$

Answer: A

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10. If $A+B+C=180^{\circ}$ then $\cos A-\cos B+\cos C=$

A. $-1+4\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

B. $-1+4\cos\frac{A}{2}\cos\frac{B}{2}\sin\frac{C}{2}$

C. $-1+4\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

D. $-1+4\cos\frac{A}{2}\sin\frac{B}{2}\cos\frac{C}{2}$

Answer: D

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11. In ΔABC, $\dfrac{\sin 2A + \sin 2B + \sin 2C}{\cos A + \cos B + \cos C - 1} =$

A. $4\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

B. $4\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

C. $8\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

D. $1 + 4\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

Answer: C

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12. If A, B , C are angles in a triangle, then prove that $\sin^2 A + \sin^2 B + \sin^2 C = 2 + 2\cos A\cos B\cos C$

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

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

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

D. $1 - 2\cos A\cos B\cos C$

Answer: B

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13. If $A + B + C = 180^\circ$ then $\sin^2 A - \sin^2 B - \sin^2 C =$

A. $2\cos A\sin B\sin C$

B. $-2\cos A\sin B\sin C$

C. $2\sin A\cos B\sin C$

D. 2 sin A sin B cos C `

Answer: B

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14. If $A + B + C = 180^\circ$ then $\cos^\circ A + \cos^2 B + \cos^2 C =$

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

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

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

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

Answer: A

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15. If A, B, C are angles in a triangle , then prove that $\cos^2 A + \cos^2 B - \cos^2 C = 1 - 2\sin A \sin B \cos C$.

A. $1 - 2\sin A \sin B \cos C$

B. $1 - 2\sin A \cos B \sin C$

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

D. $1 - 2\sin A \sin B \sin C$

Answer: A

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16. If $A + B + C = 180^{\circ}$ then $\sin^2\frac{A}{2} + \sin^2\frac{B}{2} + \sin^2\frac{C}{2} =$

A. $1 - 2\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

B. $1 - 2\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

C. $1 - 2\cos\frac{A}{2}\cos\frac{B}{2}\sin\frac{C}{2}$

D. $1 - 2\sin\frac{A}{2}\cos\frac{B}{2}\sin\frac{C}{2}$

Answer: A

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17. If $A + B + C = 180^{\circ}$ then $\sin^2\frac{A}{2} - \sin^2\frac{B}{2} + \sin^2\frac{C}{2} =$

A. $1 - 2\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

B. $1 - 2\cos\frac{A}{2}\sin\frac{B}{2}\cos\frac{C}{2}$

C. $1 - 2\cos\frac{A}{2}\cos\frac{B}{2}\sin\frac{C}{2}$

D. $1 - 2\sin\frac{A}{2}\cos\frac{B}{2}\sin\frac{C}{2}$

Answer: B

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18. If $A + B + C = \pi,$ then prove that

$$\cos^2\left(\frac{A}{2}\right) + \cos^2\left(\frac{B}{2}\right) + \cos^2\left(\frac{C}{2}\right) = 2\left(1 + \sin.\ \frac{A}{2}\sin.\ \frac{B}{2}\sin.\ \frac{C}{2}\right)$$

A. $2\cos\frac{A}{2}\cos\frac{B}{2}\sin\frac{C}{2}$

B. $2\cos\frac{A}{2}\sin\frac{B}{2}\cos\frac{C}{2}$

C. $2 + 2\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

D. $2 + 2\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

Answer: D

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19. In ΔABC, $\cos^2\frac{A}{2} + \cos^2\frac{B}{2} - \cos^2\frac{C}{2} =$

A. $2\cos\frac{A}{2}\cos\frac{B}{2}\sin\frac{C}{2}$

B. $2\cos\frac{A}{2}\sin\frac{B}{2}\cos\frac{C}{2}$

C. $2 + 2\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

D. $2 + 2\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

Answer: A

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20. If $A + B + C = 180^\circ$ then prove the following:

$\cos\frac{A}{2} + \cos\frac{B}{2} + \cos\frac{C}{2}$

$= 4\cos\left(\frac{\pi - A}{4}\right)\cos\left(\frac{\pi - B}{4}\right)\cos\left(\frac{\pi - C}{4}\right)$

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

B. $\cos\frac{A}{2} + \cos\frac{B}{2} + \cos\frac{C}{2}$

C. $\sin A + \sin B + \sin C$

D. $\sin\frac{A}{2} + \sin(B)/(2) + \sin\frac{C}{2}$

Answer: B

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21. If A, B, C are the angles in a triangle then prove that $\sin.\ \frac{A}{2} + \sin.\ \frac{B}{2} + \sin.\ \frac{C}{2} = 1 + 4\sin\left(\frac{\pi - A}{4}\right)\sin\left(\frac{\pi - B}{4}\right)\sin\left(\frac{\pi - C}{4}\right)$

A. $\sin\frac{A}{2} + \sin\frac{B}{2} + \sin\frac{C}{2}$

B. $\cos\frac{A}{2} + \cos\frac{B}{2} + \cos\frac{C}{2}$

C. $\sin\frac{A}{2} + \sin\frac{B}{2} - \sin\frac{C}{2}$

D. $\cos\frac{A}{2} + \cos\frac{B}{2} - \cos\frac{C}{2}$

Answer: A

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22. If $A+B+C=180^{\circ}$ then $\sin 3A+\sin 3B+\sin 3C=$

A. $4\cos\frac{3A}{2}\cos\frac{3B}{2}\cos\frac{3C}{2}$

B. $-4\cos\frac{3A}{2}\cos\frac{3B}{2}\cos\frac{3C}{2}$

C. $1-4\cos\frac{3A}{2}\cos\frac{3B}{2}\cos\frac{3C}{2}$

D. $1-4\sin\frac{3A}{2}\sin\frac{3B}{2}\sin\frac{3C}{2}$

Answer: B

Watch Video Solution

23. If $A+B+C=180^{\circ}$ then $\cos 3A+\cos 3B+\cos 3C=$

A. $4\cos\frac{3A}{2}\cos\frac{3B}{2}\cos\frac{3C}{2}$

B. $-4\cos\frac{3A}{2}\cos\frac{3B}{2}\cos\frac{3C}{2}$

C. $1-4\cos\frac{3A}{2}\cos\frac{3B}{2}\cos\frac{3C}{2}$

D. $1-4\sin\frac{3A}{2}\sin\frac{3B}{2}\sin\frac{3C}{2}$

Answer: D

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24. If $A+B+C=180^{\circ}$ then $\sin^3 A\cos(B-C)+\sin^3 B\cos(C-A)+\sin^3 C\cos(A-B)=$

A. $2\sin A\sin B\cos C$

B. $3\sin A\cos B\sin C$

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

D. $3\sin A\sin B\sin C$

Answer: D

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25. If $A+B+C=180^{\circ}$ then $\tan^2\frac{A}{2}+\tan^2\frac{B}{2}+\tan^2\frac{C}{2}\geq$

A. 1

B. 2

C. 3

D. 4

Answer: A

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26. In $\Delta ABC, \sum \sin\frac{A}{2}\cos\left(\frac{B-C}{2}\right) =$

A. $4\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

B. $4\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

C. $8\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

D. $1 + 4\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

Answer: D

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27. In ΔABC, if $\tan\frac{A}{2}, \tan\frac{B}{2}, \tan\frac{C}{2}$ are in A.P. then cos A , cos B , cos C are in

A. A.P.

B. H.P.

C. G.P.

D. A.G.P

Answer: A

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28. If $A+B+C=\pi$ and $\cos A=\cos B \cos C$ then $\cot B \cot C=$

A. 0

B. 1

C. $1/2$

D. $1/6$

Answer: C

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29. If $A + B + C = 90^\circ$ then $\sin 2A + \sin 2B - \sin 2C =$

A. $1 + 4\sin A \sin B \sin C$

B. $1 - 2\sin A \sin B \sin C$

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

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

Answer: D

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30. If $A + B + C = 180^\circ$ then $\cos 2A + \cos 2B + \cos 2C + 1 =$

A. $1+4\sin A\sin B\sin C$

B. $1-2\sin A\sin B\sin C$

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

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

Answer: A

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31. If $A+B+C=\frac{\pi}{2}$, then prove that $\sin^2A+\sin^2B+\sin^2C=1-2A\sin B\sin C.$

A. $1+4\sin A\sin B\sin C$

B. $1-2\sin A\sin B\sin C$

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

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

Answer: B

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32. If $A+B+C=90^{\circ}$ then $\cos^2A+\cos^2B+\cos^2C=$

A. $1+4\sin A\sin B\sin C$

B. $1-2\sin A\sin B\sin C$

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

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

Answer: C

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33. If $A+B+C=90^{\circ}$ then $\dfrac{\cos 2A+\cos 2B+\cos 2C-1}{\sin A\sin B\sin C}=$

A. 2

B. 4

C. 3

D. 1

Answer: B

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34. If $A + B + C = 0$, then prove that $\sin 2A + \sin 2B + \sin 2C = -4\sin A \sin B \sin C$.

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

B. $2\sin A \cos B \sin C$

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

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

Answer: D

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35. If $A+B+C=0^{\circ}$ then $\sin A+\sin B+\sin C=$

A. $4\cos\frac{A}{2}\sin\frac{B}{2}\cos\frac{C}{2}$

B. $4\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

C. $4\sin\frac{A}{2}\cos\frac{B}{2}\sin\frac{C}{2}$

D. $-4\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

Answer: D

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36. $A+B+C=0$అయితే , $\cos^2 A+\cos^2 B+\cos^2 C=1+2\cos A\cos B\cos C$ అని

రుజువు చేయండి.

A. $1+4\sin A\sin B\sin C$

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

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

D. $2\sin A\sin B\sin C$

Answer: B

Watch Video Solution

37. $A+B+C=0$అయితే , $\cos^2 A+\cos^2 B+\cos^2 C=1+2\cos A\cos B\cos C$ అని రుజువు చేయండి.

A. 1

B. 2

C. 0

D. 3

Answer: A

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38. If $A+B+C=\frac{3\pi}{2}$, prove that $\cos 2A+\cos 2B+\cos 2C=1-4\sin A\sin B\sin C$.

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

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

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

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

Answer: A

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39. If $A + B + C = 270^{\circ}$, then cos 2A + cos 2B +cos 2C +4sin A sin B sin C=

A. 0

B. 1

C. 2

D. 3

Answer: B

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40. If $A+B+C=90^\circ$ then $\cos^2 A+\cos^2 B+\cos^2 C=$

A. $2\cos A\sin B\sin C$

B. $-2\cos A\sin B\sin C$

C. $2\sin A\cos B\sin C$

D. $-2\cos A\cos B\sin C$

Answer: D

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41. If $A+B+C=2S$, then prove that

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

A. $4\cos\left(\frac{S-A}{2}\right)\cos\left(\frac{S-B}{2}\right)\sin\frac{C}{2}$

B. $4\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

C. $4\cos\left(\frac{S+A}{2}\right)\cos\left(\frac{S+B}{2}\right)\sin\frac{C}{2}$

D. $\sin A \sin B$

Answer: A

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42. If $A + B + C = 2S, \text{ then } \sin(S - A)\sin(S - B) + \sin S \sin(S - C) =$

A. $2\sin A \cos B \sin C$

B. $4\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

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

D. $\sin A \sin B$

Answer: D

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43. If A+B+C = 2S , then

P.T $\cos(S - A) + \cos(S - B) + \cos(S - C) + \cos S = 4\cos.\frac{A}{2}\cos.\frac{B}{2}\cos.\frac{C}{2}$

A. $2\sin A\cos B\sin C$

B. $4\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

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

D. $\sin A\sin B$

Answer: B

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44. If

$A + B + C = 2S,$ then $\cos^2 S + \cos^2(S - A) + \cos^2(S - B) + \cos^2(S - C) =$

A. $2\sin A\cos B\sin C$

B. $4\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

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

D. $\sin A \sin B$

Answer: C

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45. If $A + B + C = 2S$, then $\sin^2 S - \sin^2(S - A) + \sin^2(S - B) - \sin^2(S - C) =$

A. $2\sin A\cos B\sin C$

B. $4\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

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

D. $\sin A\sin B$

Answer: A

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46. If $\alpha + \beta + \gamma = 2\theta$, then $\cos\theta + \cos(\theta - \alpha) + \cos(\theta - \beta) + \cos(\theta - \gamma) =$

A. $4\sin\frac{\alpha}{2}\cdot\cos\frac{\beta}{2}\cdot\sin\frac{\gamma}{2}$

B. $4\cos\frac{\alpha}{2}\cos\frac{\beta}{2}\cos\frac{\gamma}{2}$

C. $4\sin\frac{\alpha}{2}\cdot\sin\frac{\beta}{2}\cdot\sin\frac{\gamma}{2}$

D. $4\sin\alpha\cdot\sin\beta\cdot\sin\gamma$

Answer: B

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47. If $A+B+C+D=180^\circ$ then $\cos A\cos B+\cos C\cos D=$

A. $\sin A\sin B+\sin C\sin D$

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

C. $\sin A+\sin B+\sin C\sin D$

D. $\sin A\sin B\sin C\sin D$

Answer: A

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48. If $A + B + C + D = 360^\circ$, the prove that $\cos 2A + \cos 2B + \cos 2C + \cos 2D = 4\cos(A + B)\cos(A + C)\cos(A + D)$

A. $4\cos(A + B)\cos(A + C)\cos(A + D)$

B. $4\cos(A - B)\cos(A + C)\cos(A + D)$

C. $4\cos(A + B)\cos(A - C)\cos(A + D)$

D. $4\cos(A + B)\cos(A + C)\cos(A - D)$

Answer: A

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49. If $A + B + C + D = 2\pi$, then $-4\cos\left(\frac{A + B}{2}\right)\sin\left(\frac{A + C}{2}\right)\cos\left(\frac{A - D}{2}\right) =$

A. $\sin A + \sin B + \sin C - \sin D$

B. $\sin A - \sin B + \sin C - \sin D$

C. $\sin A + \sin B + \sin C + \sin D$

D. $\sin A - \sin B + \sin C + \sin D$

Answer: B

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EXERCISE 1 F (PERIODIC FUNCTIONS)

1. The period of $\sin\left(\frac{4x - 9}{7}\right)$ is

A. $7\pi/2$

B. $5\pi/2$

C. $\pi/2$

D. $3\pi/2$

Answer: A

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2. The period of $\cos(5x/2)$ is

A. $4\pi/5$

B. $2\pi/7$

C. $3\pi/2$

D. $4\pi/3$

Answer: A

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3. If $f: R \to R$ is defined by $f(x) = 7 + \cos(5x + 3)$ for $x \in R$, then the period of f is

A. 2π

B. π

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

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

Answer: D

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4. The period of the function $\tan(3x + 5)$is

A. $2\pi/3$

B. $\pi/6$

C. $\pi/3$

D. π

Answer: C

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5. The period of $\cot\left(\frac{3x - 4}{7}\right)$ is

A. $4\pi/5$

B. $2\pi/7$

C. $7\pi/3$

D. $4\pi/3$

Answer: C

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6. The period of sec (2x+5) is

A. π

B. 2π

C. 4π

D. $\pi/2$

Answer: A

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7. The period of $\operatorname{cosec}(6 - 5x)$ is

A. π

B. $2\pi/5$

C. $4\pi/3$

D. $\pi/2$

Answer: B

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8. The period of $\cos(x + 2x + 3x + \ldots. + nx)$ is

A. $4\pi/n(n + 1)$

B. $4\pi/(n + 1)$

C. $4\pi/(n - 1)$

D. none

Answer: A

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9. The period of $\sin\left(x + 8x + 27x + \dots + n^3x\right)$ is

A. $8\pi/n^2(n+1)^2$

B. $4\pi/n(n+1)$

C. $8\pi/n(n+1)$

D. $4\pi/n^2(n+1)^2$

Answer: A

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10. The period of `sin (x+4x+9x+....+n^2x) is

A. $6\pi/n(n+1)(2n+1)$

B. $9\pi/(n+1)(n+2)$

C. $12\pi/n(n+1)(2n+1)$

D. none

Answer: C

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11. The period of $\tan(x + 2x + 3x.... nx)$ is

A. π

B. $2\pi/n(n+1)$

C. $4\pi/n(n-1)$

D. $4\pi/n(n+1)$

Answer: B

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12. Period of $\tan\left(x + 4x + 9x + \ldots + n^2x\right)$ is

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

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

C. $\dfrac{6\pi}{n(n+1)(2n+1)}$

D. $\dfrac{12\pi}{n(n+1)(2n+1)}$

Answer: C

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13. The period of $\sin^2 x$ is

A. π

B. 2π

C. $\pi/2$

D. 3π

Answer: A

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14. The period of $\cos^3 x$ is

A. π

B. 2π

C. $\pi/2$

D. 3π

Answer: B

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15. The period of $\sin^4 x$ is

A. π

B. 2π

C. $\pi/2$

D. 3π

Answer: A

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16. Find the period of $\cos^4 x$.

A. π

B. 2π

C. $\pi/2$

D. 3π

Answer: A

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17. The period of $3\cos 3x + 3\tan 3x$ is

A. π

B. $2\pi/3$

C. $\pi/2$

D. 2π

Answer: B

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18. The period of $118\sin 2x$ - $143\cot 4x$ is

A. $2\pi^c$

B. π^c

C. $4\pi^c$

D. none

Answer: B

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19. The period of the function $f(\theta) = \sin\frac{\theta}{3} + \cos\frac{\theta}{2}$ is

A. 3π

B. 6π

C. 9π

D. 12π

Answer: D

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20. The period of $f(x) = \cos\left(\frac{x}{3}\right) + \sin\left(\frac{x}{2}\right)$ is

A. 2π

B. 4π

C. 8π

D. 12π

Answer: D

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21. The period of $\sin\frac{\pi x}{2} + \cos\frac{\pi x}{3}$ is

A. 4

B. 6

C. 12

D. 24

Answer: C

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22. The period of $\sin\frac{\pi x}{2} + 2\cos\frac{\pi x}{3} - \tan\frac{\pi x}{4}$ is

A. 6

B. 3

C. 4

D. 12

Answer: D

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23. If $f(x) = \sin^2\left(\frac{\pi}{8} + \frac{x}{2}\right) - \sin^2\left(\frac{\pi}{8} - \frac{x}{2}\right)$, then the period of f is

A. π

B. $\pi/2$

C. $\pi/3$

D. 2π

Answer: D

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24. The period of $\sin^3 x + \cos^3 x$ is

A. $\pi/2$

B. π

C. 2π

D. $3\pi/2$

Answer: C

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25. The period of $\sin^4 x + \cos^4 x$ is

A. 2π

B. π

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

D. $\pi/4$

Answer: C

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26. The period of sin x cos x is

A. $\pi/2$

B. π

C. 2π

D. `3pi//2

Answer: B

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27. The period of $|\sin x|$ is

A. $\pi/2$

B. π

C. 2π

D. 3π

Answer: B

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28. The period of $|\sin x + \cos x|$ is

A. $e\pi$

B. π

C. $\pi/4$

D. $\pi/2$

Answer: B

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29. The period of $\sin x \sin\left(120^{\circ} + x\right)\sin\left(120^{\circ} - x\right)$ is

A. π

B. $\pi/3$

C. $2\pi/3$

D. $3\pi/2$

Answer: C

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30. The period of $\cos x \cos(\pi/3 + x)\cos(\pi/3 - x)$ is

A. π

B. $\pi/3$

C. $2\pi/3$

D. $3\pi/2$

Answer: C

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31. The period of $\left(\tan\theta - \frac{1}{3}\tan^3\theta\right)\left(\frac{1}{3} - \tan^2\theta\right)^{-1}$, where $\tan^2\theta \neq \frac{1}{3}$ is :

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

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

C. π

D. 2π

Answer: A

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32. The period of $\dfrac{\sin 3x}{\cos 2x}$ is

A. π

B. 2π

C. $2\pi/3$

D. $4\pi/3$

Answer: B

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33. If $n \in N$, and the period of $\dfrac{\cos nx}{\sin(x/n)}$ is 4π, then n=

A. 4

B. 3

C. 2

D. 1

Answer: C

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34. The period of $\dfrac{\cot(5x+3)+\sin(3x+4)}{\sec(3-4x)-\cos(4-6x)}$ is

A. $\pi/2$

B. π

C. 2π

D. 3π

Answer: C

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35. The period of $\dfrac{\cot(x/4)+\tan(x/4)}{1+\tan(x/2)-\tan x}$ is

A. 2π

B. 3π

C. 4π

D. π

Answer: C

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36. The period of x-[x] , where [x] represents the integral part of x , is equal to

A. $1/2$

B. 1

C. $1/3$

D. 2

Answer: B

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37. Find a sine function whose period is $2/3$.

A. $\sin(3\pi x)$

B. $\pm\sin(3\pi x)$

C. $\pm\sin(2\pi x/5)$

D. $\sin(\pi x/3)$

Answer: B

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38. The cosine function having period 2/5 is

A. $\cos 5\pi x$

B. $\pm\cos(3\pi x)$

C. $\pm\cos(2\pi x/3)$

D. $\cos(\pi x/3)$

Answer: A

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39. The tan function having period 2 is

A. $\tan 2\pi x$

B. $\pm\tan(\pi x/2)$

C. $\pm\tan(2\pi x/3)$

D. $\tan(\pi x/3)$

Answer: B

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EXERCISE 1 G (VARIATION IN TRIGONOMETRIC FUNCTIONS)

1. Minimum value of cos x + sin x is obtained at

A. 0

B. $-\sqrt{2}$

C. $-1/2$

D. -2

Answer: B

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2. The minimum value of sin 2x - cos 2x is

A. 30

B. $\sqrt{2}$

C. -20

D. $-\sqrt{2}$

Answer: D

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3. The least value of $\sin 2x - \sqrt{3}\cos 2x$ is

A. -2

B. $-\sqrt{3}$

C. -1

D. 0

Answer: A

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4. The maximum value of $3\cos\theta + 4\sin\theta$ is

A. 3

B. 4

C. 5

D. $\sqrt{5}$

Answer: C

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5. The maximum value of $8\sin x + 6\cos x$ is

A. 14

B. 8

C. 10

D. 6`

Answer: C

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6. Maximum of $\sqrt{3}\sin x - \cos x$ is

A. -2

B. 2

C. 4

D. 5

Answer: B

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7. The maximum value of $7\cos x - 24\sin x$ is

A. 21

B. 22

C. 25

D. 26

Answer: C

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8. The maximum value of $8\sin 4x - 15\cos 4x$ is

A. -11

B. -13

C. 17

D. -18

Answer: C

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9. The minimum value of $7\cos x - 24\sin x + 5$ is

A. 30

B. $\sqrt{2}$

C. -20

D. $-\sqrt{2}$

Answer: C

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10. The minimum value of $4\cos\theta + 2\sqrt{3}\sin\theta$ is

A. $-2\sqrt{7}$

B. $-3\sqrt{7}$

C. $3\sqrt{7}$

D. $2\sqrt{7}$

Answer: A

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11. 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. 23

Answer: B

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12. Maximum of cos A - cos B , if $A + B = \frac{\pi}{2}$ is

A. $\sqrt{2}$

B. 2

C. 3

D. -3

Answer: A

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13. Minimum of $\cos A - \cos B, \quad \text{if } A + B = \pi/2$ is

A. 1

B. $\sqrt{2}$

C. $-\sqrt{2}$

D. 2

Answer: C

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14. Local Minimum of $\tan\theta + \cot\theta$ is

A. 2

B. -2

C. $1/2$

D. none

Answer: A

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15. Local maximumu value of $1 + \tan x \tan 2x$ is

A. 1

B. 2

C. -2

D. -1

Answer: D

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16. Local minimum value of $1 - \tan x \cot 2x$ is

A. 2

B. $1/2$

C. $-1/2$

D. $1/3$

Answer: B

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17. The Maximum of $\dfrac{1}{3\sin x - 4\cos x + 7}$ is

A. $1/6$

B. $1/8$

C. $1/11$

D. $1/12$

Answer: D

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18. The maximum value of $\sin x \cos x$ is

A. 0

B. $1/2$

C. $-1/2$

D. 1

Answer: B

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19. Minimum value of $\sqrt{3}\sin x \cos x$ is

A. $\sqrt{3}/2$

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

C. $\sqrt{2}/3$

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

Answer: B

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20. The minimum value of $\sin^2 x$ is

A. 0

B. 1

C. -1

D. 2

Answer: A

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21. The maximum value of $\sin^2\theta + \cos^4\theta$ is

A. 0

B. 1

C. $3/4$

D. $\pi/2$

Answer: B

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22. The minimum value of $3\sin^2 x + 4\cos^2 x$ is

A. 2

B. 3

C. 4

D. 5

Answer: B

Watch Video Solution

23. The minimum value of $2\sin^2 x - \cos 2x$ is

A. 1

B. 2

C. 3

D. -1

Answer: D

Watch Video Solution

24. The maximum value of $\sin^2 x + 2\sin x + 3$ is

A. 0

B. 2

C. 3

D. 6

Answer: D

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25. The minimum value of $2\cos x - 3\cos^2 x + 5$ is

A. -1

B. 0

C. 1

D. 2

Answer: B

Watch Video Solution

26. The maximum value of $\cos 2x + \cos^2 x$ is

A. 2

B. 1

C. -2

D. -1

Answer: A

Watch Video Solution

27. The maximum value of $\cos^4 x - \sin^4 x$ is

A. 1

B. $1/2$

C. 2

D. -1

Answer: A

Watch Video Solution

28. The minimum value of $\sin^6 x + \cos^6 x$ is

A. 1

B. $3/4$

C. $1/4$

D. $3/2$

Answer: C

Watch Video Solution

29. The minimum value of $1 - 8\sin^2 x\cos^2 x$ is

A. 2

B. 1

C. -2

D. -1

Answer: D

Watch Video Solution

30. The minimum 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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31. Maximum of $\sin(\pi/4 + x)\sin(\pi/4 - x)$ is

A. $1/2$

B. $-1/2$

C. $1/3$

D. $-1/4$

Answer: A

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32. The minimum value of $\sin x \sin\left(60^{\circ} - x\right)\sin\left(60^{\circ} + x\right)$ is

A. $-1/4$

B. $1/4$

C. $3/4$

D. $-3/4$

Answer: A

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33. The extreme values of $\cos x \cos\left(\frac{2\pi}{3} + x\right)\cos\left(\frac{2\pi}{3} - x\right)$ is

A. $-1/2, 1/2$

B. $-1/3, 1/3$

C. $-1/4, 1/4$

D. $-1/5, 1/5$

Answer: C

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34. The extreme values of $4\cos\left(x^2\right)\cos\left(\frac{\pi}{3} + x^2\right)\cos\left(\frac{\pi}{3} - x^2\right)$ over R are

A. $-1, 1$

B. -2, 2

C. -3, 3

D. -4, 4

Answer: A

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

A. $1/2$

B. 1

C. $3/2$

D. $-1/2$

Answer: C

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

A. $-\sqrt{3}/2$

B. $1/2$

C. $3/2$

D. $\sqrt{3}/2$

Answer: A

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37. Maximum and minimum value of $\sin^2\left(120^\circ + \theta\right) + \sin^2\left(120^\circ - \theta\right)$ are

A. max=3/2, min=1/2

B. max=1/2 , min=0

C. max=3/2, min=0

D. max=3/2, min=1/3

Answer: A

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38. The minimum of $\cos^2\left(120^\circ + x\right) + \cos^2\left(120^\circ - x\right)$ is

A. $1/3$

B. $1/2$

C. $3/2$

D. $2/3$

Answer: B

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39. The maximum value of $\cos^2(\pi/4 - x) + (\sin x - \cos x)^2$ is

A. 1

B. 3

C. 2

D. 0

Answer: C

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40. Minimum value of $\cos^2(\pi/4 + x) + (\sin x - \cos x)^2 =$

A. -1

B. 0

C. 1

D. 2

Answer: B

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41. The minimum value of $5\cos\theta + 3\cos(\theta + \pi/3) + 3$is

A. 2

B. 3

C. 4

D. -4

Answer: D

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42. The maximum of $5\cos x + 3\cos\left(x - 60^{\circ}\right) + 7$ is

A. 11

B. 13

C. 14

D. 17

Answer: C

Watch Video Solution

43. The minimum value of $5\cos x + 3\cos(x + \pi/3) + 8$ is

A. 1

B. 3

C. 15

D. 0

Answer: A

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44. For all values of θ , the values of $3 - \cos\theta + \cos\left(\theta + \frac{\pi}{3}\right)$ lie in the interval

A. $[-2, 3]$

B. $[-2, 1]$

C. $[2, 4]$

D. $[1, 5]$

Answer: C

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45. Maximum value of $\sin x \cos(\pi/4 - x)$ is

A. $\left(\sqrt{2}+1\right)/2\sqrt{2}$

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

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

D. $\left(\sqrt{2}+1\right)/2$

Answer: A

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46. The minimum value of $\cos^3 x + \cos^3\left(120^\circ + x\right) + \cos^3\left(120^\circ - x\right)$ is

A. $-\sqrt{3}/4$

B. $3/4$

C. $-3/4$

D. $\sqrt{3}/4$

Answer: C

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47. $$\frac{\text{Minimum of } \left(\sin^2 x + \cos^2 x\right)}{\text{Maximum of } \left[\sin^2(3x/2) + \cos^2(3x/2)\right]} =$$

A. 1

B. 2

C. 5

D. 7

Answer: A

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48. For $x \in R$, $3\cos(4x - 5) + 4$ lies in the interval

A. [1,7]

B. [4,7]

C. [0,7]

D. [2,7]

Answer: A

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49. The range of $8\cos\theta$ - $15\sin\theta$ is

A. [-16,16]

B. [-17,17]

C. [-18,18]

D. [-19,19]

Answer: B

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50. If $A = \cos\theta + 2\sqrt{2}\sin\theta$, then for all real values of θ

A. $-2 \le A \le 2$

B. $-3 \le A \le 3$

C. $-2 \le A \le 1$

D. $-2 \le A \le 3$

Answer: B

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51. If $y = 1 + 4\sin^2 x \cos^2 x$, then

A. $1 \leq y \leq 2$

B. $-1 \leq y \leq 1$

C. $-3 \leq y \leq 3$

D. $-2 \leq y \leq 2$

Answer: A

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52. The value of $\cos\theta + 3\sqrt{2}\sin(\theta + \pi/4) + 6$ lies between

A. 2 and 12

B. -2 and 12

C. 1 and 11

D. -1 and 11

Answer: C

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53. If $f(x) = \sin^6 x + \cos^6 x$ for $x \in R$, then f(x) lies in the interval

A. $\left[\frac{7}{8}, \frac{5}{4}\right]$

B. $\left[\frac{1}{2}, \frac{5}{8}\right]$

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

D. $\left[\frac{1}{4}, \frac{1}{2}\right]$

Answer: C

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54. Minimum value of $4\tan x + 9\cot x$ is

A. 4

B. 9

C. 6

D. 12

Answer: D

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55. Minimum value of $5\sec x + 4\tan x$ is

A. 1

B. 3

C. 4

D. 5

Answer: B

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56. Minimum value of $\sin^2\theta + \text{cosec}^2\theta$ is

A. 1

B. 2

C. $1/2$

D. 4

Answer: B

Watch Video Solution

57. Minimum value of $24\cos^2 x + 16\sec^2 x$ is

A. 9

B. 16

C. 25

D. 40

Answer: D

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58. The least value of $4\sec^2\theta + 9\ \text{cosec}^2\theta$ is

A. 0

B. 4

C. 9

D. 25

Answer: D

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59. The range of $f(x) = -3\cos\sqrt{3x + x + x^2}$ is

A. $[-1, 1]$

B. $[-2, 2]$

C. $[-3, 3]$

D. $[-4, 4]$

Answer: C

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60. If $0 \leq \theta \leq \pi/2$ then

A. $\sin(\cos\theta) = \cos(\sin\theta)$

B. $\sin(\cos\theta) < \cos(\sin\theta)$

C. $\sin(\cos\theta) > \cos(\sin\theta)$

D. cannot be determined

Answer: B

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61. Maximum value of $\sin x \cos x$ is obtained at

A. π

B. $\pi/2$

C. $\pi/3$

D. $\pi/4$

Answer: D

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62. Maximum value of $\cos x + \sqrt{3}\sin x - 2$ is obtained at

A. $\pi/6$

B. $\pi/4$

C. $\pi/3$

D. $\pi/4$

Answer: C

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63. Minimum value of cos x + sin x is obtained at

A. $\pi/4$

B. $\pi/2$

C. 2π

D. $5\pi/4$

Answer: D

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64. The graph of $\cot\theta, \pi/2 < \theta < 3\pi/2$ is discontinuous at θ=

A. π

B. $\pi/2$

C. 2π

D. 3π

Answer: A

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65. The graph of $\tan\theta, 0 < \theta < \pi$ is discontinuous at θ=

A. $\pi/2$

B. $\pi/3$

C. π

D. 2π

Answer: A

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66. If $\sqrt{3}\sin x + \cos x$ is maximum , then x

A. 45°

B. 60°

C. 72°

D. 90°

Answer: B

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67. If $U = \sqrt{a^2\cos^2\theta + b^2\sin^2\theta} + \sqrt{b^2\cos^2\theta + a^2\sin^2\theta}$ then the difference between the maximum and minimum values of U^2 is given by

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

B. $(a - b)^2$

C. $(a + b)^2$

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

Answer: B

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EXERCISE 2 (SPEICAL TYPE QUESTIONS) SET -1

1. I: If A,B,C,D are angles of a cyclic quadrilateral then $\cos A + \cos B + \cos C + \cos D = 0$

II : If A, B, C, D are the angles of a quadrilateral then $\cos\frac{A + B}{2} + \cos\frac{C + D}{2} = 0$

A. only I is true

B. only II is true

C. both I & II are true

D. neither I nor II are true

Answer: C

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2. I: If $x = \sin 1, y = \sin 1^{\circ}$ then $x < y$

II : If $x = \cos 1, y = \cos 1^{\circ}$ then $x < y$

A. only I is true

B. only II is true

C. both I & II are true

D. neither I nor II are true

Answer: B

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3. I : If $\sec\theta + \tan\theta = 1/5$ then θ lies in Q_4. II : If $\operatorname{cosec}\theta - \cot\theta = \frac{1}{3}$ then θlies in Q_1 .

A. only I is true

B. only II is true

C. both I & II are true

D. neither I nor II are true

Answer: C

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4. I : If $\cos\alpha + \cos\beta + \cos\gamma = 3$ then $\sin\alpha + \sin\beta + \sin\gamma = 0$

II : If $\sin\alpha + \sin\beta + \sin\gamma = 3$ then $\cos\alpha + \cos\beta + \cos\gamma = 0$

A. only I is true

B. only II is true

C. both I & II are true

D. neither I nor II are true

Answer: C

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5. I : $\tan 20^\circ + \tan 40^\circ + \sqrt{3}\tan 20^\circ \tan 40^\circ = 1$

II : $\dfrac{\left(1+\tan 21^\circ\right)\left(1+\tan 24^\circ\right)}{\left(1+\tan 22^\circ\right)\left(1+\tan 23^\circ\right)} = 2$

A. only I is true

B. only II is true

C. both I & II are true

D. neither I nor II are true

Answer: D

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6. I : If $x\cos\theta = y\cos\left(120^\circ + \theta\right) = z\cos\left(\theta + 240^\circ\right)$ then xy+ yz+ zx=1

II : $\cos\alpha + \cos\left(120^\circ + \alpha\right) + \cos\left(120^\circ - \alpha\right) = 0$

A. only I is true

B. only II is true

C. both I & II are true

D. neither I nor II are true

Answer: B

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7. I : If $\alpha + \beta = \pi/2$ and $\beta + \gamma = \alpha$ then $\tan\alpha = \tan\beta = 2\tan\gamma$

II : In ΔABC if C is an obtuse angle then $\tan A + \tan B = 1$

A. only I is true

B. only II is true

C. both I & II are true

D. neither I nor II are true

Answer: A

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8. I : If $(1 + \tan A)(1 + \tan B) = 2$ then $A + B = 45^\circ$ or 225°

II : $\sin^2\theta + \sin^2\left(60^\circ + \theta\right) + \sin^2\left(60^\circ - \theta\right) = 3/2$

A. only I is true

B. only II is true

C. both I & II are true

D. neither I nor II are true

Answer: A

Watch Video Solution

9. I : $\cos^2\theta + \cos^2\left(60^\circ + \theta\right) + \cos^2\left(60^\circ - \theta\right) = 3/2$

II : $\sin^2\theta + \sin^2\left(60^\circ + \theta\right) + \sin^2\left(60^\circ - \theta\right) = 3/2$

A. only I is true

B. only II is true

C. both I & II are true

D. neither I nor II are true

Answer: C

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10. I : If $\frac{\cos\alpha}{a} = \frac{\sin\alpha}{b}$ then $a\cos 2\alpha + b\cos 2\alpha = a$

II : If $\frac{\sin\alpha}{a} = \frac{\cos\alpha}{b}$ then $a\sin 2\alpha + b\cos 2\alpha = a$

A. only I is true

B. only II is true

C. both I & II are true

D. neither I nor II are true

Answer: A

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11. I : $\sin^2 42^\circ - \sin^2 12^\circ = \dfrac{\sqrt{5}+1}{8}$

II : $8\cos^3 10^\circ - 6\cos 10^\circ = \sqrt{3}$

A. only I is true

B. only II is true

C. both I & II are true

D. neither I nor II are true

Answer: C

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12. I : If $180^{\circ} < \theta < 270^{\circ}$, $\sin\theta = -3/5$ then $\cos\theta/2 \equiv 1/10$.

II : If $630^{\circ} < \theta < 720^{\circ}$, $|\tan\theta| = 12/5$ then $\tan\theta/2 = 2/3$

A. only I is true

B. only II is true

C. both I & II are true

D. neither I nor II are true

Answer: D

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13. I : If $\cos x + \cos y = \frac{1}{3}$, $\sin x + \sin y = 1/4$ then $\cos(x+y) = 7/25$

II : If $\cos x + \cos y = 1/3$, $\sin x + \sin y = 1/4$ then $\sin(x+y) = 24/25$

A. only I is true

B. only II is true

C. both I & II are true

D. neither I nor II are true

Answer: C

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14. I : $\cos 52^{\circ} + \cos 68^{\circ} + \cos 172^{\circ} = 1/2$

II : $4\sin A\cos^3 A - 4\cos A\sin^3 A = \cos 4A$

A. only I is true

B. only II is true

C. both I & II are true

D. neither I nor II are true

Answer: D

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15. I : If $\cos A = \frac{3}{4}$ then $\cos\frac{A}{2}\cos\frac{5A}{2} = -7$

II : If $\sin\left(120° - \alpha\right) = \sin\left(120° - \beta\right)$ and $0 < \alpha, \beta < \pi$ then $\alpha + \beta + 60°$

A. only I is true

B. only II is true

C. both I & II are true

D. neither I nor II are true

Answer: C

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EXERCISE 2 (SPEICAL TYPE QUESTIONS) SET -2

1. $A = \sin 1, B = \cos 1, C = \tan 1$ then the ascending order is

A. A,B,C

B. B,A,C

C. C,A,B

D. B,C,A

Answer: C

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2. $A = \cos 20^\circ - \sin 20^\circ, B = \cos 100^\circ + \sin 100^\circ, C = \cos\frac{5\pi}{6} + \sin\frac{2\pi}{3}$ then the ascending order is

A. C,A,B

B. A,B,C

C. B,C,A

D. C,B,A

Answer: A

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3. $X = \tan 1, y = \tan 2, Z = \tan 3$ then the descending order is

A. X,Y,Z

B. Z,Y,Z

C. X,Z,Y

D. Y,Z,X

Answer: C

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4. If $A = \cos 15^\circ - \cos 75^\circ, B = \tan 15^\circ + \tan 75^\circ, C = \cos^2 45^\circ - \sin^2 15^\circ$

then ascending order is

A. A,B,C

B. C,A,B

C. B,C,A

D. C,B,A

Answer: B

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5. If α, β are acute angles, $\sin\alpha = 4/5, \tan\beta = 5/12$ then the descending order of $A = \sin(\alpha + \beta), B = \cos(\alpha + \beta), C = \tan(\alpha + \beta)$ is

A. A,B,C

B. B,C,A

C. B,A,C

D. C,A,B

Answer: D

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6. If

$$A = \tan 15^\circ + \cot 15^\circ, B = \tan\frac{22^{1}{}^\circ}{2} + \cot 22\frac{1}{2}^\circ \text{ and } C = \sin 54^\circ - \sin 18^\circ$$

then the ascending order is

A. A,B,C

B. B,C,A

C. C,A,B

D. C,B,A

Answer: D

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7. If

$$A = 6\sin 20^\circ - 8\sin^3 20^\circ, B = 8\cos^3 20^\circ - 6\cos 20^\circ \text{ and } C = \frac{\sin 3\theta}{\sin\theta} - \frac{\cos 3\theta}{\cos\theta}$$

then

A. $C > A > B$

B. $A > B > C$

C. $A > C > B$

D. $C > B > A$

Answer: A

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8. If

$$A = \cos^2\frac{3\pi}{5} + \cos^2\frac{4\pi}{5}, B = \cos^2\frac{\pi}{8} + \sin^2\frac{3\pi}{8}, C = \operatorname{cosec} 10^\circ - \sqrt{3}\sec 10^\circ$$

then

A. $A < C < B$

B. $A > C > B$

C. $A < b < C$

D. $A > B > C$

Answer: C

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9. If $A = \cos^2 10^\circ + \cos^2 50^\circ + \cos^2 70^\circ$, $B = \sin^4 \frac{3\pi}{8} - \cos^4 \frac{3\pi}{8}$, $C = \cos^2 \frac{\pi}{10} + \cos^2 \frac{2\pi}{5}$

then the descending order is

A. C,A,B

B. A,B,C

C. B,A,C

D. C,B,A

Answer: A

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10. If $x = \tan 15^\circ$, $y = \operatorname{cosec} 75^\circ$ and $z = 4\sin 18^\circ$, then

A. $x < y < z$

B. $y < z < x$

C. $z < x < y$

D. $x < z < y$

Answer: A

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11. If

$$A = \cos^2 76^\circ + \cos^2 16^\circ - \cos 76^\circ \cos 16^\circ, B = \cos^2(45^\circ - \alpha) + \cos^2(15^\circ + \alpha)$$

then the ascending order is

A. C,A,B

B. B,A,C

C. A,C,B

D. A,B,C

Answer: B

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12.

$A = \sin 78^\circ - \sin 18^\circ + \cos 132^\circ, B = \cos 12^\circ + \cos 84^\circ + \cos 132^\circ + \cos 156^\circ$ a

then by arranging in the ascending order is

A. C,A,B

B. B,A,C

C. A,C,B

D. A,B,C

Answer: B

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13. $A = \cos 20^\circ \cos 40^\circ \cos 60^\circ \cos 80^\circ$,

$B = \cos 6^\circ \cos 42^\circ \cos 66^\circ \cos 78^\circ$ and

$C = \cos 36^\circ \cos 72^\circ \cos 108^\circ \cos 144^\circ$ then

A. $A > B > C$

B. $B > C > A$

C. $C > A > B$

D. $A = B = C$

Answer: D

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14. Arrange the periods of the following functions in ascending order

(A) tan (2x-7) (B) sin x cos x (C) sin 3x+ cos 3x (D) $\sin^3 x$ - $\cos^3 x$

A. A,B,C,D

B. B,C,A,D

C. C,A,D,B

D. B,D,A,C

Answer: A

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15. Arrange the folloiwng in the ascending order

Maximum value of $3\sin^2 x + 4\cos^2 x$ (B) Maximum value of $2\sin^2 x$ - $\cos 2x$

(C) Maximum value of $\cos^4 x$ - $\sin^4 x$ (D) Maximum value of $\cos^4 x$ - $\sin^4 x$

A. D,C,B,A

B. A,C,B,D

C. C, B, D, A

D. B,A,D,C

Answer: D

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EXERCISE 2 (SPEICAL TYPE QUESTIONS) SET -4

1. A : $\sin\theta + \sin(\pi + \theta) + \sin(2\pi + \theta)\ldots\ldots\ldots + \sin(10\pi + \theta) = \sin\theta$

R : $\sin\theta + \sin(\pi + \theta) + \sin(2\pi + \theta)\ldots\ldots. + \sin(n\pi + \theta) = \sin\theta$ if n is even

A. A is true , R is true and R is correct explanation of A

B. A is true , R is true and R is not correct explanation of A

C. A is true , R is false

D. A is false , R is true

Answer: A

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2. A : $\sqrt{1 - \sin^2 100°} \sec 100° = -1$

R : $\sqrt{x^2} = -x$ if $x < 0$

A. A is true , R is true and R is correct explanation of A

B. A is true , R is true and R is not correct explanation of A

C. A is true , R is false

D. A is false , R is true

Answer: A

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3. A : $\sin^2 5^\circ + \sin^2 10^\circ + \ldots\ldots + \sin^2 85^\circ = 17/2$

R : If $A + B = 90^\circ$, then $\sin^2 A + \sin^2 B = 1$

A. A is true , R is true and R is correct explanation of A

B. A is true , R is true and R is not correct explanation of A

C. A is true , R is false

D. A is false , R is true

Answer: A

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4. A : If $\sin x + \operatorname{cosec} x = 2$, then $\sin^n x + \operatorname{cosec}^n x = 2$

R : If $x > 0$, then $x + \frac{1}{x} \geq 2$

A. A is true , R is true and R is correct explanation of A

B. A is true , R is true and R is not correct explanation of A

C. A is true , R is false

D. A is false , R is true

Answer: A

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5. A : $\cos 20^{\circ} + \cos 100^{\circ} + \cos 140^{\circ} = 0$.

R : $\cos\theta + \cos\left(120^{\circ} - \theta\right) + \cos\left(120^{\circ} + \theta\right) = 0$

A. A is true , R is true and R is correct explanation of A

B. A is true , R is true and R is not correct explanation of A

C. A is true , R is false

D. A is false , R is true

Answer: A

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6. A : $\sin 40^\circ - \sin 80^\circ + \sin 160^\circ = 0$

R : $\sin\theta + \sin\left(60^\circ - \theta\right) - \sin\left(60^\circ + \theta\right) = 0$

A. A is true , R is true and R is correct explanation of A

B. A is true , R is true and R is not correct explanation of A

C. A is true , R is false

D. A is false , R is true

Answer: A

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7. A : $\tan(\alpha - \beta) + \tan(\beta - \alpha) + \tan(\gamma - \alpha) = \tan(\alpha - \beta)\tan(\beta - \gamma)\tan(\gamma - \alpha)$

R : In $\Delta ABC, \sum \tan A = \Pi \tan A$

A. A is true , R is true and R is correct explanation of A

B. A is true , R is true and R is not correct explanation of A

C. A is true , R is false

D. A is false , R is true

Answer: B

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

R : If $\frac{a}{b} = \frac{c}{d}$ then $\frac{a + b}{a - b} = \frac{c + d}{c - d}$

A. A is true , R is true and R is correct explanation of A

B. A is true , R is true and R is not correct explanation of A

C. A is true , R is false

D. A is false , R is true

Answer: D

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9. A : If $\cot A + \cot B + \cos C = \sqrt{3}$ then ΔABC is an equilateral triangle

R: If $a^2 + b^2 + c^2 = 0$ then a=b=c .

A. A is true , R is true and R is correct explanation of A

B. A is true , R is true and R is not correct explanation of A

C. A is true , R is false

D. A is false , R is true

Answer: A

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10. A : $\cos 40^\circ \cos 80^\circ \cos 160^\circ = -1/8$

R : $\cos\theta \cos\left(120^\circ - \theta\right)\cos\left(120^\circ + \theta\right) = \frac{1}{4}\cos 3\theta$

A. A is true , R is true and R is correct explanation of A

B. A is true , R is true and R is not correct explanation of A

C. A is true , R is false

D. A is false , R is true

Answer: A

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11. A : $\cos 24^\circ \cos 48^\circ \cos 96^\circ \cos 168^\circ = 1/16$

R : $\cos x \cos 2x \cos 4x \ldots\ldots . \cos\left(2^n x\right) = \dfrac{\sin\left(2^{n+1}x\right)}{2^{n+1}\sin x}$

A. A is true , R is true and R is correct explanation of A

B. A is true , R is true and R is not correct explanation of A

C. A is true , R is false

D. A is false , R is true

Answer: A

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12. A : $\tan\theta + 2\tan 2\theta + 4\tan 4\theta + 8\tan 8\theta - 16\cot 6\theta = \cot\theta$

R : $\cot\alpha - \tan\alpha = 2\cot 2\alpha$

A. A is true , R is true and R is correct explanation of A

B. A is true , R is true and R is not correct explanation of A

C. A is true , R is false

D. A is false , R is true

Answer: A

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13. A : $\cos^3 x + \cos^3\left(120^\circ + x\right) + \cos^3\left(120^\circ - x\right) = \frac{3}{4}\cos 3x$

R :

$\cos\theta + \cos\left(120^\circ + \theta\right)\cos\left(120^\circ - \theta\right) = 0$ and $\cos\theta\cos\left(120^\circ + \theta\right)\cos\left(120^\circ - \theta\right)$

A. A is true , R is true and R is correct explanation of A

B. A is true , R is true and R is not correct explanation of A

C. A is true , R is false

D. A is false , R is true

Answer: A

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14. A : If $x + y + z = xyz$ then $\sum \frac{3x - x^3}{1 - 3x^2} = \Pi \frac{3x - x^3}{1 - 3x^2}$.

R : If $\tan A + \tan B + \tan C = \tan A \tan B \tan C$ then $A + B + C = n\pi$.

A. A is true , R is true and R is correct explanation of A

B. A is true , R is true and R is not correct explanation of A

C. A is true , R is false

D. A is false , R is true

Answer: A

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15. A : If

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

R : $2\sin A\sin B = \cos(A - B) + \cos(A + B)$

A. A is true , R is true and R is correct explanation of A

B. A is true , R is true and R is not correct explanation of A

C. A is true , R is false

D. A is false , R is true

Answer: C

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16. A : $\sum_{r=1}^{n-1} \frac{\cos^2(r\pi)}{n} = \frac{n}{2} - 1$

R :

$\cos\alpha + \cos(\alpha + \beta) + \cos(\alpha + 2\beta) + \ldots\ldots\ldots + \cos(\alpha + (n - 1)\beta) = \frac{\sin(n\beta/2)}{\sin(\beta/2)}\cos\left(\frac{2\alpha +}{}\right.$

A. A is true , R is true and R is correct explanation of A

B. A is true , R is true and R is not correct explanation of A

C. A is true , R is false

D. A is false , R is true

Answer: A

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17. Assertion (A) : $\sin\frac{\pi}{n} + \sin\frac{3\pi}{n} + \sin\frac{5\pi}{n} + ... +$ to n terms=0

Reason (R) : $\sin\alpha + \sin(\alpha + \beta) + ... +$ to n terms

$$= \frac{\sin\left(\frac{n\beta}{2}\right)}{\sin\beta/2} \times \sin\left(\frac{2\alpha + (n - 1)\beta}{2}\right)$$

A. A is true , R is true and R is correct explanation of A

B. A is true , R is true and R is not correct explanation of A

C. A is true , R is false

D. A is false , R is true

Answer: A

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18. A : If $A + B + C = 180^\circ$ then $\cos^2 A + \cos^2 B + \cos^2 C = 1 - 2\cos A \cos B \cos C$.

R : If $A + B + C = 180^\circ$ then $\cos 2A + \cos 2B + \cos 2C = -1 - 4\cos A \cos B \cos C$

A. A is true , R is true and R is correct explanation of A

B. A is true , R is true and R is not correct explanation of A

C. A is true , R is false

D. A is false , R is true

Answer: A

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19. A : Period of $\sin 8x + \cos 2x$ is π

R : Period of $\sin ax$ or $\cos ax$ is $\dfrac{2\pi}{|a|}$

A. A is true , R is true and R is correct explanation of A

B. A is true , R is true and R is not correct explanation of A

C. A is true , R is false

D. A is false , R is true

Answer: A

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20. Assertion (A) : The maximum value of $2\cos^2\theta + \sqrt{5}\cos\theta\sin\theta + 4\sin^2\theta$ is $\dfrac{9}{2}$

Reason (R) : The maximum value of $a\cos^2\theta + b\cos\theta\sin\theta + c\sin^2\theta$ is $\dfrac{1}{2}\left[(a + c) + \sqrt{(a - c)^2 + b^2}\right]$

A. A is true , R is true and R is correct explanation of A

B. A is true , R is true and R is not correct explanation of A

C. A is true , R is false

D. A is false , R is true

Answer: A

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