MATHS

BOOKS - TARGET MATHS (HINGLISH)

TRIGONOMETRIC FUNCTIONS OF COMPOUND ANGLES

Classical Thinking

1. The value of $\cos 105^\circ$ is

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

B. $\frac{\sqrt{3}-1}{2\sqrt{2}}$

C. $-\frac{\sqrt{3}+1}{2\sqrt{2}}$

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

Answer: D

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2. $\tan 15^\circ =$

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

B. $\sqrt{3} - 2$

C. $2 - \sqrt{3}$

D. $2 + \sqrt{3}$

Answer: C

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3. $\cos 38^\circ \cos 8^\circ + \sin 38^\circ \sin 8^\circ$ is equal to

A. $\cos 30^\circ$

B. $\cos 60^\circ$

C. $\cos 45^\circ$

D. $\cos 38^\circ$

Answer: A

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4. $\frac{1}{3}\left(\sqrt{3}\cos 23^\circ - \sin 23^\circ\right) =$

A. $\cos 43^\circ$

B. $\cos 7^\circ$

C. $\frac{1}{4}\cos 53^\circ$

D. $\frac{2}{3}\cos 53^\circ$

Answer: D

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5. The value of $\tan 5A - \tan 3A - \tan 2A$ is equal to

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

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

C. 0

D. 1

Answer: A

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6. The value of

$\tan 57^\circ - \tan 12^\circ - \tan 57^\circ \tan 12^\circ$ is

A. $\tan 69^\circ$

B. $\tan 45^\circ$

C. 0

D. $\tan 57^\circ$

Answer: B

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7. $\frac{\cos 10^0 + s \in 10^0}{\cos 10^0 - s \in 10^0}$ is equal to $\tan 55^0$ b. $\cos 55^0$ c.$-\tan 35^0$ d. $-\cot 35^0$

A. $\tan 55^\circ$

B. $\cot 55^\circ$

C. $-\tan 55^\circ$

D. $-\cot 35^\circ$

Answer: A

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8. Find value of (cos 8º −sin 8º)/(cos 8º +sin 8º)

A. $\tan 53^\circ$

B. $\tan 37^\circ$

C. $\tan 82^\circ$

D. $\tan 62^\circ$

Answer: B

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9. If $\tan A = \frac{a}{a+1}$ and $\tan B = \frac{1}{2a+1}$ then find the value of A+B

A. 0

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

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

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

Answer: D

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10. If tan A - tan B = x and cot B - cot A =y , then what is cot (A -B) equal to ?

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

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

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

D. $\frac{1}{x}+\frac{1}{y}$

Answer: D

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11. The value of $\cos^2 48^\circ - \sin^2 12^\circ$ is

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

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

C. $\frac{\sqrt{3}-1}{4}$

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

Answer: B

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12. $\frac{\cot^2 15^\circ - 1}{\cot^2 15^\circ + 1} =$

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

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

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

D. $\sqrt{3}$

Answer: B

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13. The value of $\tan(-945^\circ)$ is

A. -1

B. -2

C. -3

D. -4

Answer: A

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14. $\sin\left(\frac{\pi}{10}\right)\sin\left(\frac{3\pi}{10}\right)$

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

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

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

D. 1

Answer: C

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15. $\sin 15^\circ + \cos 105^\circ =$

A. 0

B. $2\sin 15^\circ$

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

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

Answer: A

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16. If $\tan A = \frac{1}{2}, \tan B = \frac{1}{3},$ then $\cos 2A =$

A. $\sin B$

B. $\sin 2B$

C. $\sin 3B$

D. $-\sin 2B$

Answer: B

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17. If $8\theta = \pi,$ then $\cos 7\theta + \cos \theta$ is equal to

A. 0

B. 1

C. -1

D. 7

Answer: A

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18. If ABCD is a cyclic quadrilateral, then $\cos A + \cos B$ is equal to

A. 0

B. $\cos C + \cos D$

C. $-(\cos C + \cos D)$

D. $\cos C - \cos D$

Answer: C

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19. If ABCD is a cyclic quadrilateral, then the value of $\cos A - \cos B + \cos C - \cos D$ is

A. 0

B. 1

C. $2(\cos B - \cos D)$

D. $2(\cos A - \cos C)$

Answer: A

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20. $\sin 10^\circ + \sin 20^\circ + \sin 30^\circ + \ldots + \sin 360^\circ$ is equal to

A. 0

B. 1

C. -1

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

Answer: A

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21. $\cos 1^\circ + \cos 2^\circ + \cos 3^\circ + \ldots. + \cos 180^\circ$ is equal to

A. 0

B. 1

C. -1

D. 2

Answer: C

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22. Which of the following is the correct identity ?

A. $\cos\left(\frac{\pi}{2}+A\right)=\tan A$

B. $\sec\left(\frac{7\pi}{2}-A\right)-\cos ecA$

C. $\sin(n\pi+A)=-\sin A$

D. $\sin(\pi-A)=-\sin A$

Answer: B

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23. The value of $\frac{\cot 54^\circ}{\tan 36^\circ}+\frac{\tan 20^\circ}{\cot 70^\circ}$ is

A. 0

B. 2

C. 3

D. 1

Answer: B

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24. Prove that

$$\frac{\cos(90^\circ + \theta)\sec(-\theta)\tan(180^\circ - \theta)}{\sec(360^\circ - \theta)\sin(180^\circ + \theta)\cot(90^\circ - \theta)} = -1$$

A. 2

B. 1

C. -1

D. 0

Answer: C

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25. $\sin^2 25^\circ + \sin^2 65^\circ$ is equal to

A. 0

B. 1

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

D. 2

Answer: B

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26. The value of :

$\sin^2\left(\frac{\pi}{8}\right) + \sin^2\left(\frac{3\pi}{8}\right) + \sin^2\left(\frac{5\pi}{8}\right) + \sin^2\left(\frac{7\pi}{8}\right) is:$

A. 1

B. 2

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

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

Answer: B

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27. $\cos 2\theta$ is not equal to

A. $2\cos^2\theta - 1$

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

C. $\frac{1 + \tan^2\theta}{1 - \tan^2\theta}$

D. $\frac{1 - \tan^2\theta}{1 + \tan^2\theta}$

Answer: C

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28. $\sin 4\theta$ can be written as

A. $4\sin\theta\left(1-2\sin^2\theta\right)\sqrt{1-\sin^2\theta}$

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

C. $4\sin\theta-6\sin^3\theta$

D. $4\sin\theta+6\sin^2\theta$

Answer: A

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29. If $\tan\theta=t,$ then $\tan 2\theta+\sec 2\theta=$

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

B. $\dfrac{1-t}{a+t}$

C. $\dfrac{2t}{a-t}$

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

Answer: A

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30. If $\sin A + \cos A = 1,$ then $\sin 2A$ is equal to

A. 1

B. 2

C. 0

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

Answer: C

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31. Find the value of : $\sqrt{2 + \sqrt{2 + 2\cos 4\theta}}$

A. $\cos\theta$

B. $\sin\theta$

C. $2\cos\theta$

D. $2\sin\theta$

Answer: C

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32. $1+\cos^2 2A$ is equal to

A. $\sin^4 A+\cos^4 A$

B. $\sin^2 2A$

C. $2\left(\cos^4 A+\sin^4 A\right)$

D. $2\left(\cos^4 A-\sin^4 A\right)$

Answer: C

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33. $1-2\sin^2\left(\frac{\pi}{4}+\theta\right)=$

A. $\cos 2\theta$

B. $-\cos 2\theta$

C. $\sin 2\theta$

D. $-\sin 2\theta$

Answer: D

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34. The largest value of $\sin\theta\cos\theta$ is

A. 1

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

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

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

Answer: B

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35. $(\sec 2A + 1)\sec^2 A =$

A. $\sec A$

B. $2\sec A$

C. $\sec 2A$

D. $2\sec 2A$

Answer: D

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36. $\cos ecA - 2\cot 2A\cos A =$

A. $2\sin A$

B. $\sec A$

C. $2\cos A\cot A$

D. $\cos A$

Answer: A

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37. $\cos 20^\circ \cos 40^\circ \cos 80^\circ =$

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

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

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

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

Answer: D

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

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

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

C. $\tan\theta$

D. $\cot\theta$

Answer: C

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

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

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

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

D. $\frac{5\sqrt{7}}{16}$

Answer: D

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40. If $\cos 3\theta = \alpha \cos \theta + \beta \cos^3 \theta$, then $(\alpha, \beta) =$

A. $(3, 4)$

B. $(4, 3)$

C. $(-3, 4)$

D. $3, -4)$

Answer: C

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41. If $\tan A = \frac{1}{2}$, then $\tan 3A =$

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

B. $\frac{11}{2}$

C. $\frac{7}{2}$

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

Answer: B

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42. If $x+\frac{1}{x}=2\cos\theta$, then $\left(x^3+\frac{1}{x^3}\right)$ is equal to-

A. $\cos 3\theta$

B. $2\cos 3\theta$

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

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

Answer: B

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43. If $\sin\alpha=\frac{-3}{5}$, where $\pi<\alpha<\frac{3\pi}{2}$, then $\cos\left(\frac{\alpha}{2}\right)=$

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

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

C. $\frac{3}{\sqrt{10}}$

D. $\frac{-3}{\sqrt{10}}$

Answer: A

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44. If $\tan\frac{\theta}{2}$= t, then the value of $\frac{1-t^2}{1+t^2}$ is

A. $\cos\theta$

B. $\sin\theta$

C. $\sec\theta$

D. $\cos 2\theta$

Answer: A

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45. If $\tan\frac{A}{2}=\frac{3}{2}$, then $\frac{1+\cos A}{1-\cos A}=$

A. -5

B. 5

C. $\frac{9}{4}$

D. $\frac{4}{9}$

Answer: D

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46. $\tan\frac{A}{2}$ is equal to

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

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

C. $\sqrt{\frac{1-\cos A}{1+\cos A}}$

D. $\sqrt{\frac{1+\cos A}{1-\cos A}}$

Answer: C

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47. If $\tan\beta = \cos\theta \tan\alpha$, then prove that $\tan^2\frac{\theta}{2} = \frac{\sin(\alpha-\beta)}{\sin(\alpha+\beta)}$.

A. $\frac{\sin(\alpha+\beta)}{\sin(\alpha+\beta)}$

B. $\frac{\cos(\alpha-\beta)}{\cos(\alpha+\beta)}$

C. $\frac{\sin(\alpha-\beta)}{\sin(\alpha-\beta)}$

D. $\frac{\cos(\alpha+\beta)}{\cos(\alpha-\beta)}$

Answer: C

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Critical Thinking

1. If $\cos(A+B) = \alpha \cos A \cos B + \beta \sin A \sin B$, then (α, β) is

A. $(-1, -1)$

B. $(-1, 1)$

C. $(1, -1)$

D. $(1, 1)$

Answer: C

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2. If $\sin A = \frac{4}{5}$ and $\cos B = -\frac{12}{13}$, where A and B lie in first and third quadrant respectively, then $\cos(A+B) =$

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

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

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

D. $-\frac{16}{56}$

Answer: D

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3. If $\sin A = \frac{1}{\sqrt{10}}$ and $\sin B = \frac{1}{\sqrt{5}}$, where A and B are positive acute angles, then $A + B$ is equal to

A. π

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

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

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

Answer: D

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4. If $\tan\theta$=1/2 and $\tan\phi$=1/3 , then $\tan(2\theta + \phi)$

A. 1

B. 2

C. 3

D. 4

Answer: C

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

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

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

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

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

Answer: A

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6. If $A - B = \pi/4$, then $(1 + tanA)(1 - tanB)$ is equal to

A. 1

B. 2

C. ∞

D. -2

Answer: B

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7. If $A + B = 45^\circ$, then $(\cot A - 1)(\cot B - 1)$ is equal to

A. 0

B. 2

C. 1

D. 4

Answer: B

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8. If $\cos(\theta - \alpha) = a, \sin(\theta - \beta) = b,$ then $\cos^2(\alpha - \beta) + 2ab\sin(\alpha - \beta)$ is equal to

A. $4a^2b^2$

B. $a^2 - b^2$

C. $a^2 + b^2$

D. $-a^2b^2$

Answer: C

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9. If x,y,z are any three real numbers, then $\tan(x-y)+\tan(y-z)+\tan(z-x)$ is equal to

A. 1

B. 0

C. $\tan(x-y)\tan(y-z)\tan(z-x)$

D. $\tan(y-x)\tan(z-y)\tan(z-x)$ is equal to

Answer: C

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10. The value of $\tan 3A-\tan 2A-\tan A$ is equal to (A) $\tan 3A\tan 2A\tan A$ (B) $-\tan 3A\tan 2A\tan A$ (C) $\tan A\tan 2A-\tan 2A\tan 3A-\tan 3A\tan A$ (D) none of these

A. $\tan 3A\tan 2A\tan A$

B. $-\tan 3A\tan 2A\tan A$

C. $\tan A \tan 2A - \tan 2A \tan 3A$

D. $\tan 2A \tan 3A - \tan A \tan 2A$

Answer: A

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11. $\tan 20^\circ + \tan 40^\circ + \sqrt{3}. \tan 20^\circ . \tan 40^\circ =$

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

B. $\sqrt{3}$

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

D. $-\sqrt{3}$

Answer: B

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12. $\tan\frac{2\pi}{5} - \tan\frac{\pi}{15} - \sqrt{3}\tan\frac{2\pi}{5}\tan\frac{\pi}{15}$ is equal to

A. $-\sqrt{3}$

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

C. 1

D. $\sqrt{3}$

Answer: D

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13. If $\tan A = 2\tan B + \cot B,$ then $2\tan(A - B)$ is equal to

A. $\tan B$

B. $2\tan B$

C. $\cot B$

D. $2\cos B$

Answer: C

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

A. < 1

B. > 1

C. 1

D. None of these

Answer: A

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15. $\frac{1}{\tan 3A - \tan A} - \frac{1}{\cot 3A - \cot A} =$

A. $\tan A$

B. $\tan 2A$

C. $\cot A$

D. $\cot 2A$

Answer: D

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16. Show that $\sin 150^\circ + \cos 105^\circ = \frac{1}{\sqrt{5}}$

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

B. 1

C. $\sqrt{2}$

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

Answer: D

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17. The vlaue of

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

A. 1

B. 2

C. 3

D. 4

Answer: D

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18. If $\alpha + \beta = \frac{\pi}{2} and \beta + \gamma = \alpha,$ then $\tan\alpha$ equals $2(\tan\beta + \tan\gamma)$ (b) $\tan\beta + \tan\gamma$ $\tan\beta + 2\tan\gamma$ (d) $2\tan\beta + \tan\gamma$

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

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

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

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

Answer: C

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19. $\tan\left(\frac{\pi}{4} + \theta\right)\tan\left(\frac{3\pi}{4} + \theta\right)$ is equal to

A. -2

B. -1

C. 1

D. 0

Answer: B

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

A. 0

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

C. -1

D. 1

Answer: D

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21. If A+B=225° Find cotA/(1+cotA)*cotB(1+cotB)`

A. 1

B. -1

C. 0

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

Answer: D

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22. The value of $\frac{\sin(-660^\circ)\tan(1050^\circ)\sec(420^\circ)}{\cos(225^\circ)\cos ec(315^\circ)\cos(510^\circ)}$ is:

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

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

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

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

Answer: C

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23. $\cos^2\left(\frac{\pi}{4}\beta\right) - \sin^2\left(\alpha - \frac{\pi}{4}\right) =$

A. $\sin(\alpha+\beta)\sin(\alpha-\beta)$

B. $\cos(\alpha+\beta)\cos(\alpha-\beta)$

C. $\sin(\alpha+\beta)\cos(\alpha+\beta)$

D. $\sin(\alpha+\beta)\cos(\alpha-\beta)$

Answer: D

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24. THe value of $\cos^2\left(\frac{\pi}{12}\right)+\cos^2\left(\frac{\pi}{4}\right)+\cos^2\left(\frac{5\pi}{12}\right)$ is

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

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

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

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

Answer: D

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25. $\tan\alpha=\frac{1}{7},\tan\beta=\frac{1}{3},then\cos 2\alpha=$

A. $\sin 2\beta$

B. $\sin 4\beta$

C. $\sin 3\beta$

D. $\sin \beta$

Answer: B

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26. If $\cos\theta = \frac{1}{2}\left(x + \frac{1}{x}\right)$ then $\frac{1}{2}\left(x^2 + \frac{1}{x^2}\right)$=

A. $\sin 2\theta$

B. $\cos 2\theta$

C. $\tan 2\theta$

D. $\sec 2\theta$

Answer: B

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

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

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

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

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

Answer: A

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

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

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

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

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

Answer: C

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29. If : $\tan\left(\frac{\pi}{4}+\theta\right)-\tan\left(\frac{\pi}{4}-\theta\right)=m\cdot\tan(n\theta)$, then

A. $2\tan 2\theta$

B. $2\cot 2\theta$

C. $\tan 2\theta$

D. $\cot 2\theta$

Answer: A

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30. If $\sec 2\theta = p+\tan 2\theta,$ then the value of $\sin^2\theta$ in terms of p is

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

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

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

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

Answer: A

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31. If θ and ϕ are angles in first quadrant and $\tan\theta = \frac{1}{7}$ and $\sin\phi = \frac{1}{\sqrt{10}}$ then

A. $\theta + 2\phi = 90^\circ$

B. $\theta + 2\phi = 60^\circ$

C. $\theta + 2\phi = 30^\circ$

D. $\theta + 2\phi = 45^\circ$

Answer: D

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

A. $1 - a^2 - b^2$

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

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

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

Answer: B

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33. If $\tan^2\theta = 2\tan^2\varphi + 1, then \cos 2\theta + \sin^2\varphi$ equals -1 (b) 0 (c) 1 (d) none of these

A. -1

B. 0

C. 1

D. 2

Answer: B

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34. If $\tan\theta - \cot\theta = a$ and $\sin\theta + \cos\theta = b\left(b^2 - 1\right)^2\left(a^2 + 4\right)$ is equal to

A. 2

B. -4

C. ± 4

D. 4

Answer: D

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35. If sin A sin 2A = x and cos A + cos 2A = y, then $\left(x^2+y^2\right)\left(x^2+y^2\right)=$

A. $2y$

B. y

C. 3y

D. 4y

Answer: A

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36. If $\tan x=\frac{2b}{a-c}, a\neq c, y=a\cos^2 x+2b\sin x\cdot\cos x+c\sin^2 x, z=a\sin^2 x$ then

A. $y=z$

B. $y+z=a+c$

C. $y - z = a + c$

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

Answer: B

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37. $8 \cdot \sin\left(\frac{x}{8}\right) \cdot \cos\left(\frac{x}{2}\right) \cdot \cos\left(\frac{x}{4}\right) \cdot \cos\left(\frac{x}{8}\right) =$

A. $8 \sin x$

B. $\sin x$

C. $\cos x$

D. $8 \cos x$

Answer: B

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38. If $x = \cos 10^\circ \cos 20^\circ \cos 40^\circ$, then the value of x is

A. $\frac{1}{4}\tan 10^\circ$

B. $\frac{1}{8}\cos 10^\circ$

C. $\frac{1}{8}\cos ec10^\circ$

D. $\frac{1}{8}\sec 10^\circ$

Answer: B

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39. If $\theta = \frac{\pi}{2^n + 1}$, then

$\cos\theta \cos 2\theta \cos 2^2\theta \ldots \cos 2^{n-1}\theta$ is equal to

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

B. $\cos\theta$

C. 2

D. 2^n

Answer: A

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40. $\cos\left(\frac{\pi}{7}\right)\cos\left(\frac{2\pi}{7}\right)\cos\left(\frac{4\pi}{7}\right) =$

A. 0

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

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

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

Answer: D

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41. The value of $cos\frac{\pi}{5}cos.2\frac{\pi}{5}cos4\frac{\pi}{5}cos8\frac{\pi}{5} =$

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

B. 0

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

D. $\frac{-1}{16}$

Answer: D

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42. The value of $\frac{1}{\sin 10^\circ} - \frac{\sqrt{3}}{\cos 10^\circ}$ is equal to

A. 1

B. 2

C. 4

D. 3

Answer: C

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

A. $\tan A$

B. $-\tan A$

C. $\cot A$

D. $-\cot A$

Answer: C

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44. If $\tan x = \frac{b}{a}$ then $\sqrt{\frac{a+b}{a-b}} + \sqrt{\frac{a-b}{a+b}} =$

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

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

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

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

Answer: B

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45. Show that: $tan\left(60^0+\theta\right)tan\left(60^0-\theta\right)=\frac{2\cos 2\theta+1}{2\cos 2\theta-1}$

A. $\frac{2\cos 2A+1}{2\cos 2A-1}$

B. $\frac{2\cos 2A-1}{2\cos 2A+1}$

C. $\frac{\cos 2A+21}{\cos 2A-1}$

D. $\frac{\cos 2A-1}{\cos 2A+21}$

Answer: A

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46. Maximum value of $\sin^4\theta+\cos^4\theta$ is

A. $0, 2$

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

C. $-1, 1$

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

Answer: B

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47. Let $B = 2\sin^2 x - \cos 2x,$ then

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

B. $0 \leq B \leq 2$

C. $-1 \leq B \leq 1$

D. $-2 \leq B \leq 2$

Answer: A

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48. If $3\sin 2\theta = 2\sin 3\theta$ and $0 < \theta < \pi$, then $\sin\theta =$

A. 0

B. $\frac{\sqrt{15}}{4}$

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

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

Answer: B

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49. If $\sin 2A = \sin 3A$ and $0 \leq A \leq 90^\circ$, then A is equal to

A. 45°

B. 60°

C. 0° or 36°

D. 72°

Answer: C

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50. Solve that following equations :

$\text{tantheta} + \tan\left(\theta + \frac{\pi}{3}\right) + \tan\left(\theta + \frac{2\pi}{3}\right) = 3$

A. $\tan 2\theta = 1$

B. $\tan 3\theta = 1$

C. $\tan^3 \theta = 1$

D. $\tan^2 \theta = 1$

Answer: B

Watch Video Solution

51. If $\sin\theta = -\frac{4}{5}$ and θ lies in third quadrant, then the value of $\cos\left(\frac{\theta}{2}\right)$ is

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

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

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

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

Answer: B

Watch Video Solution

52. If $\sec\theta = 1\frac{1}{4}$, then $\tan\frac{\theta}{2} =$

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

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

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

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

Answer: A

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

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

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

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

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

Answer: C

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54. If $\cos\theta = \frac{3}{5}$ and $\cos\phi = \frac{4}{5}$, where θ and ϕ are positive acute angles, then $\cos\frac{\theta-\phi}{2} =$

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

B. $\frac{7}{5\sqrt{2}}$

C. $\frac{7}{\sqrt{5}}$

D. $\frac{7}{2\sqrt{5}}$

Answer: B

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

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

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

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

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

Answer: A

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

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

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

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

D. $\cos ec\frac{A}{2}$

Answer: A

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57. $\frac{1+\sin A-\cos A}{1+\sin A+\cos A}=$

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

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

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

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

Answer: C

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58. $\frac{\tan A+\sec A-1}{\tan A-\sec A+1}=\frac{1+\sin A}{\cos A}$

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

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

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

D. $\frac{1+\cos A}{\sin A}$

Answer: C

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59. If $0 < \theta < \frac{\pi}{2}$ and $\frac{y+1}{1-y} = \sqrt{\frac{1+\sin\theta}{1-\sin\theta}}$, then y is equal to

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

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

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

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

Answer: B

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60. If $\tan A \& \tan B$ are the roots of the quadratic equation $x^2 - ax + b = 0$, then the value of $\sin^2(A+B)$ is:

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

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

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

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

Answer: A

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Competitive Thinking

1. Prove that

$(i)\ \cos\left(\frac{\pi}{4}+x\right)+\cos\left(\frac{\pi}{4}-x\right)=\sqrt{2}\cos x$

$(ii)\ \cos\left(\frac{3\pi}{4}+x\right)-\cos\left(\frac{3\pi}{4}-x\right)=-\sqrt{2}\sin x$

A. $\sqrt{2}\sin^2 x$

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

C. $\sqrt{2}\cos^2 x$

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

Answer: D

Watch Video Solution

2. IF $2\sin\left(\theta+\frac{\pi}{3}\right)=\cos\left(\theta-\frac{\pi}{6}\right)$, then $\tan\theta=$

A. $\sqrt{3}$

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

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

D. $-\sqrt{3}$

Answer: D

Watch Video Solution

3. The value of $\cos 15^\circ-\sin 15^\circ$ is equal to

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

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

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

D. 0

Answer: A

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4. If $\sin\theta = \frac{12}{13}, \left(0 < \theta < \frac{\pi}{2}\right)$ and $\cos\phi = -\frac{3}{5}, \left(\pi < \phi < \frac{3\pi}{2}\right)$.

Then , $\sin(\theta + \phi)$ will be

A. $\frac{-56}{61}$

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

C. $\frac{1}{65}$

D. -56

Answer: B

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5. If $\frac{\pi}{2} < \alpha < \pi, \pi < \beta < 3\frac{\pi}{2}; \sin\alpha = \frac{15}{17}$ and $\tan\beta = \frac{12}{5}$, then the value of $\sin(\beta - \alpha)$ is

A. $\frac{-171}{221}$

B. $\frac{21}{221}$

C. $\frac{21}{221}$

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

Answer: D

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6. If $\tan(A + B) = p$ and $\tan(A + B) = q$, then write the value of $\tan 2B$.

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

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

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

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

Answer: C

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7. If $\cos(\alpha+\beta)=\frac{4}{5}; \sin(\alpha-\beta)=\frac{5}{13}$ and α, β lie between $0 \& \frac{\pi}{4}$ then find the value of $\tan 2\alpha$

A. $\frac{16}{63}$

B. $\frac{56}{33}$

C. $\frac{28}{33}$

D. None of these

Answer: B

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

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

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

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

D. $\sin A \sin B=-\frac{1}{5}$

Answer: A

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9. If $\sin\theta=3\sin(\theta+2\alpha)$, then the value of $\tan(\theta+\alpha)+2\tan\alpha$ is

A. 3

B. 2

C. -1

D. 0

Answer: D

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10. If $tan\beta = \frac{ns \in \alpha \cos \alpha}{1 - ns \in^2 \alpha}$, show that $\tan(\alpha - \beta) = (1 - n)tan\alpha$.

A. $n \tan \alpha$

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

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

D. $\frac{\tan \alpha}{n}$

Answer: B

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11. If y = (1 + tan A) (1 - tan B), where $A - B = \frac{\pi}{4}$ then $(y + 1)^{y+1}$ is equal to

A. 9

B. 4

C. 27

D. 81

Answer: C

Watch Video Solution

12. $\cot\left(\frac{\pi}{4}+\theta\right)\cot\left(\frac{\pi}{4}-\theta\right)$ is

A. 0

B. -1

C. 1

D. -2

Answer: C

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13. A positive acute angle is divided into two parts whose tangents are $\frac{1}{2}$ and $\frac{1}{3}$. Then the angle is

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

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

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

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

Answer: A

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14. If $\cos P = \frac{1}{7}$ and $\cos Q = \frac{13}{14}$, whera P and Q both are acute angles. Then the value of P-Q is

A. 30°

B. 60°

C. 45°

D. 75°

Answer: B

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15. If $\sin\alpha = \frac{1}{\sqrt{5}}$ and $\sin\beta = \frac{3}{5}$, then $\beta - \alpha$ lies in

A. $\left(0, \frac{\pi}{4}\right)$

B. $\left(\frac{\pi}{2}, \frac{3\pi}{4}\right)$

C. $[0, \pi]$

D. $\left(\pi, \frac{5\pi}{4}\right)$

Answer: A

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16. if $\tan\theta_1 = k\cot\theta_2$ then find $\dfrac{\cos(\theta_1 - \theta_2)}{\cos(\theta_1 + \theta_2)} =$

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: B

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17. $\dfrac{\cos 17^\circ + \sin 17^\circ}{\cos 17^\circ - \sin 17^\circ} =$

A. $\tan 62^\circ$

B. $\tan 56^\circ$

C. $\tan 54^\circ$

D. $\tan 73^\circ$

Answer: A

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18. Prove that

$$\frac{\cos 9^\circ + \sin 9^\circ}{\cos 9^\circ - \sin 9^\circ} = \tan 54^\circ$$

A. $\tan 54^\circ$

B. $\tan 36^\circ$

C. $\tan 18^\circ$

D. $\tan 73^\circ$

Answer: A

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

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

B. $-\sqrt{2}\sin\theta, \ -\sqrt{2}\cos\theta$

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

D. $\sqrt{2}\cos\theta, \sqrt{2}\cos\theta$

Answer: A

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20. $\cos^2 45^\circ - \sin^2 15^\circ =$

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

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

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

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

Answer: B

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21. The value of $\cos^2\left(\frac{\pi}{6}+\theta\right)-\sin^2\left(\frac{\pi}{6}-\theta\right)$ is

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

B. 0

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

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

Answer: A

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

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

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

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

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

Answer: B

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23. What is the value of $\sin 15^\circ$?

A. $\frac{\sqrt{3}-1}{2\sqrt{2}}$

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

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

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

Answer: A

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24. $\sin 75^\circ =$

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

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

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

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

Answer: B

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25. $\sin 765^\circ$

A. 1

B. 0

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

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

Answer: D

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26. The value of $tan\theta \sin\left(\frac{\pi}{2}+\theta\right)\cos\left(\frac{\pi}{2}-\theta\right)$ is -1 b. 1 c. $\frac{1}{2}\sin 2\theta$ d. none of these

A. 1

B. 0

C. $\cos^2\theta$

D. $\sin^2\theta$

Answer: D

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27. $\cot(45+\theta)\cot(45-\theta) =$

A. -1

B. 0

C. 1

D. ∞

Answer: C

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

A. $2\sqrt{3}$

B. $2 + \sqrt{3}$

C. $2 - \sqrt{3}$

D. $-2\sqrt{3}$

Answer: A

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

A. $\tan 20^\circ + \tan 50^\circ$

B. $\tan 20^\circ + \tan 50^\circ$

C. $\tan 20^\circ + 2\tan 50^\circ$

D. $2\tan 20^\circ + 2\tan 50^\circ$

Answer: C

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30. $\sec 50^\circ + \tan 50^\circ$ is equal to

A. $\tan 20^\circ + \tan 50^\circ$

B. $2\tan 20^\circ + 2\tan 50^\circ$

C. $\tan 20^\circ + 2\tan 50^\circ$

D. $2\tan 20^\circ + 2\tan 50^\circ$

Answer: C

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31. If $2\sec 2\alpha = \tan\beta + \cot\beta,$ then one of the values of $\alpha + \beta$ is

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

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

C. π

D. 2π

Answer: A

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

A. 1

B. -1

C. $\sin\theta$

D. $-\sin\theta$

Answer: B

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33. If A, B, C, D are angles of a cyclic quadrilateral, then prove that $\cos A + \cos B + \cos C + \cos D = 0$

A. $2(\cos A + \cos C)$

B. $2(\cos A + \cos B)$

C. $2(\cos A + \cos D)$

D. 0

Answer: D

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34. The value of $\cos(270^\circ + \theta)\cos(90^\circ + \theta) - \sin(270^\circ - \theta)\cos\theta$ is

A. 0

B. -1

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

D. 1

Answer: D

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35. If A = $\frac{\pi}{2}$, $\cos A + \sin(270^\circ - A) + \cos(180^\circ + A) =$

A. -1

B. 0

C. 1

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

Answer: B

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36. $\tan A + \cot\left(180^0 + A\right) + \cot\left(90^0 + A\right) + \cot\left(360^0 - A\right) =$

A. 0

B. $2\tan A$

C. $2\cot A$

D. $2(\tan A - \cot A)$

Answer: A

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37. The valur of

$\sin 1^\circ + \sin 2^\circ + \ldots + \sin 359^\circ$ is equal to

A. 1

B. 180

C. 0

D. -1

Answer: C

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38. The value of

$\sin 600^\circ \cos 330^\circ + \cos 120^\circ \sin 150^\circ$ is

A. -1

B. 1

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

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

Answer: A

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39. At $x = \frac{5\pi}{6}$, the value of $2\sin 3x + 3\cos 3x$ is

A. 0

B. 1

C. -1

D. None of these

Answer: D

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40. $\frac{1 - \tan 2^\circ \cot 62^\circ}{\tan 152^\circ - \cot 88^\circ} =$

A. $\sqrt{3}$

B. $-\sqrt{3}$

C. $\sqrt{2} - 1$

D. $1-\sqrt{2}$

Answer: B

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41. $\frac{\cos 12^\circ - \sin 12^\circ}{\cos 12^\circ + \sin 12} + \frac{\sin 147^\circ}{\cos 147^\circ} =$

A. 1

B. -1

C. 0

D. $\sqrt{3}$

Answer: C

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42. If $\tan 20^\circ = \lambda$, then $\frac{\tan 160^\circ - \tan 110^\circ}{1 + (\tan 160^\circ)(\tan 110^\circ)} =$

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

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

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

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

Answer: D

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43. $\sin^2 17.5^\circ + \sin^2 72.5^\circ$ is equal to

A. $\cos^2 90^\circ$

B. $\tan^2 45^\circ$

C. $\cos^2 30^\circ$

D. $\sin^2 45^\circ$

Answer: B

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44. Find the value of the expression

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

.

A. 0

B. 1

C. 3

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

Answer: B

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

A. 7

B. 8

C. 9

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

Answer: D

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46. $\cos 15^\circ$

A. $\sqrt{\frac{1+\cos 30^\circ}{2}}$

B. $\sqrt{\frac{1-\cos 30^\circ}{2}}$

C. $\pm\sqrt{\frac{1+\cos 30^\circ}{2}}$

D. $\pm\sqrt{\frac{1-\cos 30^\circ}{2}}$

Answer: A

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47. Which one of the following number (s) is/are rational?

A. $\sin 15^\circ$

B. $\cos 15^\circ$

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

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

Answer: C

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48. The vlaue of $\frac{1}{8}(3 - 4\cos 2\theta + \cos 4\theta)$ is

A. $\cos 4\theta$

B. $\sin 4\theta$

C. $\sin^4 \theta$

D. $\cos^4 \theta$

Answer: C

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49. If $0 < x < \frac{\pi}{4}$, then $\sec 2x - \tan 2x =$

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

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

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

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

Answer: B

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50. $\sqrt{3}\operatorname{cosec} 20^\circ - \sec 20^\circ =$

$$\frac{\sqrt{3}}{\sin(20^\circ)} - \frac{1}{\cos(20^\circ)} =$$

A. 2

B. $\frac{2\sin 20^\circ}{\sin 40^\circ}$

C. 4

D. $\frac{4\sin 20^\circ}{\sin 40^\circ}$

Answer: C

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51. The value of $\tan(1^0) + \tan(89^0)$ is

A. $\frac{2}{\sin(1^\circ)}$

B. $\frac{1}{\sin(1^\circ)}$

C. $\frac{1}{\sin(2^\circ)}$

D. $\frac{2}{\sin(2^\circ)}$

Answer: D

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52. If $\cot\frac{2x}{3}+\tan\left(\frac{x}{3}\right)=\cos ec\frac{kx}{3}$, then the value of k is

A. 1

B. 2

C. 3

D. -1

Answer: B

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53. If $2\sin^2\left((\pi/2)\cos^2 x\right)=1-\cos(\pi\sin 2x), x\neq(2n+1)\pi/2, n\in I$, then $\cos 2x$ is equal to

A. $\frac{1}{5}$

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

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

D. 1

Answer: B

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54. If $8\cos 2\theta + 8\sec 2\theta = 65, 0 < \theta < \frac{\pi}{2}$, then the value of $4\cos 4\theta$ is equal to

A. $-\frac{33}{8}$

B. $-\frac{31}{8}$

C. $-\frac{31}{32}$

D. $-\frac{33}{32}$

Answer: B

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55. If $5\left(\tan^2 x - \cos^2 x\right) = 2\cos 2x + 9$, then the value of cos4x is

A. $-\frac{7}{9}$

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

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

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

Answer: A

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56. $x + \frac{1}{x} = 2\cos\alpha$ then $x^n + \frac{1}{x^n} =$

A. $2^n \cos\alpha$

B. $2^n \cos n\alpha$

C. $2i \sin n\alpha$

D. $2\cos n\alpha$

Answer: D

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57. If $\sin x + \cos x = \frac{1}{5}$, then tan 2x is

A. $\frac{25}{17}$

B. $\frac{7}{26}$

C. $\frac{25}{7}$

D. $\frac{24}{7}$

Answer: D

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

A. 0

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

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

D. $\frac{48}{5}$

Answer: A

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59. If $a\tan\theta = b,$ then $a\cos 2\theta + b\sin 2\theta =$

A. a

B. b

C. $-a$

D. $-b$

Answer: A

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60. If $a\cos 2\theta + b\sin 2\theta = c$ has α and β as its solution, then the value of $\tan\alpha + \tan\beta$ is

A. $\frac{c+a}{2b}$

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

C. $\frac{c-a}{2b}$

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

Answer: B

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61. If α, β are solutin of $6\cos\theta + 8\sin\theta = 9$, then $\sin(\alpha+\beta) =$

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

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

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

D. $\frac{12}{13}$

Answer: C

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62. If α is a root of $25\cos^2\theta + 5\cos\theta - 12 = 0$, $\frac{\pi}{2} < \alpha < \pi$ the $\sin 2\alpha$ is equal to:

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

B. $\frac{-24}{25}$

C. $\frac{13}{18}$

D. $\frac{-13}{18}$

Answer: B

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63. $2\cos^2\theta - 2\sin^2\theta = 1,$ then $\theta =$

A. 15°

B. 30°

C. 45°

D. 60°

Answer: B

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64. $2\sin A\cos^3 A - 2\sin^3 A\cos A =$

A. $\sin 4A$

B. $\frac{1}{2}\sin 4A$

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

D. $\frac{1}{8}\sin 4A$

Answer: B

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65. $\sin^4\frac{\pi}{8}+\sin^4\frac{3\pi}{8}+\sin^4\frac{5\pi}{8}+\sin^4\frac{7\pi}{8}=$

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

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

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

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

Answer: C

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

A. 14

B. 11

C. 12

D. 13

Answer: D

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67. If $\sin 2\theta + \sin 2\phi = \frac{1}{2}$ and $\cos 2\theta + \cos 2\phi = \frac{3}{2}$, then $\cos^2(\theta - \phi) =$

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

B. $\frac{5}{8}$

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

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

Answer: B

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68. If $n = 1, 2, 3, \ldots\ldots,$ then $\cos\alpha \cos 2\alpha \cos 4\alpha \ldots\ldots \cos 2^{n-1}\alpha$ is equal to

A. $\dfrac{\sin 2n\alpha}{2n \sinh \alpha}$

B. $\dfrac{si2^n\alpha}{2^n \sin 2^{n-1}\alpha}$

C. $\dfrac{\sin 4^{n-1}\alpha}{4^{n-1} \sin \alpha}$

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

Answer: D

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69. $\cos\dfrac{2\pi}{15}\cos\dfrac{4\pi}{15}\cos\dfrac{8\pi}{15}\cos\dfrac{16\pi}{15} =$

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

B. $\dfrac{1}{4}$

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

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

Answer: D

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

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

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

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

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

Answer: B

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

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

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

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

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

Answer: D

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72. The value of $\sin\frac{31}{3}\pi$ is

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

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

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

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

Answer: A

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73. Find the value $\tan\left(\frac{\pi}{5}\right) + 2\tan\left(\frac{2\pi}{5}\right) + 4\cot\left(\frac{4\pi}{5}\right)$.

A. $\cot\frac{\pi}{51}$

B. $\cot\frac{2\pi}{5}$

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

D. $\cot\frac{3\pi}{5}$

Answer: A

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74. The valur of $\frac{\cot x - \tan x}{\cot 2x}$ is

A. 1

B. 2

C. -1

D. `4

Answer: B

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75. $\frac{\sec 8A - 1}{\sec 4A - 1} =$

A. $\frac{\tan 2A}{\tan 8A}$

B. $\frac{\tan 8A}{\tan 2A}$

C. $\frac{\cot 8A}{\cot 2A}$

D. $\frac{\tan 6A}{\tan 2A}$

Answer: B

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76. If $2\tan A = 3\tan B$, *then* $\frac{\sin 2B}{5 - \cos 2B}$ is equal to

A. $\tan A - \tan B$

B. $\tan(A - B)$

C. $\tan(A + B)$

D. $\tan(A + 2B)$

Answer: B

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77. $\cos 2\alpha = \frac{3\cos 2\beta - 1}{3 - \cos 2\beta}$, then $\tan\alpha =$

A. $\sqrt{2}\tan\beta$

B. $\frac{\tan\beta}{\sqrt{2}}$

C. $\frac{\tan^2\beta}{\sqrt{2}}$

D. $\tan\beta$

Answer: A

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78. If $\cos\theta = \frac{1}{2}\left(a + \frac{1}{a}\right)$, then the value of $\cos 3\theta$ is

A. $\frac{1}{8}\left(a^3 + \frac{1}{a^3}\right)$

B. $\frac{3}{2}\left(a + \frac{1}{a}\right)$

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

D. $\frac{1}{3}\left(a^3 + \frac{1}{a^3}\right)$

Answer: C

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79. $\cos^3 110^\circ + \cos^3 10^\circ + \cos^3 130^\circ =$

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

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

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

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

Answer: C

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80. If $\sin 6\theta = 32\cos^2\theta\sin\theta - 32\cos^3\theta\sin\theta + 3x,$ then x=

A. $\cos\theta$

B. $\cos 2\theta$

C. $\sin\theta$

D. $\sin 2\theta$

Answer: D

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81. $\tan\left(\frac{\pi}{4}+\frac{\theta}{2}\right)+\tan\left(\frac{\pi}{4}-\frac{\theta}{2}\right)$ is equal to

A. $\sec\theta$

B. $2\sec\theta$

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

D. $\sin\theta$

Answer: B

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82. If $\tan x=\frac{3}{4}, \pi<x<\frac{3\pi}{2}$, then the value of $\cos\frac{x}{2}$ is

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

B. $\frac{3}{\sqrt{10}}$

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

D. $-\frac{3}{\sqrt{10}}$

Answer: A

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83. If $90^\circ < A < 180^\circ$ and $\sin A = \frac{4}{5}$, *then* $\tan\frac{A}{2}$ is equal to

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

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

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

D. 2

Answer: D

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84. If θ is an acute angle and $\sin\left(\frac{\theta}{2}\right) = \sqrt{\frac{x-1}{2x}}$,then $\tan\theta$ is equal to

A. $x^2 - 1$

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

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

D. $x^2 + 1$

Answer: B

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

A. $2 - \sqrt{5}$

B. $\sqrt{5} - 2$

C. $\sqrt{5} + 2$

D. $9 - 4\sqrt{5}$

Answer: B

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86. If $\cos\theta = \dfrac{\cos\alpha - \cos\beta}{1 - \cos\alpha\cos\beta}$, then one of the values of $\tan\left(\dfrac{\theta}{2}\right)$ is

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

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

C. $\tan\dfrac{\beta}{2}\cot\dfrac{\alpha}{2}$

D. $\tan^2\dfrac{\alpha}{2}\tan^2\dfrac{\beta}{2}$

Answer: A

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87. If $\theta \in \left(\dfrac{\pi}{2}, \dfrac{3\pi}{2}\right)$, then the value of $\sqrt{4\cos^4\theta + \sin^2 2\theta} + 4\cot\theta\cos^2\left(\dfrac{\pi}{4} + \dfrac{\theta}{2}\right)$ is

A. $-2\cot\theta$

B. $2\cot\theta$

C. $2\cos\theta$

D. $2\sin\theta$

Answer: B

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88. $(m+2)\sin\theta + (2m-1)\cos\theta = 2m+1$ then $\tan\theta$ is

A. $\frac{4}{3}$ or $\frac{2m}{m^2-1}$

B. $\frac{3}{4}$ or $\frac{2m}{m^2+1}$

C. $\frac{4}{3}$ or $\frac{2m+1}{m^2}$

D. $\frac{3}{4}$ or $\frac{m^2}{2m+1}$

Answer: A

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89. Given that $\cos\left(\frac{\alpha-\beta}{2}\right)=2\cos\left(\frac{\alpha+\beta}{2}\right)$, then $\tan\frac{\alpha}{2}\tan\frac{\beta}{2}$ is equal to

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

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

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

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

Answer: B

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90. What is $\tan\left(7\frac{1}{2}\right)^{\circ}$ equal to ?

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

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

C. $\sqrt{6}+\sqrt{3}+\sqrt{2}-2$

D. $\sqrt{6}-\sqrt{3}-\sqrt{2}-2$

Answer: B

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91. $\sqrt{2}+\sqrt{3}+\sqrt{4}+\sqrt{6}$ is equal to

A. $\cot\left(7\frac{1}{2}\right)^{\circ}$

B. $si\left(7\frac{1}{2}\right)^{\circ}$

C. $\sin 15^{\circ}$

D. $\cos 15^{\circ}$

Answer: A

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92. If $\alpha = 22^\circ 30', then (1+\cos\alpha)(1+\cos 3\alpha)(1+\cos 5\alpha)(1+\cos 7\alpha)$ equals

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

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

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

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

Answer: A

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93. If $\tan A = \frac{1-\cos B}{\sin B}$, then $\tan 2A$ is equal to

A. $\tan B$

B. $\tan^2 B$

C. $\tan^2 B + 2\tan B$

D. $\tan B + 2\tan B$

Answer: A

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94. If $\cos ec\theta = \frac{p+q}{p-q}, then \cot(\pi, /4+\theta/2) =$

A. $\sqrt{\frac{p}{q}}$

B. $\sqrt{\frac{q}{p}}$

C. $\sqrt{pq}$

D. pq

Answer: B

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95. $\frac{\sqrt{2}-\sin\alpha-\cos\alpha}{\sin\alpha-\cos\alpha} =$

A. $\sec\left(\frac{\alpha}{2}-\frac{\pi}{8}\right)$

B. $\cos\left(\frac{\pi}{8}-\frac{\alpha}{2}\right)$

C. $\tan\left(\frac{\alpha}{2}-\frac{\pi}{8}\right)$

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

Answer: C

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96. $\cos 2(\theta+\phi)+4\cos(\theta+\phi)\sin\theta\sin\phi+2\sin^2\phi=$

A. $\cos 2\theta$

B. $\cos 3\theta$

C. $\sin 2\theta$

D. $\sin 3\theta$

Answer: A

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97. If $\sin\theta + \sin\phi = a$ and $\cos\theta + \cos\phi = b$, find the value of $\tan\left(\frac{\theta - \phi}{2}\right)$

A. $\sqrt{\frac{a^2 + b^2}{4 - a^2 - b^2}}$

B. $\sqrt{\frac{4 - a^2 - b^2}{a^2 + b^2}}$

C. $\sqrt{\frac{a^2 + b^2}{4 + a^2 + b^2}}$

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

Answer: B

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98. The value of expression

$$\frac{1 + \sin 2\alpha}{\cos(2\alpha - 2\pi)\tan\left(\alpha - \frac{3\pi}{4}\right)} - \frac{1}{2}\sin 2\alpha\left(\cot\frac{\alpha}{2} + \cot\left(\frac{3\pi}{2} + \frac{\alpha}{2}\right)\right) \text{ is}$$

A. 0

B. 1

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

D. $\sin^2 \alpha$

Answer: D

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

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

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

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

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

Answer: A

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100. Let

$f_n(\Theta) = \left(\tan\left(\frac{\Theta}{2}\right)\right)(1+\sec(\Theta))(1+\sec(2\Theta))\ldots..(1+\sec(2^n\Theta)..$

then

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

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

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

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

Answer: D

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101. The sum of the series $\sum_{n=1}^{\infty} \sin\left(\frac{n!\pi}{720}\right)$ is

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

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

C. $\sin\left(\frac{\pi}{6}\right) + \sin\left(\frac{\pi}{30}\right) + \sin\left(\frac{\pi}{120}\right) + \sin\left(\frac{\pi}{360}\right) + \sin\left(\frac{\pi}{720}\right)$

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

Answer: C

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Evaluation Test

1. If $x\cos\theta=y\cos\left(\theta+\frac{2\pi}{3}\right)=z\cos\left(\theta+\frac{4\pi}{3}\right)$, then write the value of $\frac{1}{x}+\frac{1}{y}=\frac{1}{z}$.

A. 1

B. 2

C. 0

D. $3\cos\theta$

Answer: C

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2. $\tan 70^\circ - \tan 20^\circ - 2\tan 40^\circ =$

A. $2\tan 20^\circ$

B. $\tan 40^\circ$

C. $4\tan 10^\circ$

D. $\tan 10^\circ$

Answer: C

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3. If $\sqrt{x} + \frac{1}{\sqrt{x}} = 2\cos\theta,$ then $x^6 + x^{-6} =$

A. $2\cos 6\theta$

B. $2\cos 12\theta$

C. $2\cos 3\theta$

D. $2\sin 3\theta$

Answer: B

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4. The value of

$\cos^3\theta + \cos^3(\theta + 120^\circ) + \cos^3(\theta - 120^\circ)$ is

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

B. $\frac{3}{4}\sec^3\theta$

C. $\frac{3}{2}\tan^3\theta$

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

Answer: D

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5. If $\tan\alpha = \frac{1}{5}$, $\tan\beta = \frac{1}{239}$, then the value of $\tan(4\alpha - \beta)$ is

A. 0

B. -1

C. 1

D. None of these

Answer: C

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

A. ± 1

B. ± 2

C. $\pm\sqrt{2}$

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

Answer: C

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

A. 2

B. 3

C. 4

D. 6

Answer: A

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

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

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

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

D. $-(3)\sqrt{130}$

Answer: D

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9. If $\tan\alpha = \left(1+2^{-x}\right)^{-1}, \tan\beta = \left(1+2^{x+1}\right)^{-1} then \alpha+\beta$ equals

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

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

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

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

Answer: B

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10. A and B are positive acute angles satisfying the equation $3\cos^2 A + 2\cos^2 B = 4, \frac{3\sin A}{\sin B} = \frac{2\cos B}{\cos A}$ then $A + 2B$ is

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

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

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

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

Answer: B

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11. If $\frac{\sin^4 A}{a} + \frac{\cos^4 A}{b} = \frac{1}{a+b}$, then the value of $\frac{\sin^8 A}{a^3} + \frac{\cos^8 A}{b^3}$ is equal to (A) $\frac{1}{(a+b)^3}$ (B) $\frac{a^3b^3}{(a+b)^3}$ (C) $\frac{a^2b^2}{(a+b)^2}$ (D) none of these

A. $\frac{1}{(a+b)^3}$

B. $\frac{a^3b^3}{(a+b)^3}$

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

D. None of these

Answer: A

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12. If $\sin(\pi\cos\theta) = \cos(\pi\sin\theta)$, then of the value $\cos\left(\theta \pm \frac{\pi}{4}\right)$ is

A. $\sqrt{2}$

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

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

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

Answer: D

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