

JEE Main January 2026
Question Paper With Text Solution
22 January | Shift-1

MATHEMATICS



JEE Main & Advanced | XI-XII Foundation| VI-X Pre-Foundation

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**JEE MAIN JANUARY 2026 | 22TH JANUARY SHIFT-1****SECTION – A**

Question ID : 444792155

1. If the sum of the first four terms of an A.P. is 6 and the sum of its first six terms is 4, then the sum of its first twelve terms is

(1) –26 (2) –20 (3) –24 (4) –22

Ans. Official answer NTA(4)

Sol.

Question ID : 444792166

2. Let $f(x) = x^{2025} - x^{2000}$, $x \in [0, 1]$ and the minimum value of the function $f(x)$ in the interval $[0, 1]$ be $(80)^{80} (n)^{-81}$. Then n is equal to :

(1) –41 (2) –80 (3) –81 (4) –40

Ans. Official answer NTA(3)

Sol.

Question ID : 444792157

3. Two distinct numbers a and b are selected at random from $1, 2, 3, \dots, 50$. The probability, that their product ab is divisible by 3, is :

(1) $\frac{272}{1225}$ (2) $\frac{561}{1225}$ (3) $\frac{8}{25}$ (4) $\frac{664}{1225}$

Ans. Official answer NTA(4)

Sol.

Question ID : 444792156

4. The coefficient of x^{48} in $(1+x) + 2(1+x)^2 + 3(1+x)^3 + \dots + 100(1+x)^{100}$ is equal to :

(1) $100 \cdot {}^{100}C_{49} - {}^{100}C_{50}$

(2) ${}^{100}C_{50} + {}^{101}C_{49}$

(3) $100 \cdot {}^{100}C_{49} - {}^{100}C_{48}$

(4) $100 \cdot {}^{101}C_{49} - {}^{101}C_{50}$

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Ans. Official answer NTA(4)

Sol.

Question ID : 444792152

5. If the domain of the function $f(x) = \sin^{-1}\left(\frac{5-x}{3+2x}\right) + \frac{1}{\log_e(10-x)}$ is $(-\infty, \alpha] \cup [\beta, \gamma) - \{\delta\}$ then

$6(\alpha + \beta + \gamma + \delta)$ is equal to :

(1) 66

(2) 68

(3) 70

(4) 67

Ans. Official answer NTA(3)

Sol.

Question ID : 444792168

6. Let the line $x = -1$ divide the area of the region $\{(x, y): 1 + x^2 \leq y \leq 3 - x\}$ in the ratio $m : n$, $\gcd(m, n) = 1$.

Then $m + n$ is equal to :

(1) 27

(2) 26

(3) 28

(4) 25

Ans. Official answer NTA(1)

Sol.

Question ID : 444792161

7. Let the set of all values of r , for which the circles $(x+1)^2 + (y+4)^2 = r^2$ and $x^2 + y^2 - 4x - 2y - 4 = 0$ intersect at two distinct points be the interval (α, β) . Then $\alpha\beta$ is equal to :

(1) 20

(2) 24

(3) 21

(4) 25

Ans. Official answer NTA(4)

Sol.

Question ID : 444792164

8. Let $P(\alpha, \beta, \gamma)$ be the point on the line $\frac{x-1}{2} = \frac{y+1}{-3} = z$ at a distance $4\sqrt{14}$ from the point $(1, -1, 0)$ and

nearer to the origin. Then the shortest distance, between the lines $\frac{x-\alpha}{1} = \frac{y-\beta}{2} = \frac{z-\gamma}{3}$ and

$\frac{x+5}{2} = \frac{y-10}{1} = \frac{z-3}{1}$, is equal to :

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(1) $2\sqrt{\frac{7}{4}}$

(2) $4\sqrt{\frac{5}{7}}$

(3) $4\sqrt{\frac{7}{5}}$

(4) $7\sqrt{\frac{5}{4}}$

Ans. Official answer NTA(3)

Sol.

Question ID : 444792163

9. Let $\vec{AB} = 2\hat{i} + 4\hat{j} - 5\hat{k}$ and $\vec{AD} = \hat{i} + 2\hat{j} + \lambda\hat{k}$, $\lambda \in \mathbb{R}$. Let the projection of the vector $\vec{v} = \hat{i} + \hat{j} + \hat{k}$ on the diagonal \vec{AC} of the parallelogram ABCD be of length one unit. If α, β , where $\alpha > \beta$, be the roots of the equation $\lambda^2 x^2 - 6\lambda x + 5 = 0$, then $2\alpha - \beta$ is equal to :

(1) 3

(2) 1

(3) 6

(4) 4

Ans. Official answer NTA(1)

Sol.

Question ID : 444792165

10. If the image of the point $P(1, 2, a)$ in the line $\frac{x-6}{3} = \frac{y-7}{2} = \frac{7-z}{2}$ is $Q(5, b, c)$, then $a^2 + b^2 + c^2$ is equal to :

(1) 298

(2) 264

(3) 283

(4) 293

Ans. Official answer NTA(1)

Sol.

Question ID : 444792167

11. Let $f : [1, \infty) \rightarrow \mathbb{R}$ be a differentiable function. If $6 \int_1^x f(t) dt = 3xf(x) + x^3 - 4$ for all $x \geq 1$, then the value of $f(2) - f(3)$ is :

(1) 3

(2) -4

(3) -3

(4) 4

Ans. Official answer NTA(1)

Sol.



Question ID : 444792160

12. If the chord joining the points $P_1(x_1, y_1)$ and $P_2(x_2, y_2)$ on the parabola $y^2 = 12x$ subtends a right angle at the vertex of the parabola, then $x_1x_2 - y_1y_2$ is equal to :

- (1) 280 (2) 284 (3) 292 (4) 288

Ans. Official answer NTA(4)

Sol.

Question ID : 444792153

13. The number of distinct real solutions of the equation $x|x+4| + 3|x+2| + 10 = 0$ is :

- (1) 0 (2) 3 (3) 2 (4) 1

Ans. Official answer NTA(4)

Sol.

Question ID : 444792162

14. The number of solutions of $\tan^{-1} 4x + \tan^{-1} 6x = \frac{\pi}{6}$, where $-\frac{1}{2\sqrt{6}} < x < \frac{1}{2\sqrt{6}}$, is equal to :

- (1) 0 (2) 1 (3) 2 (4) 3

Ans. Official answer NTA(2)

Sol.

Question ID : 444792159

15. If the line $\alpha x + 2y = 1$, where $\alpha \in \mathbb{R}$, does not meet the hyperbola $x^2 - 9y^2 = 9$, then a possible value of α is :

- (1) 0.7 (2) 0.8 (3) 0.5 (4) 0.6

Ans. Official answer NTA(2)

Sol.



Question ID : 444792158

16. If a random variable x has the probability distribution :

x	0	1	2	3	4	5	6	7
$P(x)$	0	$2k$	k	$3k$	$2k^2$	$2k$	$k^2 + k$	$7k^2$

then $P(3 < x \leq 6)$ is equal to

- (1) 0.64 (2) 0.33 (3) 0.22 (4) 0.34

Ans. Official answer NTA(2)**Sol.**

Question ID : 444792154

17. If $A = \begin{bmatrix} 2 & 3 \\ 3 & 5 \end{bmatrix}$, then the determinant of the matrix $(A^{2025} - 3A^{2024} + A^{2023})$ is :

- (1) 16 (2) 28 (3) 12 (4) 24

Ans. Official answer NTA(1)**Sol.**

Question ID : 444792151

18. Let the relation R on the set $M = \{1, 2, 3, \dots, 16\}$ be given by $R = \{(x, y) : 4y = 5x - 3, x, y \in M\}$. Then the minimum number of elements required to be added in R , in order to make the relation symmetric, is equal to :

- (1) 1 (2) 2 (3) 3 (4) 4

Ans. Official answer NTA(2)**Sol.**

Question ID : 444792169

19. Let the solution curve of the differential equation $x dy - y dx = \sqrt{x^2 + y^2} dx$, $x > 0$, $y(1) = 0$, be $y = y(x)$. Then $y(3)$ is equal to :

- (1) 2 (2) 6 (3) 1 (4) 4

Ans. Official answer NTA(4)

**Sol.**

Question ID : 444792170

20. The value of $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \left(\frac{1}{[x]+4} \right) dx$, where $[\cdot]$ denotes the greatest integer function, is :

- (1) $\frac{1}{60}(21\pi-1)$ (2) $\frac{7}{60}(\pi-3)$ (3) $\frac{7}{60}(3\pi-1)$ (4) $\frac{1}{60}(\pi-7)$

Ans. Official answer NTA(3)**Sol.****SECTION - B**

Question ID : 444792173

21. Let ABC be a triangle. Consider four points p_1, p_2, p_3, p_4 on the side AB, five points p_5, p_6, p_7, p_8, p_9 on the side BC, and four points $p_{10}, p_{11}, p_{12}, p_{13}$ on the side AC. None of these points is a vertex of the triangle ABC. Then the total number of pentagons, that can be formed by taking all the vertices from the points p_1, p_2, \dots, p_{13} , is _____.

Ans. Official answer NTA(660)**Sol.**

Question ID : 444792175

22. If $\int (\sin x)^{\frac{-11}{2}} (\cos x)^{\frac{-5}{2}} dx = -\frac{p_1}{q_1} (\cot x)^{\frac{9}{2}} - \frac{p_2}{q_2} (\cot x)^{\frac{5}{2}} - \frac{p_3}{q_3} (\cot x)^{\frac{1}{2}} + \frac{p_4}{q_4} (\cot x)^{\frac{-3}{2}} + C$, where p_i and q_i are

positive integers with $\gcd(p_i, q_i) = 1$ for $i = 1, 2, 3, 4$ and C is the constant of integration, then $\frac{15p_1p_2p_3p_4}{q_1q_2q_3q_4}$ is

equal to _____.

Ans. Official answer NTA(16)**Sol.****MATRIX JEE ACADEMY**

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Question ID : 444792174

23. If $\frac{\cos^2 48^\circ - \sin^2 12^\circ}{\sin^2 24^\circ - \sin^2 6^\circ} = \frac{\alpha + \beta\sqrt{5}}{2}$, where $\alpha, \beta \in \mathbb{N}$, then $\alpha + \beta$ is equal to _____.

Ans. Official answer NTA(4)**Sol.**

Question ID : 444792171

24. Let $\alpha = \frac{-1+i\sqrt{3}}{2}$ and $\beta = \frac{-1-i\sqrt{3}}{2}$, $i = \sqrt{-1}$. If $(7 - 7\alpha + 9\beta)^{20} + (9 + 7\alpha - 7\beta)^{20} + (-7 + 9\alpha + 7\beta)^{20} + (14 + 7\alpha + 7\beta)^{20} = m^{10}$, then m is _____.

Ans. Official answer NTA(49)**Sol.**

Question ID : 444792172

25. Let A be a 3×3 matrix such that $A + A^T = O$. If $A \begin{bmatrix} 1 \\ -1 \\ 0 \end{bmatrix} = \begin{bmatrix} 3 \\ 3 \\ 2 \end{bmatrix}$, $A^2 \begin{bmatrix} 1 \\ -1 \\ 0 \end{bmatrix} = \begin{bmatrix} -3 \\ 19 \\ -24 \end{bmatrix}$ and $\det(\text{adj}(2 \text{adj}(A+I))) = (2)^\alpha \cdot (3)^\beta \cdot (11)^\gamma$, α, β, γ are non-negative integers, then $\alpha + \beta + \gamma$ is equal to _____.

Ans. Official answer NTA(18)**Sol.**