JEE-Main-01-02-2024 (Memory Based) [MORNING SHIFT]

Mathematics

Question: Five people are distributed in four identical rooms. A room can also contain zero people. Find the number of ways to distribute them.
Options:
(a) 47
(b) 53
(c) 43
(d) 51
Answer: (d)
Solution:

Question: $3, a, b, c$ are in AP, $3, a-1, b+1, c+9$ are in GP, then AM of a, b, c is
Answer: 11.00
Solution:

Question: If $3, 7, 11, \ldots, 403 = \text{A.P.}_1$ and $2, 5, 8, \ldots., 401 = A.P._2$. Find the sum of common terms of A.P._1 and A.P._2
Options:
(a) 3366
(b) 6699
(c) 9999
(d) 6666
Answer: (b)
Solution:

Question: The value of integral $\int_0^{\frac{\pi}{4}} \frac{x\,dx}{\cos^4 2x + \sin^4 2x} =$
Options:
(a) $\frac{\pi^2}{16\sqrt{2}}$
(b) $\frac{\pi^2}{64}$
(c) $\frac{\pi^2}{32}$
(d) $\frac{\pi^2}{8\sqrt{2}}$
Answer: (a)
Solution:

$I=\frac{\pi^2}{16\sqrt{2}}$

Question: $y=y(x)$ solution of equation

$\frac{dy}{dx}=2x(x+y)^3-x(x+y)-1, y(0)=1\left(\frac{1}{\sqrt{2}}+y\left(\frac{1}{\sqrt{2}}\right)\right)^2=?$

Options:

(a) $\log\frac{4}{4+\sqrt{e}}$

(b) $\frac{2}{1+\sqrt{6}}$

(c) $\frac{3}{3-\sqrt{e}}$

(d) $\frac{1}{2-\sqrt{e}}$

Answer: (d)

Solution:

Question: If the system of equations $2x+3y-z=5;\ x+\alpha y+3z=-4;\ 3x-y+\beta z=7$ have many solutions, then $13\alpha\beta$ is equal to

Options:

(a) 1110

(b) 1120

(c) 1210

(d) 1220

Answer: (b)

Solution:

Question: A bag contains 8 balls, whose colours are either write or black back. 4 balls are drawn at random without replacement and it was found that 2 balls are white and other 2 balls are black. The probability that the bag contains equal number of white and black balls is:

Options:

(a) $\frac{1}{5}$

(b) $\frac{1}{7}$

(c) $\frac{2}{5}$

(d) $\frac{2}{7}$

Answer: (d)

Solution:

Question: For $0<\theta<\frac{\pi}{2}$, if the eccentricity of hyperbola $x^2-y^2\text{cosec}^2\theta=5$ is $\sqrt{7}$ times eccentricity of the ellipse $x^2\text{cosec}^2\theta+y^2=5$, then the value of θ is:

Options:

(a) $\frac{\pi}{6}$

(b) $\frac{5\pi}{12}$

(c) $\frac{\pi}{4}$

(d) $\frac{\pi}{3}$

Answer: (d)

Solution:

Question: Let $s=\left\{x\in R:\left(\sqrt{3}+\sqrt{2}\right)^x+\left(\sqrt{3}-\sqrt{2}\right)^x=10\right\}$. Number of elements in s is:

Options:

(a) 2

(b) 0

(c) 1

(d) 4

Answer: (a)

Solution:

Question: If $A=\begin{bmatrix}\sqrt{2} & 1\\ -1 & \sqrt{2}\end{bmatrix}, B=\begin{bmatrix}1 & 0\\ 1 & 1\end{bmatrix}, C=ABA^T$ and $X=AC^2A^T$ then $|X|$ is equal to

Options:

(a) 729

(b) 283

(c) 27

(d) 23

Answer: (a)

Solution:

Question: $\overline{a}=-5\hat{i}+\hat{j}-3\hat{k}, \overline{b}=\hat{i}+2\hat{j}-4\hat{k}, \overline{c}=\left[\left(\overline{a}\times\overline{b}\right)\times\hat{j}\times\hat{j}\right]\times\hat{j}$ then $\overline{c}\cdot\left(-\hat{i}+\hat{j}+\hat{k}\right)$

Answer: -12.00

Solution:

Question: $\frac{x-\lambda}{-2}=\frac{y-2}{1}=\frac{z-1}{1}$ and $\frac{x-\sqrt{3}}{1}=\frac{y-1}{-2}=\frac{z-2}{1}$. If the shortest distance between the above two lines is 1 then sum of possible values of λ

Options:

(a) 0

(b) $2\sqrt{3}$
(c) $3\sqrt{3}$
(d) $-2\sqrt{3}$
Answer: (b)
Solution:

Question: $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{8\sqrt{2}\cos x}{\left(1+e^{\sin x}\right)\left(1+\sin^4 x\right)} = a\pi + b\log\left(3+2\sqrt{2}\right)$, then find $a+b$.
Options:
(a) 4
(b) 6
(c) 8
(d) 2
Answer: (d)
Solution:

Question: $x = x(t)$ solution of $(t+1)dx = \left[ex + (t+1)^4\right]dx$, $x(0) = 2$ then $x(1) =$
Answer: 12.00
Solution:

Question: Given: $5f(x) + 4f\left(\frac{1}{x}\right) = x^2 - 4$ & $y = 9f(x)\cdot x^2$. If y is strictly increasing, then find interval of x.
Options:
(a) $\left(-\infty, -\frac{1}{\sqrt{5}}\right] \cup \left(\frac{1}{\sqrt{3}}, 0\right)$
(b) $\left(-\frac{1}{\sqrt{5}}, 0\right) \cup \left(0, \frac{1}{\sqrt{5}}\right)$
(c) $\left(0, \frac{1}{\sqrt{5}}\right) \cup \left(\frac{1}{\sqrt{5}}, \infty\right)$
(d) $\left(-\sqrt{\frac{2}{5}}, 0\right) \cup \left(\sqrt{\frac{2}{5}}, \infty\right)$
Answer: (d)
Solution: