MATHS

BOOKS - SAI MATHS (TELUGU ENGLISH)

TRIGONOMETRIC RATIOS

Problems

1. If $A = \sin^3 + \cos^4\theta,$ then for all values of θ, A lies in the interval

A. $[1, 2]$

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

C. $\left[\frac{1}{2}, \frac{3}{4}\right]$

D. $\left[\frac{3}{4}, \frac{19}{16}\right]$

Answer: B

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2. If $\sin\theta + \cos\theta = p$ and $\tan\theta + \cot\theta = q$ then $q(p^2 - 1) =$

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

B. 2

C. 1

D. 3

Answer: B

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3. $\tan\frac{\pi}{5} + 2\tan\frac{2\pi}{5} + 4\cot\frac{4\pi}{5} =$

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

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

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

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

Answer: A

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

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

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

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

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

Answer: D

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5. $\tan 81^\circ - \tan 63^\circ - \tan 27^\circ + \tan 90^\circ$ equals to

A. 6

B. 0

C. 2

D. 4

Answer: D

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6. If x and y are angles such that $\cos x + \cos y = \frac{3}{2}$ and $\sin x + \sin y = \frac{3}{4}$, then $\sin(x + y)$ equals to

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

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

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

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

Answer: D

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7. The period of $f(x) = \cos\left(\frac{x}{2}\right) + \sin\left(\frac{x}{2}\right)$ is

A. 2π

B. 4π

C. 8π

D. 12π

Answer: D

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

A. q

B. 2q

C. $-q$

D. $-2q$

Answer: D

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

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

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

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

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

Answer: A

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10. $3\sin x + 4\cos x = 5 \Rightarrow 6\tan\frac{x}{2} - 9\tan^2\frac{x}{2} =$

A. 0

B. 1

C. 3

D. 4

Answer: B

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11. The minimum value of $27\tan^2\theta + 3\cot^2\theta$ is

A. 15

B. 18

C. 24

D. 30

Answer: B

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

A. 1

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

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

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

Answer: B

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13. If ABC are angle of a triangle then prove that $\cot A \cot B + \cot B \cot C + \cot C \cos tA = 1$

A. -1

B. 0

C. 1

D. 2

Answer: C

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14. If $f: R \to R$ is defined by $f(x) = 7 + \cos(5x + 3)$ for $x \in R$, then the period of f is

A. 2π

B. π

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

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

Answer: D

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15. $\cos A = \frac{3}{4} \Rightarrow 32 \sin\left(\frac{A}{2}\right)\sin\left(\frac{5A}{2}\right) =$

A. 7

B. 8

C. 13

D. 11

Answer: D

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16. If $f(x) = \sin^6 x + \cos^6 x$ for $x \in R$, then f(x) lies in the interval

A. $\left[\frac{7}{8}, \frac{5}{4}\right]$

B. $\left[\frac{1}{2}, \frac{5}{8}\right]$

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

D. $\left[\frac{1}{4}, \frac{1}{2}\right]$

Answer: C

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17. The period of $\left(\tan\theta - \frac{1}{3}\tan^3\theta\right)\left(\frac{1}{3} - \tan^2\theta\right)$, when $\tan^2\theta \neq \frac{1}{3}$ is

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

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

C. π

D. 2π

Answer: A

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

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

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

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

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

Answer: B

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19. If $\cos(x-y), \cos x, \cos(x+y)$ are three distinct numbers which are in harmonic progression and $\cos x \neq \cos y, \quad \text{then} \quad 1+\cos y =$

A. $\cos^2 x$

B. $-\cos^2 x$

C. $\cos^2 x - 1$

D. $\cos^2 x - 2$

Answer: A

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20. The period of $\sin^4 x + \cos^4 x$ is

A. $\frac{\pi^4}{2}$

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

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

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

Answer: D

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21. $\frac{\cos x}{\cos(x-2y)} = \lambda \Rightarrow \tan(x-y)\tan y =$

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

B. $\frac{1-\lambda}{1+\lambda}$

C. $\frac{\lambda}{1+\lambda}$

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

Answer: B

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

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

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

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

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

Answer: A

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23. $\sqrt{3}\cos ec20^\circ - \sec 20^\circ$ is equal to

A. 2

B. $2\sin 20^\circ \cos ec40^\circ$

C. 4

D. $4\sin 20^\circ \cos ec40^\circ$

Answer: C

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

A. 0

B. 1

C. 2

D. 3

Answer: B

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

A. $\tan 2\theta$

B. $\tan 3\theta$

C. $\tan^2\theta$

D. $\tan^5\theta$

Answer: B

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26. If

$\alpha + \beta + \gamma = 2\theta, \quad \text{then} \quad \cos\theta + \cos(\theta - \alpha) + \cos(\theta - \beta) + \cos(\theta - \gamma) =$

A. $4\sin\frac{\alpha}{2}\cos\frac{\beta}{2}\sin\frac{\gamma}{2}$

B. $\cos\frac{\alpha}{2}\cos\frac{\beta}{2}\cos\frac{\gamma}{2}$

C. $4\sin alhp\frac{e}{2}\sin\frac{\beta}{2}\sin\frac{\gamma}{2}$

D. $\sin\alpha\sin\beta\sin\gamma$

Answer: B

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27. If $'\theta'$ lies in the first quadrant and $5\tan\theta = 4$, then $\frac{5\sin\theta - 3\cos\theta}{\sin\theta + 2\cos\theta}$ is equal to

A. $\frac{5}{14}$

B. $\frac{3}{14}$

C. $\frac{1}{14}$

D. 0

Answer: A

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28. If $\cos(A-B)=\frac{5}{3}, \tan A \tan B=2,$ then which one of the following is true ?

A. $\sin(A+B)=\frac{1}{5}$

B. $\sin(A+B)=-\frac{1}{5}$

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

D. $\cos(A+B)=-\frac{1}{5}$

Answer: D

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29. The value of $\frac{\tan 80^\circ - \tan 10^\circ}{\tan 70^\circ}$

A. 0

B. 1

C. 2

D. 3

Answer: C

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30. $\sin A + \sin B = \sqrt{3}(\cos B - \cos A) \Rightarrow \sin 3A + \sin 3B =$

A. 0

B. 2

C. 1

D. -1

Answer: A

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

A. 1

B. -1

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

D. $-\frac{\left(\sqrt{3}+1\right)}{4}$

Answer: B

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32. $\text{cosec} 15^\circ + \sec 15^\circ =$

A. $2\sqrt{2}$

B. $\sqrt{6}$

C. $2\sqrt{6}$

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

Answer: C

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33. If $5\cos x + 12\cos y = 13$, then the maximum value of $5\sin x + 12\sin y$ is

A. 12

B. $\sqrt{120}$

C. $\sqrt{20}$

D. 13

Answer: B

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34. If $x = \tan 15^\circ, y = \cos ec75^\circ$ and $z = 4\sin 18^\circ$ then,

A. $x < y < z$

B. $y < z < x$

C. $z < x < y$

D. $x < z < y$

Answer: A

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35. If $\cos\theta - 4\sin\theta - 1,$ then $\sin\theta + 4\cos\theta i$ is equal to

A. ± 1

B. 0

C. ± 2

D. ± 4

Answer: D

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36. If $\frac{\tan 3A}{\tan A} = a$ then $\frac{\sin 3A}{\sin A}$ is equal to

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

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

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

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

Answer: B

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37. $A + C = 2B \Rightarrow \frac{\cos C - \cos A}{\sin A - \sin C} =$

A. $\cot B$

B. $\cot 2B$

C. $tna2B$

D. $\tan B$

Answer: D

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38. If $A + B = C$ then $\cos^2 A + \cos^2 B + \cos^2 C - 2\cos A \cos b \cos C$ is equal to

A. 1

B. 2

C. 0

D. 3

Answer: A

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39. $\tan 9^\circ - \tan 27^\circ - \tan 63^\circ + \tan 81^\circ =$

A. 4

B. 3

C. 2

D. 1

Answer: A

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

A. -1

B. 0

C. 1

D. 2

Answer: B

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41. The value of the series

$\cos 12^\circ + \cos 84^\circ + \cos 132^\circ + \cos 156^\circ$ is,

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

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

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

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

Answer: D

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42. For $x \in R$, $3\cos(4x - 5) + 4$ lies in the interval

A. $[1, 7]$

B. $[4, 7]$

C. $[0, 7]$

D. $[2, 7]$

Answer: A

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43. $\cos\alpha \sin(\beta - \gamma) + \cos\beta \sin(\gamma - \alpha) + \cos\gamma \sin(\alpha - \beta)$ is equla to

A. 0

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

C. 1

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

Answer: A

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44. The value of $\cos\frac{2\pi}{15}\cos\frac{4\pi}{15}\cos\frac{8\pi}{15}\cos\frac{14\pi}{15}$ is

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

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

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

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

Answer: A

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45. If $A+B+C=270^\circ$ then $\cos 2A+\cos 2B+\cos 2C$ is equal to

A. $4\sin A\sin B\sin C$

B. $4\cos A\cos B\cos C$

C. $1-4\sin A\sin B\sin C$

D. $1 - 5\cos A\cos B\cos C$

Answer: C

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46. If $\sin 6\theta = 32\cos^5\theta\sin\theta - 32\cos^3\theta\sin\theta + 3x$ then x is equal to

A. $\cos\theta$

B. $\cos 2\theta$

C. $\sin\theta$

D. $\sin 2\theta$

Answer: D

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47. If $\cos(\alpha+\beta)=\frac{4}{5}, \sin(\alpha-\beta)=\frac{5}{13}$ and α, β between 0 and $\frac{\pi}{4}$, then $\tan 2\alpha$ is equal to

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

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

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

D. $\frac{60}{61}$

Answer: A

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48. $\cos^2 76^\circ + \cos^2 16^\circ$ is equal to

A. 0

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

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

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

Answer: D

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49. $\sum_{k=1}^{3} \cos^2(2k-1)\frac{\pi}{12}$ is equal to

A. 0

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

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

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

Answer: D

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50. $\frac{\sin 5\theta}{\sin \theta}$ is equal to

A. $16\cos^4\theta - 12\cos^2\theta + 1$

B. $16\cos^4\theta + 12\cos^2\theta + 1$

C. $16\cos^4\theta - 12\cos^2\theta - 1$

D. $16\cos^4\theta + 12\cos^2\theta - 1$

Answer: A

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51. If $\cos ec\theta = \frac{p+q}{p-q}$, then $\cot\left(\frac{\pi}{4} + \frac{\theta}{2}\right)$ is equal to

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

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

C. $\sqrt{pq}$

D. pq

Answer: B

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52. $\cos^2\left(\frac{\pi}{6}+theta\right)-\sin^2\left(\frac{\pi}{6}-\theta\right)$ is equal to

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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53. If A,B,C,D are angles of a cyclic quadrilateral, then $\cos A+\cos B+\cos C+\cos D$ is equal to

A. 0

B. 1

C. -1

D. 4

Answer: A

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54. If $\tan thea + \cot\theta = 2,$ then $\sin\theta$ is equal to

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

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

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

D. 1

Answer: A

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