MATHS

BOOKS - MODERN PUBLICATION MATHS (KANNADA ENGLISH)

TRIGONOMETRIC RATIOS, IDENTITIES AND EQUATIONS

Multiple Choice Question Level I

1. The $\sin\theta + \text{cosec}\theta = 2$, then: $\sin^2\theta + \text{cosec}^\circ\theta$=

A. 1

B. 2

C. 4

D. None of these.

Answer: C

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2. If $f(x) = \cos^2 x + sec^2 x, then\ f(x) < 1$ (b) $f(x) = 1$ (c) `2

A. $f(x) < 1$

B. $f(x) = 1$

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

D. $f(x) > = 2.$

Answer: D

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

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

B. π

C. 0

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

Answer: D

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4. Which of the following is not correct ?

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

B. $\cos\theta = 1$

C. $\sin\theta = \frac{1}{2}$

D. $\tan\theta = 20$.

Answer: C

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

A. 0

B. 1

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

D. Not defined.

Answer: B

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6. If $\tan t\widehat{a}$ = 3 and θ lies in third quadrant, then the value of $\sin\theta$ is :

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

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

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

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

Answer: C

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

A. $2\sqrt{3}$

B. $2 + \sqrt{3}$

C. $2 - \sqrt{3}$

D. 1

Answer: A

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8. Which of the following is not correct ?

A. $\sin 1^\circ > \sin 1$

B. $\sin 1^\circ < \sin 1$

C. $\sin 1^\circ = \sin 1$

D. $\sin 1^\circ = \frac{\pi}{18^\circ} \sin 1.$

Answer: B

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9. If $\tan\alpha = \frac{m}{m+1}$ and $\tan\beta = \frac{1}{2m+1}$, then $\alpha + \beta$ is equal to

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

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

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

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

Answer: D

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10. The minimum value of 3cox + 4 sinx + 8 is

A. 5

B. 9

C. 7

D. 3

Answer: D

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

D. None of these.

Answer: A

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12. The value of $\sin(45^\circ + \theta) - \cos(45^\circ - \theta)$ is

A. $2\cos\theta$

B. $2\sin\theta$

C. 1

D. 0

Answer: D

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13. The value of $\cot\left(\frac{\pi}{4} + \theta\right)\cot\left(\frac{\pi}{4} - \theta\right)$ is

A. -1

B. 0

C. 1

D. Not defined.

Answer: C

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

A. $\sin 2(\theta + \phi)$

B. $\cos 2(\theta + \phi)$

C. $\sin 2(\theta - \phi)$

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

Answer: B

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

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

B. 1

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

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

Answer: C

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16. If $\tan A = \frac{1}{2}$ and $\tan B = \frac{1}{3}$, then $\tan(2A + B)$ is equal to

A. 1

B. 2

C. 3

D. 4

Answer: C

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17. The value of $\sin\frac{\pi}{10}\sin\frac{13\pi}{10}$ is

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

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

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

D. 1

Answer: C

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18. The value of $\sin 50^\circ - \sin 70^\circ + \sin 10^\circ$ is equal to

A. 1

B. 0

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

D. 2

Answer: B

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19. If $\sin\theta + \cos\theta = 1$, then the value of $\sin 2\theta$ is equal to

A. 1

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

C. 0

D. -1.

Answer: C

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20. If $\alpha + \beta = \frac{\pi}{4}$ then value of $(1 = \tan\alpha).(1 + \tan\beta)$ is

A. 1

B. 2

C. -2

D. Not defined.

Answer: B

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

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

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

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

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

Answer: C

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22. The number of solutions of the equation $\tan x + \sec x = 2\cos x$ lying in the interval $[0, 2\pi]$ is

A. 0

B. 1

C. 2

D. 3

Answer: C

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23. The value of $\sin\left(\frac{\pi}{18}\right) + \sin\left(\frac{\pi}{9}\right) + \sin\left(\frac{2\pi}{9}\right) + \sin\left(\frac{5\pi}{18}\right)$ is

A. $\sin \frac{7\pi}{18} + \sin \frac{4\pi}{9}$

B. 1

C. $\cos \frac{\pi}{6} + \cos \frac{3\pi}{7}$

D. $\cos \frac{\pi}{9} + \sin \frac{\pi}{9}$.

Answer: A

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24. If A lies in the second quadrant and $3\tan A + 4 = 0$, then find the value of $2\cot A - 5\cos A + \sin A$.

A. $\frac{-53}{10}$

B. $\frac{23}{10}$

C. $\frac{37}{10}$

D. $\frac{7}{10}$.

Answer: B

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

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

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

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

D. $\frac{\sqrt{5}+1}{2\sqrt{2}}$,

Answer: A

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26. If $\tan\theta = \frac{a}{b}$, then $b\cos 2\theta + a\sin 2\theta$ is equal to

A. a

B. b

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

D. None.

Answer: B

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27. If $\sin\theta$ and $\cos\theta$ are the roots of the equation $ax^2 - bx + c = 0$, then a, b and c satisfy the relation

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

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

C. $a^2 + c^2 + 2ab = 0$

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

Answer: B

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28. The maximum value of sinx. cosx is

A. 1

B. 2

C. $\sqrt{2}$

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

Answer: D

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29. 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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30. $\sin 20^\circ \sin 40^\circ \sin 60^\circ \sin 80^\circ$

A. $\frac{-3}{16}$

B. $\frac{5}{16}$

C. $\frac{3}{16}$

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

Answer: C

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31. What is the maximum value of $\sin\theta\cos\theta$?

A. 1

B. 0

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

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

Answer: C

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32. If $\tan\theta + \sec\theta = \sqrt{3}, 0 < \theta < \pi,$ then θ is equal to

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

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

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

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

Answer: B

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33. The maximum value of $5\cos\theta + 3\cos\left(\theta + \frac{\pi}{3}\right) +$ is:

A. 5

B. 10

C. 1

D. -1.

Answer: B

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34. In a triangle ABC, $\cos ecA(\sin B\cos C + \cos B\sin C)$ is :

A. c/a

B. a/c

C. 1

D. None of these.

Answer: C

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

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

B. 0

C. 1

D. -1.

Answer: B

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36. If $\sin x + \sin^2 x = 1$ then $\cos^2 x + \cos^4 x$

A. 2

B. -1

C. 0

D. 1

Answer: D

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37. If the chord of a circle is equal to the radius of the circle, then the angle subtended by the chord at a point on the minor arc is:

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

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

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

D. 1

Answer: B

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

A. $-2 \leq B \leq 2$

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

C. $0 \leq B \leq 2$

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

Answer: C

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39. If $A = \sin^8 \theta + \cos^{14} \theta$, then for all values of θ,

A. $0 \leq A \leq 1$

B. $1 \leq 2A \leq 3$

C. $A \geq 1$

D. None of these.

Answer: A

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40. The solution of the equation $\cos^2\theta + \sin\theta + 1 = 0$ lies in the interval

A. $\left(\frac{5\pi}{4}, \frac{7\pi}{4}\right)$

B. $\left(\frac{3\pi}{4}, \frac{5\pi}{4}\right)$

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

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

Answer: A

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41. Which of the following number (s) is/are rational number? (A) $\sin 15^0$ (B) $\cos 15^0$ (C) $\sin 15^0 \cos 15^0$ (D) $\sin 15^0 \cos 75^0$

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

A. 2

B. 2^8

C. 2^4

D. None of these.

Answer: A

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43. If $0^\circ < \theta < 180^\circ$ then $\sqrt{2+\sqrt{2+\sqrt{2+\ldots+\sqrt{2(1+\cos\theta)}}}}$, then being n number of 2's, is equal to

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

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

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

D. None of these.

Answer: A

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44. If $\tan\left(\dfrac{\pi}{9}\right), X$ and $\tan\left(\dfrac{5\pi}{18}\right)$ are in $A.P.$ and $\tan\left(\dfrac{\pi}{9}\right), y$ and $\tan\left(\dfrac{7\pi}{18}\right)$, are also in $A.P$, then

A. $2x - y$

B. $x > y$

C. $x = y$

D. None of these.

Answer: A

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45. Let α and β be any two positve values of x for which $2\cos x$, $|\cos x|$ and $1 - 3\cos^2 x$ are in GP. The minium value of $|\alpha + \beta|$ is

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

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

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

D. None of these.

Answer: D

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46. If $3\sin^2\theta + 2\sin^2\phi = 1$ and $3\sin 2\theta = 2\sin 2\phi, 0 < 0 < \frac{\pi}{2}$ and $0 < \phi < \frac{\pi}{2}$, then the value of $\theta + 2\phi$ is :

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

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

C. 0

D. None of these.

Answer: A

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47. Range of $f(x) = \sin^{20} x + \cos^{48} x$ is (A) [0,1] (B) (0,1] (C) $(0, \infty)$ (D) none of these

A. [0,1]

B. (0,1]

C. $(0, \infty)$

D. None of these.

Answer: B

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48. The value of $\cos\frac{\pi}{65}.\cos\frac{2\pi}{65}.\cos\frac{4\pi}{65}.\cos\frac{8\pi}{65}.\cos\frac{16\pi p}{65}.\cos\frac{32\pi}{65}$ is :

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

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

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

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

Answer: B

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49. $\sin\theta + \sqrt{3}\cos\theta = 6x - x^2 - 11, 0 \leq \theta \leq 4\pi x \in R$ holds for :

A. no value of x and θ

B. one value of x and two values of θ

C. two values of x and two values of θ

D. three pairs of values of (x, θ).

Answer: B

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

A. $\sin 18^\circ$

B. $\cos 18^\circ$

C. $2\sin 18^\circ$

D. $2\cos 18^\circ$.

Answer: C

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51. If $\sin\alpha + \sin\beta + \sin\gamma = 3$, then $\cos\alpha + \cos\beta + \cos\gamma$ equals :

A. 0

B. 1

C. 2

D. 3

Answer: A

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52. Maximum value of $\sin^8 x + \cos^{16} x$ is

A. 1

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

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

D. None of these.

Answer: A

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53. If $\sin^4 x + \cos^4 y + 2 = 4 \sin x \cos y, 0 \leq xy \leq \frac{\pi}{2}$, then $\sin x + \cos y$ equals :

A. 0

B. -2

C. 2

D. None of these.

Answer: C

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54. $\sum_{r=1}^{n-1} \cos^2 \frac{r\pi}{n}$ is equal to

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

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

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

D. None of these.

Answer: A

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55. $\cos. \frac{2\pi}{7} + \cos. \frac{4\pi}{7} + \cos. \frac{6\pi}{7}$

A. an integer

B. a negative rational number

C. a positive rational number

D. an irrational number.

Answer: B

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56. If $\tan\frac{\pi}{9}, x$ and $\tan\frac{5\pi}{18}$ are in A.P. and $\tan\frac{\pi}{9}, y$ and $\tan\frac{7\pi}{18}$ are also in A.P., then :

A. $x = y$

B. $x > y$

C. $2x = y$

D. None of these.

Answer: C

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57. The number of real solutions of the equation $\sin(e^x) = 2^x + 2^{-x}$ is

A. 0

B. 1

C. 2

D. Infinite.

Answer: A

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58. The solution of the equation $\cos^2\theta + \sin\theta + 1 = 0$ lies in the interval

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

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

C. $\left(\frac{3\pi}{4}, \frac{5\pi}{4}\right)$

D. $\left(\frac{5\pi}{4}, \frac{7\pi}{4}\right)$.

Answer: D

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59. The equation $k \sin x + \cos 2x = 2k - 7$ possesses a solution if :

A. $k > 2$

B. $k > 6$

C. 2 $<$ = k $<$ = 6

D. None of these.

Answer: C

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60. General solution for $|\sin x| = \cos x$ is -

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

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

C. $2n\pi \pm \frac{\pi}{4}$

D. None of these.

Answer: C

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61. If $\frac{\cos^4 x}{\cos^2 y} + \frac{\sin^4 x}{\sin^2 y} = 1$, then $\frac{\cos^4 y}{\cos^2 x} + \frac{\sin^4 y}{\sin^2 y}$ equal :

A. -1

B. 0

C. 1

D. 2

Answer: C

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62. If $\alpha + \beta = \frac{\pi}{2}$ and $\beta + \gamma = \alpha$ then $\tan\alpha$ equals

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

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

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

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

Answer: C

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63. The value of $\frac{1 - \tan^2 15^\circ}{1 + \tan^2 15^\circ}$ is

A. 1

B. $\sqrt{3}$

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

D. 2

Answer: C

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

A. $y = 0$

B. $y \leq 2$

C. $y \geq -2$

D. $y > 2.$

Answer: D

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

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

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

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

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

Answer: C

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66. If $\sin(\alpha+\beta)=1, \sin(\alpha-\beta)=\frac{1}{2}$, then : $\tan(\alpha+2\beta)\tan(2\alpha+\beta)$ is equal to :

A. 1

B. -1

C. zero

D. None of these.

Answer: A

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67. If $\tan\theta = -\frac{4}{3}$, then $\sin\theta$ is :

A. $-\frac{4}{5}$ but not $\frac{4}{5}$

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

C. $-\frac{4}{5}$ but not $-\frac{4}{5}$

D. None of these.

Answer: B

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68. In a triangle PQR,$\angle R = \frac{\pi}{2}$ If $\tan\left(\frac{p}{2}\right)$ and $\tan\left(\frac{Q}{2}\right)$ are the roots of $ax^2 + bx + c = 0, a + \neq$, then :

A. $c = a + b$

B. $a = b + c$

C. $b = a + c$

D. $b = c.$

Answer: A

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69. If $\cos(\alpha - \beta) = 1$ and $\cos(\alpha + \beta) = \frac{1}{e}$, then the number of ordered pairs (α, β) such that α, β in $[-\pi, \pi]$ is :

A. 0

B. 1

C. 2

D. 4

Answer: D

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70. The number of values of x in the interval $[0, 3\pi]$ satisfying the equation $2\sin^2 x + 5\sin x - 3 = 0$ is :

A. 4

B. 6

C. 1

D. 2

Answer: A

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71. If p and q are positive real number such that $p^2 + q^2 = 1$, then the maximum value of (p + q) is :

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

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

C. $\sqrt{2}$

D. 2

Answer: C

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Multiple Choice Question Level Ii

1. If $e^{-\pi/2} < \theta < \frac{\pi}{2}$, then :

A. $\cos(\log\theta) > \log(\cos\theta)$

B. $\cos(\log\theta) < \log(\cos\theta)$

C. $\cos(\log\theta) = \log(\cos\theta)$

D. $\cos(\log\theta) = \frac{2}{3}\log(\cos\theta).$

Answer: B

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2. In a ΔABC angle A is greater than B. If the measures of angles A and B satisfy the equation $3\sin x - 4\sin^3 x - k = 0,\ 0 < k < 1,$ then the measures of angle C is :

A. $\pi/3$

B. $(2\pi)/3$

C. $\pi/2$

D. $(5\pi)/6.$

Answer: B

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3. The equation $(\cos p - 1)x^2 + (\cos p)x + \sin p = 0,$ where x is a variable, has real roots. Then the interval of p may be any one of the following :

A. $[o, 2\pi]$

B. $[-\pi, 0]$

C. $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

D. $[0, \pi]$.

Answer: D

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4. The value of : $\sin\left(\frac{\pi}{7}\right).\sin\left(\frac{3\pi}{14}\right).\sin\left(\frac{5\pi}{14}\right).\sin\left(\frac{7\pi}{14}\right)$ is :

A. 1

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

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

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

Answer: C

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

A. $\sin^2 x$

B. 2

C. 1

D. 0

Answer: A

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

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

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

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

Answer: A

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7. If $\cos 5\theta = a\cos\theta + b\cos^3\theta + c\cos^5\theta + d$, then

A. $a + b + c = 2$

B. $a + b + c + d = 1$

C. $b = -20$

D. None of these.

Answer: B

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

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

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

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

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

Answer: B

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9. Let n be a positive integer such that $\sin\left(\frac{\pi}{2^n}\right)+\cos\left(\frac{\pi}{2^n}\right)=\frac{\sqrt{n}}{2}$,then

A. $4<n<8$

B. $4<n\leq 8$

C. $4\leq n<8$

D. $6\leq n\leq 8$.

Answer: B

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

A. Zero

B. -3

C. Negative

D. Positive.

Answer: D

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11. For $m \neq n$, if $\tan m\theta = \tan n\theta$, then the different values of θ are in :

A. no particular sequence

B. G.P

C. H.P

D. A.P.

Answer: D

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12. In a triangle PQR, $\angle R = \pi/2$, If $\tan(P/2).$ and $\tan(Q/2)$ are the roots of the equation : $ax^2 + bx + c = 0a \neq 0$, then :

A. $a + b = c$

B. $b + c = a$

C. $a + c = b$

D. $b = c.$

Answer: A

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13. If $\frac{\cos^4 x}{\cos^2 y} + \frac{\sin^4 x}{\sin^2 y} = 1$ then prove that $\frac{\cos^4 y}{\cos^2 x} + \frac{\sin^4 y}{\sin^2 x} = 1$

A. 2

B. 0

C. 1

D. -1.

Answer: C

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14. If $\tan A = \sqrt{a\frac{(a+b+c)}{bc}}, \tan B = \sqrt{b\frac{(a+b+c)}{ca}}$, $\tan C = \sqrt{c\frac{(a+b+c)}{ab}}$, then $\tan(A+B+C)$ equal :

A. 4

B. 3

C. 0

D. 2

Answer: C

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15. If $\frac{\sin x}{a} = \frac{\cos x}{b} = \frac{\tan x}{c} = k$, then $bc + \frac{1}{ck} + \frac{ak}{1+bk}$ is equal to $k\left(a + \frac{1}{a}\right)$ (b) $1/k\left(a + \frac{1}{a}\right)$ $\frac{1}{k^2}$ (d) $\frac{a}{k}$

A. $k\left(a + \frac{1}{a}\right)$

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

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

D. $\frac{a}{k}$.

Answer: B

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16. Let n be an odd integer if $\sin n\theta = \sum_{r=0}^{n} b_r \sin^r \theta$, for every value of θ, then :

A. $b_0 = 1, b_1 = 3$

B. $b_0 = 0, b_1 = n$

C. $b_0 = -1, b_1 = n$

D. $b_0 = 0, b_1 = n^2 - 3n + 3.$

Answer: B

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17. If $\cos(x-y), \cos x$ and $\cos(x+y)$ are in H.P., then $\left|\cos x \frac{\sec(y)}{2}\right|$ equals

A. 1

B. 2

C. $\sqrt{2}$

D. None of these.

Answer: C

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18. If $\frac{2\sin\alpha}{1+\cos\alpha+\sin\alpha}=y$, then prove that $\frac{1-\cos\alpha+\sin\alpha}{1+\sin\alpha}$ is also equal to y.

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

B. λ

C. $1-\lambda$

D. $1+\lambda$.

Answer: B

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19. If α, β, γ and δ be four angles of a cyclic qardrilateral, then the value of : $\cos\alpha + \cos\beta + \cos\gamma + \cos\delta$ is :

A. 1

B. 0

C. -1

D. None of these.

Answer: B

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20. The number of real solutions of the equation : $\cos^7 x + \sin^4 x = 1$ in the interval $[-\pi, \pi]$ is :

A. 0

B. π

C. $-\pi$

D. None of these.

Answer: A

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21. If $x = \alpha, \beta$ satisfy both the equations $\cos^2 x + a\cos x + b = 0$ and $\sin^2 x + p\sin x + q = 0$, then the relation between a, b, p and q is :

A. $1 + b + a^2 = p^2 - q - 1$

B. $a^2 + b^2 = p^2 + q^2$

C. $b + q = a^2 + p^2 - 2$

D. None of these.

Answer: D

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22. If $0 \leq a \leq 3, 0 \leq b \leq 3$ and the equation : $x^2 + 4 + 3\cos(ax + b) = 2x$ has at least one solution, then the value of $a + b$ is :

A. 0

B. $\pi / 2$

C. π

D. None of these.

Answer: C

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23. The equation $p\cos x - q\sin x = r$ admits of a solution for x only if :

A. $r < \max\{p, q\}$

B. $-\sqrt{p^2 + q^2} < r < \sqrt{p^2 + q^2}$

C. $r^2 = p^2 + q^2$

D. None of these.

Answer: D

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24. The equation $k\cos x - 3\sin x + k + 1$ is solvable only if k belongs to the interval :

A. $[4, +\infty)$

B. $[-4, 4)$

C. $(-\infty, 4]$

D. None of these.

Answer: C

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25. If $\sin^2\theta - 2\sin\theta - 1 = 0$ is to be satisfied for exactly 4 distrinct value of $\theta \in [0, n\pi], n \in N$, then the least value of n is :

A. 2

B. 6

C. 4

D. 1

Answer: C

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26. The number of values of $x \in [0, 4\pi]$ satisfying $\left|\sqrt{3\cos x - \sin x}\right| \geq 2$ is :

A. 2

B. 0

C. 4

D. 8

Answer: C

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27. If α, β are roots of the equation $6x^2 + 11x + 3 = 0$ then :

A. both $\cos^{-1}\alpha$ and $\cos^{-1}\beta$ are real.

B. both $\cos ec^{-1}\alpha$ and $\cos ec^{-1}\beta$ are real.

C. both $\cot^{-1}\alpha$ and $\cot^{-1}\beta$ are real.

D. None of these.

Answer: C

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28. If $\sin x + \sin^2 x + \sin^3 x = 1$, then : $\cos^6 x - 4\cos^4 x + 8\cos^2 x$ equals :

A. 3

B. 4

C. 2

D. 1

Answer: B

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29. If $P_n = \cos^n \theta + \sin^n \theta$ then $2.\ P_6 - 3.\ P_4 + 1 =$

A. 2

B. 3

C. 1

D. 0

Answer: D

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30. The equation $a\sin x + b\cos x = c, \quad \text{where} |c| > \sqrt{a^2 + b^2}$ has

A. a unique solution

B. infinite number of solution

C. no solution

D. None of these.

Answer: C

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31. If the mapping $f(x) = ax + b, a < 0$ and maps [-1, 1] onto [0, 2] , then for all values of θ, $A = \cos^2\theta + \sin^4\theta$ is such that

A. $f\left(\frac{1}{4}\right) \leq A \leq f(0)$

B. $f(0) \leq A \leq f(-2)$

C. $f\left(\frac{1}{3}\right) \leq A \leq f(0)$

D. $f(-1) \leq A \leq f(-2)$.

Answer: A

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32. If

$f(x) = \sin^2 x + \sin^2(x + \pi/3) + \cos x \cos(x + \pi/3)$ and $g(5/4) = 1$

then $(gof)(x) =$

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

B. 1

C. π

D. None of these.

Answer: B

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33. if A, B, C are acute positive angles, then : $\frac{(\sin A+\sin B)(\sin A+\sin C)(\sin A+\sin C)}{\sin A \sin B \sin C}$ is :

A. <8

B. >1

C. 2

D. None of these.

Answer: B

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34. If $\tan(\pi \cos\theta)=\cot(\pi \sin\theta)$, then $\cos\left(\theta-\frac{\pi}{4}\right)$ is :

A. 0

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

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

D. None of these.

Answer: B

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35. If $\frac{\sec^4\theta}{a}+\frac{\tan^4\theta}{b}=\frac{1}{a+b}$, then prove that $|b|\leq|a|$.

A. $|b|=|a|$

B. $|b|<=|a|$

C. $|b|>=|a|$

D. None of these.

Answer: B

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36. The value of the determinant : $\begin{vmatrix} \sin^2 13^\circ & \sin^2 77^\circ & \tan 135^\circ \\ \sin^2 77^\circ & \tan 135^\circ & \sin^2 13^\circ \\ \tan 135^\circ & \sin^2 13^\circ & \sin^2 77^\circ \end{vmatrix}$ is equal to :

A. -1

B. 0

C. 1

D. 2

Answer: B

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37. If $tan\alpha, tan\beta, tan\gamma$ are the roots of the equation $x^3 - px^2 - r = 0$, then the value of $\left(1+\tan^2\alpha\right)\left(1+\tan^2\beta\right)\left(1+\tan^2\gamma\right)$ is equal to $(p-r)^2$ b. $1+(p-r)^2$ c. $1+(p-r)^2$ d. none of these

A. $(p-r)^2$

B. $1+(p-r)^2$

C. $1-(p-r)^2$

D. None of these.

Answer: B

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38. if O is the point inside the triangle ABC such that $\angle OBC = \frac{A}{2}, \angle OCA = \frac{B}{2}, \angle AOB = \frac{C}{2}$, then $\frac{\sin\left(A-\frac{C}{2}\right)\sin\left(B-\frac{A}{2}\right)\sin\left(C-\frac{B}{2}\right)}{\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}}$ equal :

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

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

C. 1

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

Answer: C

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39. If $B - 45^\circ$ in ΔABC, then :

A. $(1 - \cot A)(1 - \cot C) = 2$

B. $(1 + \cot A)(1 + \cot C) = 2$

C. $\cot A \cot B \cot C + \cot A \cot B + \cot C = 1$

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

Answer: B

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40. In a triangle,$\tan A + \tan B + \tan C = 6$ and $\tan A \tan B = 2$, then the values of $\tan A$, $\tan B$, $\tan C$ are :

A. 1, 2, 3

B. 2, 1, 3

C. 1, 2, 4

D. None of these.

Answer: B

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41. If n is an odd positive interger, then

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

A. $2\tan^n\frac{A-B}{2}$

B. $2\cot^n\frac{A-B}{2}$

C. 1

D. None of these.

Answer: B

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42. 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: C

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43. If

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

then each side is equal to

A. 1

B. -2

C. 0

D. None of these.

Answer: A

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44. If $a = \frac{1}{5\cos x + 12\sin x}$ then for all real x.

A. the least positive value of a is $\frac{1}{14}$

B. the greatest negative value of a is $-\frac{1}{13}$

C. $a \leq \frac{1}{13}$

D. $-\frac{1}{13} \leq a \leq \frac{1}{13}$.

Answer: B

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45. If $A + B = \frac{\pi}{3}$ and $\cos A + \cos B = 1$, then :

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

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

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

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

Answer: C

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46. If $A \geq 0, B = 0, A + B = \frac{\pi}{3}$ and $y = \tan A . \tan B$, then :

A. the maximum value of y is 3

B. the minimum value of y is $\frac{1}{3}$

C. the maximum value of y is $\frac{1}{3}$

D. None of these.

Answer: C

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47. $3^{\sin 2x + 2\cos^2 x} + 3^{1 - \sin 2x + 2\sin^2 x} = 28$ is satisfied by :

A. those values of x for which $\tan x = -1$

B. those values of x for which $\tan x = -1/2$

C. those values of x for which $\cos x = \frac{1}{2}$

D. those values of x for which $\tan x = 1$.

Answer: A

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48. Let $f(x) = e^{\cos^{-1}\sin(x + \pi/3)}$, Then :

A. $f\left(\frac{8\pi}{9}\right) = e^{5\pi/18}$

B. $f\left(\frac{8\pi}{9}\right) = e^{13\pi/18}$

C. $f\left(-\frac{7\pi}{4}\right) = e^{\pi/18}$

D. $f\left(-\frac{7\pi}{4}\right) = e^{11\pi/12}$.

Answer: B

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49. If $a\sin^2 x + b\cos^2 x = cb\sin^2 y + a\cos^2 y = d$ and $a\tan x = b\tan y$, then $\frac{a^2}{b^2}$ equals :

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

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

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

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

Answer: A

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50. If $33\theta = \pi$, then $\cos\theta \cos 2\theta \cos 4\theta \cos 8\theta \cos 16\theta$ is :

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

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

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

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

Answer: B

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51. The minimum value of the expression $\sin\theta_1 + \sin\theta_2 + \sin\theta_3$, where $\theta_1, \theta_2, \theta_3$ are real numbers satisfying$\theta_1 + \theta_2 + \theta_3 = \pi$ is :

A. negative

B. positive

C. zero

D. -4.

Answer: A

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52. $2\sec^2\theta - \sec^4\theta - 2\cos ec^2\theta + \cos ec^4\theta = \frac{15}{4}$ if $\tan\theta$ is equal to ,

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

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

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

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

Answer: C

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53. If $\tan 25^\circ = x$, then $\dfrac{\tan 155^\circ - \tan 115^\circ}{1 + \tan 155^\circ \tan 115^\circ}$ equals :

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

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

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

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

Answer: C

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54. $\tan^6 \dfrac{\pi}{9} - 33 \tan^4 \dfrac{\pi}{9} + 27 \tan^2 \dfrac{\pi}{9}$ equals :

A. $\tan \dfrac{\pi}{3}$

B. $\tan^2 \dfrac{\pi}{3}$

C. $\tan \dfrac{\pi}{6}$

D. $\tan^2 \dfrac{\pi}{6}$.

Answer: B

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55. If $x = \cos\theta\cos\phi + \sin\theta\sin\phi\cos\psi, y = \cos\theta\sin\phi - \sin\theta\cos\phi\cos\psi$ and $z = \sin\theta\sin\psi$, then $x^2 + y^2 + z^2$ equals :

A. 0

B. -1

C. 1

D. None of these.

Answer: C

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56. 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, then :

A. $p + q = 6$

B. $4p = 5q$

C. $4q = 5p$

D. $pq = 16.$

Answer: B

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

A. 0

B. 1

C. -1

D. None of these.

Answer: A

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58. If $D = \begin{vmatrix} 1 & \cos\alpha & 1 \\ -\sin\alpha & 1 & -\cos\alpha \\ -1 & \sin\alpha & 1 \end{vmatrix}$, then D lies in the interval :

A. $[-2, 2]$

B. $[2, 4]$

C. $[0, 4]$

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

Answer: D

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59. The number of all possible triples (a_1, a_2, a_3) such that $a_1 + a_2\cos 2x + a_3\sin^2 x = 0$ for all x is :

A. 1

B. 3

C. 0

D. Infinite.

Answer: D

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60. If $a\cos A - b\sin A = c$, then $a\sin A + b\cos A$ equals :

A. $\pm\sqrt{b^2 + c^2 - a^2}$

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

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

D. $\pm\sqrt{a^2 + b^2 + c^2}$.

Answer: C

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61. The least difference between the roots of the equation : $4\cos x\left(2-3\sin^2 x\right)+(\cos 2x+1)=0\left(0\le x\le\frac{\pi}{2}\right)$ is :

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

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

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

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

Answer: D

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62. The most general solution of : $\tan\theta=-1,\cos\theta=\frac{1}{\sqrt{2}}$ is :

A. $\theta=n\pi+\frac{7\pi}{4}$

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

C. $\theta=n\pi+(-1)^n\frac{7\pi}{4}$

D. None of these.

Answer: B

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63. For $n \in Z$, the general solution of the equation $\left(\sqrt{3}-1\right)\sin\theta+\left(\sqrt{3}+1\right)\cos\theta=2$ is :

A. $\theta=2n\pi\pm\frac{\pi}{4}+\frac{\pi}{12}$

B. $\theta=n\pi+(-1)^n\frac{\pi}{4}+\frac{\pi}{12}$

C. $\theta=2n\pi\pm\frac{\pi}{4}-\frac{\pi}{12}$

D. $\theta=n\pi+(-1)^n\frac{\pi}{4}-\frac{\pi}{12}$.

Answer: A

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64. The general solution of $\sin x-3\sin 2x+\sin 3x=\cos x-3\cos 2x+\cos 3x$ is :

A. $n\pi + \pi/8$

B. $n\pi/2 + \pi/8$

C. $(-1)^n n\pi/2 + \pi/8$

D. $2n\pi \pm \cos.$

Answer: B

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65. The number of values of x in the interval $[0, 5\pi]$ satisfying the equation $3\sin^2 x - 7\sin x + 2 = 0$ is :

A. 0

B. 5

C. 6

D. 10

Answer: C

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66. The number of real solutions of the equation : $\cos^7 x + \sin^4 x = 1$ in the interval $[-\pi, \pi]$ is :

A. 2

B. 3

C. 5

D. None of these.

Answer: B

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67. If $\frac{1}{6}\sin\theta$,$\cos\theta$ and $\tan\theta$ are in G.P., then the general value of θ is :

A. $2n\pi \pm \frac{\pi}{3}, n \in Z$

B. $2n\pi \pm \frac{\pi}{6}, n \in Z$

C. $n\pi + (-1)^n \frac{\pi}{3}, n \in Z$

D. $n\pi + \frac{\pi}{3}, n \in Z.$

Answer: A

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68. The most general values of x for which $\sin x + \cos x = \min_{a \in R} \{1, a^2 - 4a + 6\}$ are given by :

A. $2n\pi$

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

C. $n\pi + (-1)^n \frac{\pi}{4} - \frac{\pi}{4}$

D. None of these.

Answer: C

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69. Let $[x]$ = the greatest integer less than or equal to x and let $f(x) = \sin x + \cos x$. Then the most general solutions of $f(x) = \left[f\left(\frac{\pi}{10}\right)\right]$ are :

A. $2n\pi \pm \frac{\pi}{2}, n \in Z$

B. $n\pi, n \in Z$

C. $2n\pi, n \in Z$

D. None of these.

Answer: D

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70. The number of all possible 5-tuples $\alpha, \alpha_2, \alpha_3, \alpha_4, \alpha_5$ such that $\alpha_1 + \alpha_2 \sin x + \alpha_3 \cos x + \alpha_4 \sin 2x + \alpha_5 \cos 2x = 0$ holds for all x is :

A. 1

B. 2

C. 0

D. infinite.

Answer: A

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71. The solution of $|\cos x| = \cos x - 2\sin x$ is :

A. $x = n\pi$

B. $x = n\pi + \frac{\pi}{4}$

C. $x = (2n+1)\pi + \frac{\pi}{4}$

D. $x = n\pi + (-1)^n \frac{\pi}{4} (n \in I).$

Answer: C

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72. The equation $8\cos x\cos 2x\cos 4x = \dfrac{\sin 6x}{\sin x}$ has a solution given by :

A. $x = n\pi + \dfrac{\pi}{4}$

B. $x = (2n+1)\dfrac{\pi}{14}$

C. $x = (2n+1)\dfrac{\pi}{7}$

D. $x = n\pi.$

Answer: B

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73. The value of θ lying in $\left(0, \dfrac{\pi}{2}\right)$ and satisfying : $\begin{vmatrix} 1+\sin^2\theta & \cos^2\theta & 4\sin 4\theta \\ \sin^2\theta & 1+\cos^2\theta & 4\sin 4\theta \\ \sin^2\theta & \cos^2\theta & 1+4\sin 4\theta \end{vmatrix} = 0$ is :

A. $\dfrac{\pi}{24}$

B. $\dfrac{3\pi}{24}$

C. $\dfrac{5\pi}{24}$

D. $\frac{11\pi}{24}$.

Answer: D

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74. If $x+y+z=\pi, \tan x \tan y = 2 \tan x + \tan y + \tan z = 6,$ then z equals :

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

B. $n\pi + \tan^{-1} 2$

C. $n\pi + \tan^{-1} 3$

D. None of these.

Answer: C

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75. Let $f(\theta) = \sin\theta(\sin\theta + \sin 3\theta)$ then $f(\theta)$:

A. ≥ 0 only when $\theta \geq 0$

B. ≤ 0 for all real θ

C. $\geq 0\theta$

D. ≤ 0 only when$\theta \leq 0$.

Answer: C

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76. The number of integer values of k for which the equation $7\cos x + 5\sin x = 2k + 1$ has solution is :

A. 4

B. 8

C. 10

D. 12

Answer: B

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

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

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

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

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

Answer: D

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78. Let α, β be such that $\pi \leq \alpha \leq \beta \leq 3\pi$if $\sin \alpha + \sin \beta = -\frac{21}{65}$ and $\cos \alpha + \cos \beta = -\frac{27}{65}$, then the value of $\cos \frac{\alpha - \beta}{65}$ is :

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

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

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

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

Answer: A

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

A. $\frac{\left(1-\sqrt{7}\right)}{4}$

B. $\frac{\left(4-\sqrt{7}\right)}{3}$

C. $-\frac{\left(4+\sqrt{7}\right)}{3}$

D. $\frac{\left(1+\sqrt{7}\right)}{3}$.

Answer: C

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80. The number of solutions of the equation $\cos\left(\pi\sqrt{x-4}\right)\cos\left[\pi\sqrt{1}\right]=1$ is :

A. >2

B. 2

C. 1

D. 0

Answer: C

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81. The maximum value of : $(\cos\alpha_1).(\cos\alpha_2)....(\cos\alpha_n)$ under the restrictions $:0\leq\alpha_1,\alpha_2,.....,\alpha_n\leq\frac{\pi}{2}$ and $(\cot\alpha_1)(\cot\alpha_2)....(\cot\alpha_n)=1$ is :

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

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

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

D. 1

Answer: A

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

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

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

C. $(0, \pi)$

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

Answer: A

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83. Let $\theta \in \left(0, \frac{\pi}{4}\right)$ and $t_1 = (\tan\theta)^{\tan\theta}$ and $t_2 = (\tan\theta)^{\cot\theta}$, $t_3 = (\cot\theta)^{\tan\theta}$ and $t_4 = (\cot\theta)^{\cot\theta}$, then :

A. $t_2 < t_1 < t_3 < t_4$

B. $t_4 < t_1 < t_2 < t_3$

C. $t_4 < t_3 < t_2 < t_1$

D. $t_3 < t_4 < t_2 < t_1$.

Answer: A

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84. The number of solutions of the paires of equations : $2\sin^2\theta - \cos 2\theta = 0$, $2\cos^2\theta - 3\sin\theta = 0$ in the interval $[0, 2\pi]$ is :

A. zero

B. one

C. two

D. four.

Answer: C

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85. Let A and B denote the statement : $A: \cos\alpha + \cos\beta + \cos\gamma = 0$, $B: \sin\alpha + \sin\beta + \sin\gamma = 0$ If $\cos(\beta - \gamma) + (\gamma - \alpha) + \cos(\alpha - \beta) = -\frac{3}{2}$, then :

A. A is true and B is false

B. A is false and B is true

C. both A and B are true

D. both A and B are false.

Answer: C

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86. Let $z = \cos\theta + i\sin\theta$. Then the value of $\sum_{m\to 1-15} Img\left(z^{2m-1}\right)$ at $\theta = 2^\circ$ is: 1. $\frac{1}{\sin 2^\circ}$ 2. $\frac{1}{3\sin 2^\circ}$ 3. $\frac{1}{\sin 2^\circ}$ 4. $\frac{1}{4\sin 2^\circ}$

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

B. $\frac{1}{3\sin 2^\circ}$

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

D. $\frac{1}{4\sin 2^\circ.}$

Answer: D

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1. Let $\cos(\alpha+\beta) = \frac{4}{5}$ and let $s \in (\alpha\beta) = \frac{5}{13}$ where $0 \le \alpha, \beta \le \frac{\pi}{4}$, then $tan2\alpha =$ (1) $\frac{56}{33}$ (2) $\frac{19}{12}$ (3) $\frac{20}{7}$ (4) $\frac{25}{16}$

A. $\frac{25}{16}$

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

C. $\frac{19}{12}$

D. $\frac{20}{7}$.

Answer: C

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2. If $A = \sin^2 x + \cos^4 x$ then for all real x

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

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

C. $1 \leq A \leq 2$

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

Answer: A

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3. The possible values of $\theta \in (0, \pi)$ such that $\sin(\theta) + \sin(4\theta) + \sin(7\theta) = 0$ are :

A. $\frac{\pi}{4}, \frac{5\pi}{12}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{3\pi}{4}, \frac{8\pi}{9}$

B. $\frac{2\pi}{9}, \frac{\pi}{4}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{3\pi}{4}, \frac{35\pi}{36}$

C. $\frac{2\pi}{9}, \frac{\pi}{4}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{3\pi}{4}, \frac{8\pi}{9}$

D. $\frac{2\pi}{9}, \frac{\pi}{4}, \frac{4\pi}{9}, \frac{\pi}{2}, \frac{3\pi}{4}, \frac{8\pi}{9}$

Answer: D

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4. The solution of the equation $e^{\sin x} - e^{-\sin x} - 4 = 0$ is :

A. infinite number of real roots

B. no real roots

C. exactly one real roots

D. exactly four real roots.

Answer: B

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5. In a $\Delta PQR 3\sin p + 4\cos Q = 6$ and $4\sin Q + 3\cos P = 1$, then the angle R is equal to :

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

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

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

D. $\frac{3\pi}{6}$.

Answer: B

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

Then ϕ cannot satisfy

A. $0 < \phi < \frac{\pi}{2}$

B. $\frac{\pi}{2} < \phi < \frac{4\pi}{2}$

C. $\frac{4\pi}{3} < \phi < \frac{3\pi}{2}$

D. $\frac{3\pi}{3} < \phi < 2\pi$

Answer: A::C::D

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7. The expression $\frac{\tan A}{1-\cot A} + \frac{\cot A}{1-\tan A}$ can be written as (1) $secA\cos ecA + 1$ (2) $tanA + \cot A$ (3) $secA + \cos ecA$ (4) $s \in A\cos A + 1$

A. $\sec A\cos ecA + 1$

B. $\tan A + \cos ecA$

C. $\sec A + \cos ecA$

D. $\sec A \cos ecA + 1.$

Answer: A

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

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

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

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

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

Answer: C

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Recent Competitive Questions

1. $\sin\left(2\sin^{-1}0.8\right) =$

A. $\sin 1.2^\circ$

B. 0.96

C. 0.48

D. $\sin 1.6^\circ$.

Answer: B

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

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

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

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

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

Answer: C

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3. If $\tan A - \tan B = x$ and $\cot B - \cot A = y$, then $\cot(A - B)$. is equal to (i) $\frac{1}{y} - \frac{1}{x}$ (ii) $\frac{1}{x} - \frac{1}{y}$ (iii) $\frac{1}{y} + \frac{1}{x}$ (iv) $\frac{1}{x + y}$

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

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

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

D. None of these.

Answer: C

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

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

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

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

Answer: A

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5. if $\sin\theta=\sin a$, then :

A. $\frac{\theta+a}{2}$ is any odd multiple of $\frac{\pi}{2}$ and $\frac{\theta-a}{2}$ is any multiple of π

B. $\frac{\theta+a}{2}$ is any even multiple of $\frac{\pi}{2}$ and $\frac{\theta-a}{2}$ is any odd multiple of π

C. $\frac{\theta+a}{2}$ is any multiple of $\frac{\pi}{2}$ and $\frac{\theta-a}{2}$ is any odd multiple of π

D. $\frac{\theta+a}{2}$ is any multiple of $\frac{\pi}{2}$ and $\frac{\theta-a}{2}$ is any multiple of π.

Answer: A

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6. If $\tan\theta + \tan 4\theta + \tan 7\theta = \tan\theta \tan 4\theta \tan 7\theta$, then θ is equal to:

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

B. $\theta = \frac{n\pi}{12}$

C. $\theta = \frac{n\pi}{6}$

D. None of these.

Answer: B

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7. If $\tan(x+y) = 33$, and $x = \tan^{-1} 3$, then: y=

A. $\frac{3}{10}$

B. $\frac{33}{10}$

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

D. $\tan^{-1}\frac{1}{10}$.

Answer: D

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8. $\frac{\sin x - \sin 3x}{\sin^2 x - \cos^2 x} = 2\sin x$

A. $-2\sin x$

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

C. $\frac{1}{\sin x}$

D. $2\sin x$.

Answer: D

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9. In a ΔABC,$\cos ecA(\sin B\cos C+\cos B\sin C)=$

A. 0

B. 1

C. -1

D. None of these.

Answer: B

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10. The number of solutions of the equation $|\cot x|=\cot x+\frac{1}{\sin x}(0\leq x\leq 2\pi)$ is

A. 0

B. 1

C. 2

D. 3

Answer: B

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

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

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

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

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

Answer: B

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12. If $\sin x + \sin y = \frac{1}{2}$ and $\cos x + \cos y = 1$, then $\tan(x + y) = ...$

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

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

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

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

Answer: D

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