Trigonometric Functions JEE Mains 2021 Problem Set

4 JEE Main 2021 (Online) 24th February Morning Slot
MCQ (Single Correct Answer)

If $e^{\left(\cos^2 x+\cos^4 x+\cos^6 x+\ldots\infty\right)\log_e 2}$ satisfies the equation $t^2 - 9t + 8 = 0$, then the value of $\frac{2\sin x}{\sin x+\sqrt{3}\cos x}\left(0 < x < \frac{\pi}{2}\right)$ is :

A $\sqrt{3}$

B $\frac{3}{2}$

C $2\sqrt{3}$

D $\frac{1}{2}$

3 JEE Main 2021 (Online) 25th February Morning Slot
MCQ (Single Correct Answer)

All possible values of $\theta \in [0, 2\pi]$ for which $\sin 2\theta + \tan 2\theta > 0$ lie in :

A $\left(0, \frac{\pi}{4}\right) \cup \left(\frac{\pi}{2}, \frac{3\pi}{4}\right) \cup \left(\frac{3\pi}{2}, \frac{11\pi}{6}\right)$

B $\left(0, \frac{\pi}{2}\right) \cup \left(\pi, \frac{3\pi}{2}\right)$

C $\left(0, \frac{\pi}{2}\right) \cup \left(\frac{\pi}{2}, \frac{3\pi}{4}\right) \cup \left(\pi, \frac{7\pi}{6}\right)$

D $\left(0, \frac{\pi}{4}\right) \cup \left(\frac{\pi}{2}, \frac{3\pi}{4}\right) \cup \left(\pi, \frac{5\pi}{4}\right) \cup \left(\frac{3\pi}{2}, \frac{7\pi}{4}\right)$

2 JEE Main 2021 (Online) 25th February Evening Shift
MCQ (Single Correct Answer)

If $0 < x, y < \pi$ and $\cos x + \cos y - \cos(x + y) = \frac{3}{2}$, then $\sin x + \cos y$ is equal to :

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

B $\frac{1}{2}$

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

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

1 JEE Main 2021 (Online) 16th March Morning Shift

MCQ (Single Correct Answer)

The number of roots of the equation, $(81)^{\sin^2 x} + (81)^{\cos^2 x} = 30$ in the interval $[0, \pi]$ is equal to :

A 2

B 3

C 4

D 8

4 JEE Main 2021 (Online) 16th March Morning Shift

MCQ (Single Correct Answer)

If for $x \in \left(0, \frac{\pi}{2}\right)$, $\log_{10}\sin x + \log_{10}\cos x = -1$ and $\log_{10}(\sin x + \cos x) = \frac{1}{2}(\log_{10} n - 1)$, $n > 0$, then the value of n is equal to :

A 16

B 9

C 12

D 20

3 JEE Main 2021 (Online) 17th March Evening Shift

MCQ (Single Correct Answer)

The number of solutions of the equation $x + 2\tan x = \frac{\pi}{2}$ in the interval $[0, 2\pi]$ is :

A 4

B 3

C 2

D 5

2 JEE Main 2021 (Online) 18th March Evening Shift

MCQ (Single Correct Answer)

If $15\sin^4\alpha + 10\cos^4\alpha = 6$, for some $\alpha \in R$, then the value of

$27\sec^6\alpha + 8\operatorname{cosec}^6\alpha$ is equal to :

A 500

B 400

C 250

D 350

1 JEE Main 2021 (Online) 25th July Morning Shift

MCQ (Single Correct Answer)

The sum of all values of x in $[0, 2\pi]$, for which $\sin x + \sin 2x + \sin 3x + \sin 4x = 0$, is equal to :

A 8π

B 11π

C 12π

D 9π

4 JEE Main 2021 (Online) 27th July Evening Shift

MCQ (Single Correct Answer)

If $\tan\left(\frac{\pi}{9}\right), x, \tan\left(\frac{7\pi}{18}\right)$ are in arithmetic progression and $\tan\left(\frac{\pi}{9}\right), y, \tan\left(\frac{5\pi}{18}\right)$ are also in arithmetic progression, then $|x - 2y|$ is equal to :

A 4

B 3

C 0

D 1

3 JEE Main 2021 (Online) 25th July Evening Shift

MCQ (Single Correct Answer)

The value of $\cot \frac{\pi}{24}$ is :

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

B $\sqrt{2}+\sqrt{3}+2+\sqrt{6}$

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

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

2 JEE Main 2021 (Online) 27th July Morning Shift

MCQ (Single Correct Answer)

If $\sin\theta+\cos\theta=\frac{1}{2}$, then 16(sin(2$\theta$) + cos(4$\theta$) + sin(6$\theta$)) is equal to :

A 23

B -27

C -23

D 27

1 JEE Main 2021 (Online) 26th August Morning Shift

MCQ (Single Correct Answer)

The sum of solutions of the equation

$\frac{\cos x}{1+\sin x}=|\tan 2x|, x\in\left(-\frac{\pi}{2},\frac{\pi}{2}\right)-\left\{\frac{\pi}{4},-\frac{\pi}{4}\right\}$ is :

A $-\frac{11\pi}{30}$

B $\frac{\pi}{10}$

C $-\frac{7\pi}{30}$

D $-\frac{\pi}{15}$

4 JEE Main 2021 (Online) 26th August Evening Shift

MCQ (Single Correct Answer)

The value of

$2\sin\left(\frac{\pi}{8}\right)\sin\left(\frac{2\pi}{8}\right)\sin\left(\frac{3\pi}{8}\right)\sin\left(\frac{5\pi}{8}\right)\sin\left(\frac{6\pi}{8}\right)\sin\left(\frac{7\pi}{8}\right)$ is :

A $\frac{1}{4\sqrt{2}}$

B $\frac{1}{4}$

C $\frac{1}{8}$

D $\frac{1}{8\sqrt{2}}$

3 JEE Main 2021 (Online) 27th August Morning Shift

MCQ (Single Correct Answer)

The distance of the point (1, −2, 3) from the plane x − y + z = 5 measured parallel to a line, whose direction ratios are 2, 3, −6 is :

A 3

B 5

C 2

D 1

2 JEE Main 2021 (Online) 31st August Evening Shift

MCQ (Single Correct Answer)

The number of solutions of the equation $32^{\tan^2 x} + 32^{\sec^2 x} = 81,\ 0 \le x \le \frac{\pi}{4}$ is :

A 3

B 1

C 0

D 2

1 **JEE Main 2021 (Online) 1st September Evening Shift**

MCQ (Single Correct Answer)

If n is the number of solutions of the equation $2\cos x\left(4\sin\left(\frac{\pi}{4}+x\right)\sin\left(\frac{\pi}{4}-x\right)-1\right)=1, x\in[0,\pi]$ and S is the sum of all these solutions, then the ordered pair (n, S) is :

A (3, 13π / 9)

B (2, 2π / 3)

C (2, 8π / 9)

D (3, 5π / 3)