



PAPER SOLUTION

From Meerut

JEE MAIN

JAN

SHIFT

28

1st

2025

Aryan Agarwal

Founder and CEO

CVPS INTEGRATED STAR COURSE



CITY VOCATIONAL PUBLIC SCHOOL

INTEGRATED STAR COURSE



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Aryan Agarwal
Founder & CEO

Disclaimer: This academic course is exclusively for day boarders only

9389338683, 7906236652



Rank Predictor



Question Paper



JEE MAIN 2025 ▶ LIVE PAPER DISCUSSION

#Q. In an AP, $T_m = \frac{1}{25}$, $T_{25} = \frac{1}{20}$ and $20 \sum_{r=1}^{25} T_r = 13$, then $5m \sum_{r=m}^{2m} T_r$ equals

$$T_n = \frac{1}{m}, T_m = \frac{1}{n}, a = d = \frac{1}{mn}$$

$$m = 20, a = d = \frac{1}{25 \times 20} = \frac{1}{500}$$

A 127

B 126

C 125

D 124

$$5 \times 20 \sum_{r=20}^{40} T_r = 100 \left[\frac{21}{2} \left\{ \frac{2}{25} + 20 \times \frac{1}{500} \right\} \right]$$

$$\left(T_{20} + T_{21} + \dots + T_{40} \right) = \frac{100}{2} \left[\frac{21}{2} \times \frac{3}{25} \right] = 2 \times 21 \times 3 = \underline{\underline{126}}$$



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Ans. (B)

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#Q. If $a = 1 + \sum_{n=1}^6 (-3)^{n-1} \cdot {}^{12}C_{2n-1}$, then distance of point $(12, \sqrt{3})$ from the line $ax - \sqrt{3}y + 100 = 0$ is

$\omega = -\frac{1}{2} + i\frac{\sqrt{3}}{2} \Rightarrow 2\omega = -1 + i\sqrt{3}, 2\omega^2 = -1 - i\sqrt{3}$

$(1 + \frac{x}{r})^n = {}^nC_0 + {}^nC_1 x + {}^nC_2 x^2 + {}^nC_3 x^3$

①

$\checkmark \quad {}^{12}C_1 - 3 \cdot {}^{12}C_3 + 3^2 \cdot {}^{12}C_5 - \dots$

A 55

B 54

C $\frac{109}{2}$ ✓✓

D 109

$(1 + i\sqrt{3})^{12} - (1 - i\sqrt{3})^{12} = 2 \left[{}^{12}C_1 (i\sqrt{3}) + {}^{12}C_3 (i\sqrt{3})^3 + \dots \right]$

$(-2\omega^2)^{12} - (-2\omega)^{12} = 2i\sqrt{3} \left[{}^{12}C_1 - 3 \cdot {}^{12}C_3 + \dots \right]$

↓
0



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$(12, \sqrt{3})$ line $x - \sqrt{3}y + 100 = 0$

$$\text{Distance} = \frac{12 - \sqrt{3} \cdot \sqrt{3} + 100}{\sqrt{1 + 3}} = \frac{109}{2}$$

Ans. (C)



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#Q. If $2a_{n+2} = 5a_{n+1} - 3a_n$, where $n = 0, 1, 2, \dots$. If $a_0 = 3$ and $a_1 = 4$, then the value of $\sum_{k=1}^{100} a_k$ is equal to

$$a_0 = 3$$

$$a_1 = 4$$

A $3a_{99} + 91$

$$2a_2 = 5a_1 - 3a_0$$

$$2a_2 = 20 - 9 = 11$$

B $3a_{100} + 91$

$$a_2 = \frac{11}{2} = 1 + \left(\frac{9}{2^2}\right) \times 2$$

C $3a_{99} - 91$

$$2a_3 = 5a_2 - 3a_1$$

$$= \frac{55}{2} - 3 \times 4 = \frac{31}{2}$$

D $3a_{100} - 91$

$$a_3 = \frac{31}{4} = 1 + 27$$

$$a_n = 1 + 2 \left(\frac{3}{2}\right)^n$$

$$\sum_{n=1}^{100} a_n = 100 + 2 \left[\frac{3}{2} + \left(\frac{3}{2}\right)^2 + \dots \right]$$

$$= 100 + 2 \left[\frac{\frac{3}{2} \left(\left(\frac{3}{2}\right)^{100} - 1 \right)}{\frac{1}{2}} \right]$$

$$= 100 + 6 \left(\frac{3}{2}\right)^{100} - 6$$



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$$S_{100} = 94 + 6\left(\frac{3}{2}\right)^{100}$$

$$a_{100} = 1 + 2\left(\frac{3}{2}\right)^{100}$$

$$= 94 + 3[a_{100} - 1]$$

$$= 94 + 3a_{100} - 3$$

$$= 91 + 3a_{100}$$

$$2\left(\frac{3}{2}\right)^{100} = a_{100} - 1$$

Ans. (B)



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#Q. Let k_1 and k_2 be two randomly selected natural ^{numbers} ~~members~~. The probability that $(i)^{k_1} + (i)^{k_2}$ is non-zero is (where $i = \sqrt{-1}$)

- A** $\frac{1}{6}$
- B** $\frac{1}{4}$
- C** $\frac{3}{4}$
- D** $\frac{1}{2}$

$$\begin{aligned}i^{4n} &= 1 \checkmark \\i^{4n+1} &= i \rightarrow \\i^{4n+2} &= -1 \checkmark \\i^{4n+3} &= -i \rightarrow\end{aligned}$$

$$4n, 4n+1, 4n+2, 4n+3.$$

Case I $k_1 = 4n, k_2 = 4n+2$

$$P_1 = 2 \left(\frac{1}{4} \times \frac{1}{4} \right) = \frac{1}{8}$$

Case II $k_1 = 4n+1, k_2 = 4n+3$

$$P_2 = 2 \left(\frac{1}{4} \times \frac{1}{4} \right) = \frac{1}{8}$$

$$P = \frac{1}{8} + \frac{1}{8} = \frac{1}{4}$$



JEE MAIN 2025 **LIVE PAPER DISCUSSION**

Ans. (C)



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#Q. In ΔABC , $A(4\sin\theta, 4\cos\theta)$, $B(-2\cos\theta, 0)$ and $C(2, 2\sin\theta)$. If locus of centroid is $(3x-2)^2 + (3y)^2 = \alpha$ then α is

Centroid $\left(\frac{4\sin\theta - 2\cos\theta + 2}{3}, \frac{4\cos\theta + 2\sin\theta}{3} \right)$

A 12

$$3x - 2 = 4\sin\theta - 2\cos\theta$$

B 16

$$3y = 4\cos\theta + 2\sin\theta$$

C 4

$$(3x-2)^2 + (3y)^2 = 4^2\sin^2\theta + 4\cos^2\theta + 4^2\cos^2\theta + 4\sin^2\theta$$

D 20

$$= 20$$



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Ans. (D)



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$$e = \sqrt{a^2 - b^2} = \sqrt{5}, \quad b^2 = a^2(1 - e^2) = a^2 \left[1 - \frac{5}{9}\right] = a^2 \cdot \frac{4}{9}$$

#Q. Let $E_1: \frac{x^2}{9} + \frac{y^2}{4} = 1$ be an ellipse and a series of ellipse are drawn that E_{i+1} has same centre eccentricity as E_i and E_{i+1} 's major axis is minor axis of E_i . If S_i be the area of E_i , then $\left(\frac{5}{\pi} \sum_{i=1}^{\infty} S_i\right)$ is equal to

A 72

B 45

C 54

D 63

$$E_1: \quad a^2 = 9, \quad b^2 = 4 \\ a = 3, \quad b = 2, \quad e = \frac{\sqrt{5}}{3}$$

$$E_2: \quad a_1 = 2, \quad b_1 = a_1 \cdot \frac{2}{3} = 2 \cdot \frac{2}{3} \\ \left(3 \cdot \frac{2}{3}\right)$$

$$S_1 = \pi ab = \pi(3)(2)$$

$$S_2 = \pi \cdot a_1 \cdot b_1 = \pi \cdot a \times \frac{2}{3} \times b \times \frac{2}{3} \\ = \pi ab \cdot \frac{4}{9}$$

$$S_3 = S_2 \cdot \frac{4}{9} = \pi ab \left(\frac{4}{9}\right)^2$$



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$$\frac{5}{\pi} \sum_{i=1}^{\infty} S_i = \frac{5}{\pi} \left[\pi ab + \pi ab \cdot \frac{4}{9} + \pi ab \cdot \left(\frac{4}{9}\right)^2 + \dots \right]$$

$$= 5ab \left[1 + \frac{4}{9} + \left(\frac{4}{9}\right)^2 + \dots \right]$$

$$= 5(3)(2) \cdot \left[\frac{1}{1 - \frac{4}{9}} \right] = \cancel{8} \times 6 \cdot \frac{1}{\cancel{8}/9} = 6 \times 9 = \underline{\underline{54}}$$

Ans. (C)



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#Q. Let $f(x) = \begin{cases} 2x, & x < 0 \\ (1 + x + [x], 1 + 2[x]), & 0 \leq x < 2 \\ 5, & x \geq 2 \end{cases}$. If α is the number of points of discontinuity and β is the number of points of non-differentiability, then

$(\alpha + \beta)$ is equal to (where $[.]$ denote greatest integer function)

$3 + 3$

A 8

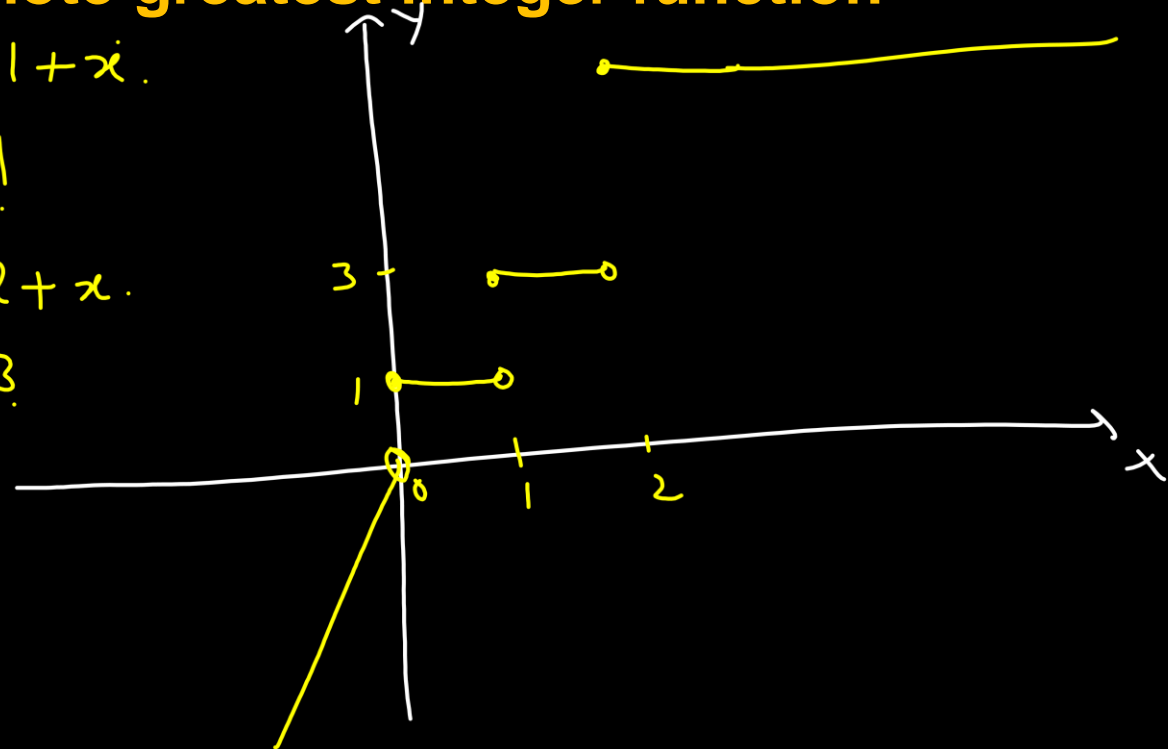
B 4

C 5

D 6 ✓

$0 \leq x < 1$, $1 + x + [x] = 1 + x$.
 $1 + 2[x] = 1$

$1 \leq x < 2$, $1 + x + [x] = 2 + x$.
 $1 + 2[x] = 3$





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Ans. (D)



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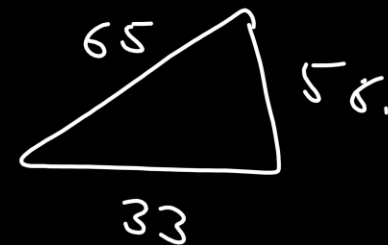
#Q. Evaluate $\cos \left(\sin^{-1} \left(\frac{3}{5} \right) + \sin^{-1} \left(\frac{5}{13} \right) + \sin^{-1} \left(\frac{33}{65} \right) \right) = \cos \left(\frac{\pi}{2} \right) = 0$.

$$\sin^{-1} x + \sin^{-1} y = \sin^{-1} \left[x \sqrt{1-y^2} + y \sqrt{1-x^2} \right]$$

$$\sin^{-1} \frac{3}{5} + \sin^{-1} \frac{5}{13} = \sin^{-1} \left[\frac{3}{5} \cdot \sqrt{1 - \frac{25}{169}} + \frac{5}{13} \sqrt{1 - \frac{9}{25}} \right]$$

$$= \sin^{-1} \left[\frac{3}{5} \times \frac{12}{13} + \frac{5}{13} \times \frac{4}{5} \right]$$

$$= \sin^{-1} \left[\frac{56}{65} \right] = \cos^{-1} \left(\frac{33}{65} \right)$$



A 2

B 0

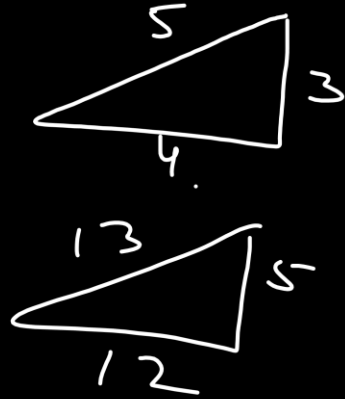
C 1

D $\cos \frac{5}{13}$



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$$\sin^{-1} \frac{3}{5} = \tan^{-1} \frac{3}{4}$$
$$\sin^{-1} \frac{5}{13} = \tan^{-1} \frac{5}{12}$$



$$\tan^{-1} x + \tan^{-1} y = \tan^{-1} \left(\frac{x+y}{1-xy} \right)$$

Ans. (B)



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#Q. $z_1 = \sqrt{3} + 2\sqrt{2}i$ & $\sqrt{3}|z_1| = |z_2|$ and $\arg(z_2) = \arg(z_1) + \frac{\pi}{6}$ then area of triangle with vertices z_1, z_2 and origin.

$$|z_1| = \sqrt{3+8} = \sqrt{11}$$

$$|z_2| = \sqrt{3} \cdot \sqrt{11}$$

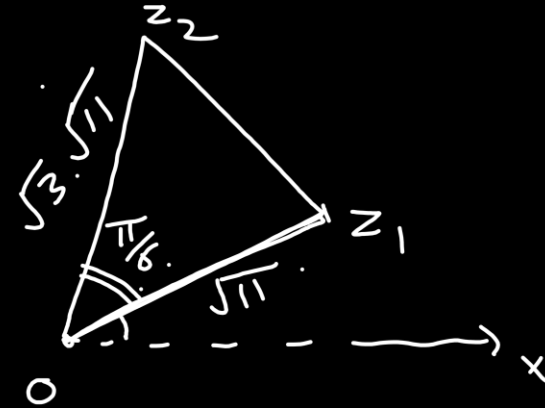
A $\frac{11\sqrt{3}}{4}$

B $\frac{11\sqrt{2}}{4}$

C $\frac{11\sqrt{5}}{4}$

D 9

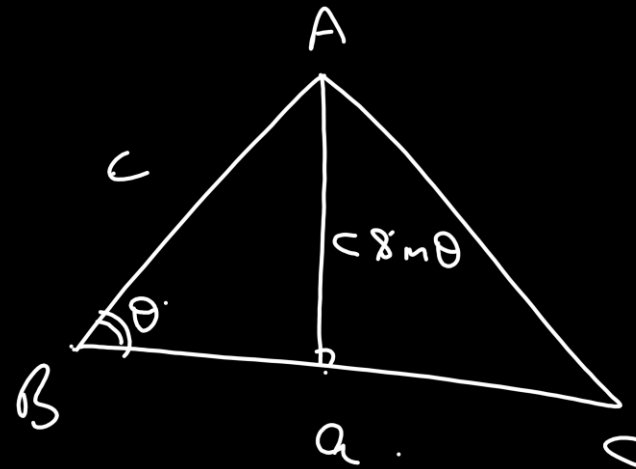
$$\begin{aligned} \text{Area} &= \frac{1}{2} \cdot \sqrt{11} \cdot \sqrt{3} \cdot \sqrt{11} \cdot \sin \frac{\pi}{6} \\ &= \frac{11\sqrt{3}}{4} \end{aligned}$$





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$$\frac{1}{2}ac \sin \theta$$



Ans. (A)



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#Q. Let R be a relation such that $R = \{(x, y) : \underline{x}, y \in \underline{Z} \text{ and } (x + y) \text{ is even}\}$, then the relation R is

Reflexive: $(x + x) = \underline{2x}$ is even. ✓

Symmetric: $x + y$ is even, then $(y + x)$ is even.

Transitive:
 $x + y$ is even
 $y + z$ is even

$x + z$ is even

- A** ✓ Equivalence relation
- B** Transitive only
- C** Reflexive and transitive but not symmetric
- D** Reflexive and symmetric but not transitive



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Ans. (A)



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#Q. Area of region $\{(x, y): 0 \leq y \leq 2|x| + 1, 0 \leq y \leq x^2 + 1, |x| \leq 3\}$

$$2 \left[\int_0^2 (x^2 + 1) dx + \int_2^3 (2x + 1) dx \right]$$

A $\frac{80}{3}$

B $\frac{64}{3}$

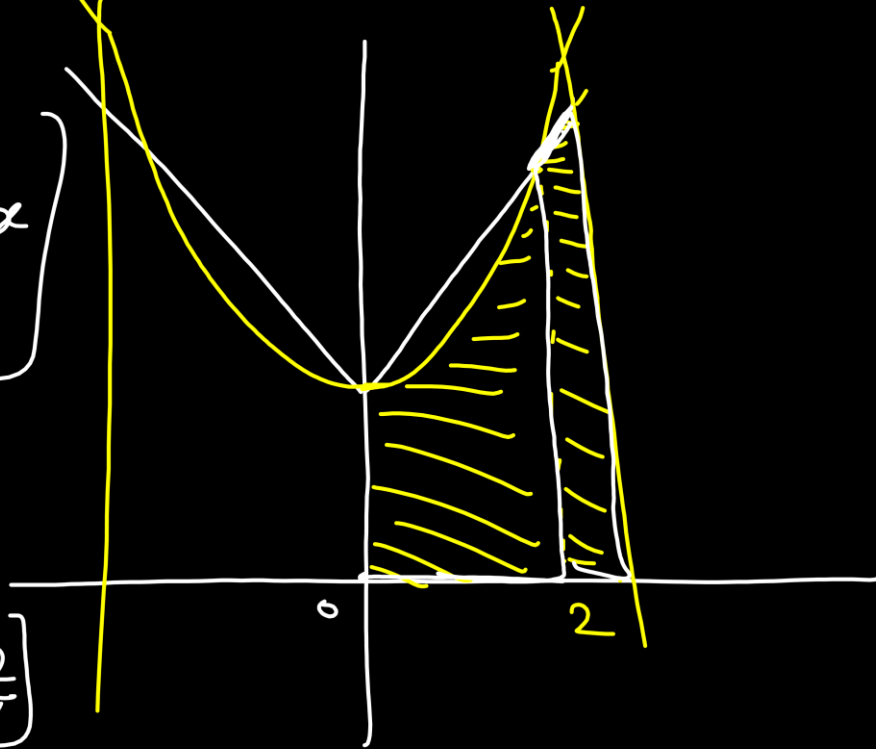
C $\frac{32}{3}$

D $\frac{17}{3}$

$$2 \left[\left(\frac{x^3}{3} + x \right)_0^2 + \left(x^2 + x \right)_2^3 \right]$$

$$2 \left[\frac{8}{3} + 2 + 9 + 3 - 4 - 2 \right]$$

$$2 \left[\frac{8}{3} + 8 \right] = 2 \times \frac{32}{3}$$





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Ans. (B)

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$$|x| = x, x \geq 0 \quad \& \quad |x| = -x, x < 0.$$

#Q. The sum of squares of real roots of the equation: $x^2 + |2x - 3| - 4 = 0$, is

$$\text{If } \underbrace{2x - 3 \geq 0},$$
$$x \geq \frac{3}{2}$$

$$x^2 + 2x - 3 - 4 = 0.$$

$$x^2 + 2x - 7 = 0$$

$$(x+1)^2 = 8 \Rightarrow x+1 = 2\sqrt{2}, -2\sqrt{2}.$$

$$x = -1 + 2\sqrt{2}, -1 - 2\sqrt{2} \quad \times$$

$$\text{If } 2x - 3 < 0$$
$$x < \frac{3}{2}.$$

$$x^2 - (2x - 3) - 4 = 0$$

$$x^2 - 2x - 1 = 0$$

$$(x-1)^2 = 2 \Rightarrow x = 1 + \sqrt{2}, 1 - \sqrt{2}$$

A $6(2 + \sqrt{2})$

B $3(2 + \sqrt{2})$

C $3(2 - \sqrt{2})$

D $6(2 - \sqrt{2})$



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$$(-1+2\sqrt{2})^2 + (1-\sqrt{2})^2$$

$$\underline{1+8-4\sqrt{2}} + \underline{1+2-2\sqrt{2}}$$

$$12-6\sqrt{2}$$

$$= \underline{6(2-\sqrt{2})}$$

Ans. (D)



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21

#Q. There are 2 bad oranges mixed with 7 good oranges and 2 oranges are drawn at random. Let X be the number of bad oranges. The variance of X is

X	0	1	2
$P(X)$	$\frac{{}^7C_2}{{}^9C_2}$	$\frac{{}^2C_1 \cdot {}^7C_1}{{}^9C_2}$	$\frac{{}^2C_2}{{}^9C_2}$
	$\frac{21}{36}$	$\frac{14}{36}$	$\frac{1}{36}$

$$\begin{aligned} & \frac{1}{2} - \left(\frac{16}{36}\right)^2 \\ & \frac{1}{2} - \frac{16}{81} \\ & \frac{81 - 32}{162} \\ & = \frac{49}{162} \end{aligned}$$

A $\frac{91}{206}$

B $\frac{63}{108}$

C $\frac{49}{162}$ ✓

D $\frac{51}{268}$

$$\begin{aligned} \text{Variance} &= \sum X_i^2 p_i - \left(\sum X_i p_i\right)^2 \\ &= 0 + \frac{14}{36} + \frac{4}{36} - \left(0 + \frac{14}{36} + \frac{2}{36}\right)^2 \end{aligned}$$



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Ans. (C)



JEE MAIN 2025 LIVE PAPER DISCUSSION

#Q. If $\int_0^x tf(t)dt = x^2 f(x)$ and $f(2) = 3$, then $f(6)$ equals to

- A** 2
- B** 3
- C** 6
- D** 1



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Ans. (D)

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#Q. If the image of the point $P(4, 4, 3)$ in the line $\frac{x-1}{2} = \frac{y-2}{1} = \frac{z-1}{1}$ $Q(\alpha, \beta, \gamma)$, then $(\alpha + \beta + \gamma)$ is equal to

A 7

B 8

C $\frac{31}{3}$

D $\frac{11}{3}$



JEE MAIN 2025 LIVE PAPER DISCUSSION

Ans. (C)



JEE MAIN 2025 LIVE PAPER DISCUSSION

#Q. If $f(x) = \frac{2^x}{2^x + \sqrt{2}}$, $x \in R$, then $\sum_{k=1}^{81} f\left(\frac{k}{82}\right)$ is equal to

- A** 41
- B** 40.5
- C** 82
- D** $81\sqrt{2}$



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Ans. (B)

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#Q. Number of ways to form 5-digit numbers greater than 50000 with the use of digits 0, 1, 2, 3, 4, 5, 6, 7 such that sum of first and last digit is not more than 8, is equal to

- A** 5119
- B** 5120
- C** 4607
- D** 4068



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Ans. (C)



JEE MAIN 2025 LIVE PAPER DISCUSSION

#Q. If $\int_{-\pi/2}^{\pi/2} \frac{96(x^2 + \cos x)}{1+e^x} dx = \alpha\pi^3 + \beta$ (where α, β are positive integers), then $\alpha + \beta$ equal to

- A** 144
- B** 100
- C** 64
- D** 196



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Ans. (B)

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