JEE-Main-02-04-2025 (Memory Based)
[EVENING SHIFT]
Maths

Question: Total number of terms in an A.P are even. Sum of odd terms is 24 and sum of even terms is 30. Last term exceeds the first term by $\frac{21}{2}$. Find the total number of terms.

Answer: (8)

$t_1 + t_3 + ...t_{2n-1} = 24$

$t_2 + t_4 + ...t_{2n} = 30$

$\frac{n}{2}[2a + (n-1)2d] = 2..... \rightarrow (1)$

$\frac{n}{2}[2(a+d) + (n-1)2d] = 30.. \rightarrow (2)$

$2a + (n-1).\frac{21}{2n-1} = \frac{24\times2}{n}$

$2a + n.\frac{21}{2n-1} = \frac{30\times2}{n}$

$\frac{21}{2n-1} = \frac{60-98}{n} = \frac{12}{n}$

$7n = 8n - 4$

$t_{2n} = t_1 + \frac{21}{2}$

$a + (2n-1)d = a + \frac{21}{2}$

$(2n-1)d = \frac{21}{2}$

$d = \frac{21}{2(2n-1)} \rightarrow (3)$

$\text{No of terms} = 8$

Question: If the domain of the function is (a, b) then

$f(x) = \dfrac{1}{\sqrt{3x+10-x^2}} + \dfrac{1}{\sqrt{x+|x|}}$ **$(1+a)^2 + b^2$ is equal to**

Options:

(a) 25

(b) 16

(c) 24

(d) 26

Answer: (d)

$f(x)=\frac{1}{\sqrt{3x+10-x^2}}+\frac{1}{\sqrt{x+|x|}}$ is (a,b)

$3x+10-x^2>0 \qquad x+|x|>0$

$x^2-3x-10<0 \qquad |x|>\ -x$

$(x-5)(x+2)<0 \qquad x\in R^+$

$-2<x<5$

$x\ \in(0,5)\ \ a=0,\ b=5$

$(1+a)^2+b^2=\ 1+25\ =26.$

Question: If $\theta\in\left[-\frac{7\pi}{6},\frac{4\pi}{3}\right]$, **then number of solutions of √3 cosec² *θ* -2(√3-1)cosec *θ* - 4 = 0, is _____ .**

Answer: (6)

$\sqrt{3}\cos ec^2\theta-2\left(\sqrt{3}-1\right)\cos ec\,\theta-4=0$

Let's assume $c\ =\ \cos ec\,\theta$

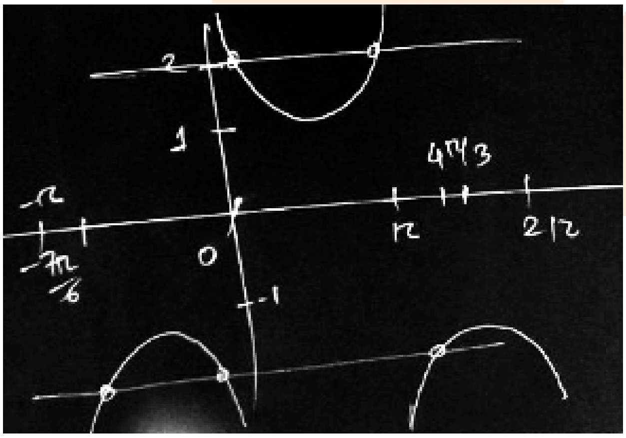
$\sqrt{3}c^2\ -2\left(\sqrt{3}-1\right)c-4=0$

$\Rightarrow\sqrt{3}c^2\ -2\sqrt{3}c+2c-4=0$

$\Rightarrow\sqrt{3}c\,(c-\ 2)\ +2(c-2)=0$

$c=2,\ \ c=\ -\frac{2}{\sqrt{3}}$

no. of solution $=6$



Question: If $\frac{dy}{dx}+2y\sec^2x=2\sec^2x+3\tan x.\ \sec^2x$ and $f(0)=\frac{5}{4}$.

Then the value of $12\left(y\left(\frac{\pi}{4}\right)-\frac{1}{e^2}\right)$ **equals to**

Answer: (21)

Question: $\lim_{x \to 0} \frac{\cos(2x) + a\cos(4x) - b}{x^4}$ **is finite, then a + b =**

Answer: (½)

$$\lim_{n \to 0} \frac{\cos 2n + a\ \cos(4n) - b}{x^4}$$

$$\frac{\left(1 - \frac{(2x)^2}{2!} + \frac{(2n)^4}{4!} \ldots..\right) + a\left(1 - \frac{(4x)^2}{2!} + \frac{(4x)^4}{4!}\right) - 4}{x^4}$$

$$\frac{(1+a-b) + x^2(-2-8a) + x^4\left(\frac{2}{3} + \frac{32}{3}a\right)}{x^4}$$

$$1 + a - y = 0$$

$$1 - \frac{1}{4} - 4 = 0$$

$$-2 - 8a = 0$$

$$\Rightarrow a = \frac{-1}{4}$$

$$b = \frac{3}{4}$$

$$a + 4 = \frac{3}{4} - \frac{1}{4}$$

$$= \frac{1}{2}$$

Question: Evaluate $\int_{-2}^{2} \frac{9x^2}{1+5^x} dx$

Options:

(a) 12

(b) 24

(c) 30

(d) 15

Answer: (b)

$$I = \int_{-2}^{2} \frac{9x^2}{1+5^x} dx$$

$$I = \int_{-2}^{2} \frac{9(-x)^2}{1+5^{-x}} dx$$

$$I = \int_{-2}^{2} (5^x) \frac{9x^2}{1+5^x} dx$$

$$2I = \int_{-2}^{2} \frac{9x^2}{(1+5^x)} (1+5^x)\, dx$$

$$2I = 2.9 \int_{0}^{2} x^2 dx$$

$$I = 39\left(\frac{x^3}{3}\right)_0^2$$

$$= 3(8-0)$$

$$I = 24$$

Question: Find the eccentricity of ellipse in which length of minor axis is equal to one fourth of the distance between foci

Options:

(a) $\frac{4}{\sqrt{17}}$

(b) $\frac{2}{\sqrt{17}}$

(c) $\frac{7}{\sqrt{17}}$

(d) $\frac{8}{\sqrt{17}}$

Answer: (a)

Question: If the mean and variance of eight observations a, b, 8, 12, 10, 6, 4, 15, is 9 and 9.25 respectively. Then a + b +ab is equal to

Options:

(a) 76

(b) 83

(c) 79

(d) 93

Answer: (d)

Question: If two vectors $\vec{a}$ and $\vec{b}$ **is given by** $\vec{a} = \hat{i} + 2\hat{j} + 3\hat{k}$ and $\vec{b} = \hat{i} + 4\hat{j} + 8\hat{k}$ **and the vectors** $\vec{c}$ and $\vec{d}$ **are related as** $\left(\vec{a} - \vec{c}\right) \times \vec{b} = 5\hat{i} - 2\hat{j} + 3\hat{k}$ and $\vec{b} \times \vec{c} = \vec{d}.$

Then $\left|\vec{a}.\ \vec{d}\right|$ **is equal to**

Options:

(a) 12

(b) 8

(c) 10

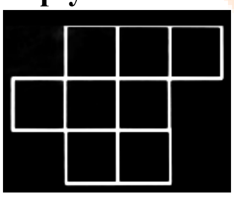
(d) 7

Answer: (c)

Question: Parabola $y^2 = 16x$ and point (1, -4) lies on the focal chord. Find the ratio in which focus divides the focal chord.

Answer: (4 : 1)

Question: In how many ways A, B, C, D, E has to be arranged such that no row is empty.



Answer: (5760)

Question: If the system of equations

$2x + \lambda y + 3z = 5$

$3x + 2y - z = 7$

$4x + 5y + \mu z = 9$ has infinitely many solutions, then

$(\lambda^2 + \mu^2)$ is equal to

Options:

(a) 22

(b) 18

(c) 26

(d) 30

Answer: (c)

Question: If $y=\cos\left(\frac{\pi}{3}+\cos^{-1}\left(\frac{x}{2}\right)\right)$, **then which of the following is true.**

Options:

(a) $x^2 - 2xy + 8y^2 = 2$

(b) $x^2 - 2xy + 4y^2 = 3$

(c) $x^2 - 3xy + 4y^2 = 3$

(d) $x^2 - 5xy + 4y^2 = 8$

Answer: (b)

Question: A variable line intersect co-ordinate axis at B & C such that area of triangle equal to 48. Find minimum value of $OB^2 + OC^2$ = ?

Answer: (192)