

PYQSide

JEE MAIN DETERMINANTS — PYQS

Max. Marks: 136

Questions: 34

Section A (MCQ)

- Q.1** If the system of linear equations :
 $x + y + z = 6,$
 $x + 2y + 5z = 10,$
 $2x + 3y + \lambda z = \mu$
 has infinitely many solutions, then the value of $\lambda + \mu$ equals :

[JEE Main 2026 (Online) 8th April Evening Shift]

- (1) 12 (2) 16 (3) 22 (4) 28

Scan or tap for the full solution 

- Q.2** Let $A = \begin{bmatrix} \alpha & 1 & 2 \\ 2 & 3 & 0 \\ 0 & 4 & 5 \end{bmatrix}$ and
 $B = \begin{bmatrix} 1 & 0 & 0 \\ 0 & -5\alpha & 0 \\ 0 & 4\alpha & -2\alpha \end{bmatrix} + \text{adj}(A)$. If $\det(B) = 66$, then

$\det(\text{adj}(A))$ equals :

[JEE Main 2026 (Online) 8th April Evening Shift]

- (1) 289 (2) 361 (3) 441 (4) 529

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- Q.3** The sum of all possible values of $\theta \in [0, 2\pi]$, for which the system of equations :
 $x \cos 3\theta - 8y - 12z = 0$
 $x \cos 2\theta + 3y + 3z = 0$
 $x + y + 3z = 0$
 has a non-trivial solution, is equal to :

[JEE Main 2026 (Online) 6th April Evening Shift]

- (1) π (2) 2π (3) 3π (4) 4π

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- Q.4** Let A be a 3×3 matrix such that
 $A^T \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix} = \begin{bmatrix} 5 \\ 2 \\ 2 \end{bmatrix}, A^T \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} = \begin{bmatrix} 3 \\ 1 \\ 1 \end{bmatrix}, A \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix} = \begin{bmatrix} 3 \\ 4 \\ 4 \end{bmatrix}$ and
 $A \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} = \begin{bmatrix} 1 \\ 3 \\ 1 \end{bmatrix}.$

If $\det(A) = 1$, then $\det(\text{adj}(A^2 + A))$ is equal to:

[JEE Main 2026 (Online) 5th April Morning Shift]

- (1) 16 (2) 25 (3) 49 (4) 64

Scan or tap for the full solution 

- Q.5** Consider the system of linear equations in x, y, z :
 $x + 2y + tz = 0$
 $6x + y + 5tz = 0$
 $3x + t^2y + f(t)z = 0$
 where $f: \mathbb{R} \rightarrow \mathbb{R}$ is a differentiable function. If this system has infinitely many solutions for all $t \in \mathbb{R}$, then f

[JEE Main 2026 (Online) 5th April Morning Shift]

- (1) is a constant function
 (2) is strictly increasing on $\mathbb{R}$
 (3) is strictly decreasing on $\mathbb{R}$
 (4) has two critical points

Scan or tap for the full solution 

- Q.6** If $f: \mathbb{N} \rightarrow \mathbb{Z}$ is defined by

$$f(n) = \begin{vmatrix} n & -1 & -5 \\ -2n^2 & 3(2k+1) & 2k+1 \\ -3n^3 & 3k(2k+1) & 3k(k+2)+1 \end{vmatrix}, k \in \mathbb{N},$$

 and $\sum_{n=1}^k f(n) = 98$, then k is equal to :

[JEE Main 2026 (Online) 5th April Evening Shift]

- (1) 3 (2) 4 (3) 5 (4) 6

Scan or tap for the full solution 

- Q.7** Let $A = \begin{bmatrix} 1 & 1 & 2 \\ -2 & 0 & 1 \\ 1 & 3 & 5 \end{bmatrix}$. Then the sum of all elements of the matrix $\text{adj}(\text{adj}(2(\text{adj } A)^{-1}))$ is equal to:

[JEE Main 2026 (Online) 4th April Morning Shift]

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

Scan or tap for the full solution 

- Q.8** If the system of equations :
 $x + y + z = 5$
 $x + 2y + 3z = 9$
 $x + 3y + \lambda z = \mu$
 has infinitely many solutions, then the value of $\lambda + \mu$ is : [JEE Main 2026 (Online) 4th April Evening Shift]

- (1) 16 (2) 18 (3) 19 (4) 21

Scan or tap for the full solution 

Q.9 Let $A = \begin{bmatrix} 1 & 2 & 7 \\ 4 & -2 & 8 \\ 3 & 8 & -7 \end{bmatrix}$ and $\det(A - \alpha I) = 0$, where α is a real number. If the largest possible value of α is p , then the circle $(x - p)^2 + (y - 2p)^2 = 320$, intersects the co-ordinate axes at

[JEE Main 2026 (Online) 4th April Evening Shift]

- (1) 1 point (2) 2 points (3) 3 points (4) 4 points

Scan or tap for the full solution



Q.10 Let $\alpha, \beta \in \mathbb{R}$ be such that the system of linear equations

$$x + 2y + z = 5$$

$$2x + y + \alpha z = 5$$

$$8x + 4y + \beta z = 18$$

has no solution. Then $\frac{\beta}{\alpha}$ is equal to :

[JEE Main 2026 (Online) 2nd April Morning Shift]

- (1) -4 (2) 4 (3) 8 (4) -8

Scan or tap for the full solution



Q.11 If the system of equations

$$x + 5y + 6z = 4,$$

$$2x + 3y + 4z = 7,$$

$$x + 6y + az = b$$

has infinitely many solutions, then the point (a, b) lies on the line

[JEE Main 2026 (Online) 2nd April Evening Shift]

- (1) $y - x = 3$ (2) $x - y = 3$
(3) $x + y = 11$ (4) $x + y = 12$

Scan or tap for the full solution



Q.12 Let $P = [p_{ij}]$ and $Q = [q_{ij}]$ be two square matrices of order 3 such that $q_{ij} = 2^{(i+j-1)}p_{ij}$ and $\det(Q) = 2^{10}$. Then the value of $\det(\text{adj}(\text{adj } P))$ is:

[JEE Main 2026 (Online) 24th January Evening Shift]

- (1) 81 (2) 16 (3) 124 (4) 32

Scan or tap for the full solution



Q.13 Let $f(x) = \int \frac{7x^{10} + 9x^8}{(1 + x^2 + 2x^9)^2} dx$, $x > 0$, $\lim_{x \rightarrow 0} f(x) = 0$ and $f(1) = \frac{1}{4}$.

If $A = \begin{bmatrix} 0 & 0 & 1 \\ \frac{1}{4} & f'(1) & 1 \\ \alpha^2 & 4 & 1 \end{bmatrix}$ and $B = \text{adj}(\text{adj } A)$ be such

that $|B| = 81$, then α^2 is equal to

[JEE Main 2026 (Online) 24th January Evening Shift]

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

Scan or tap for the full solution



Q.14 Among the statements :

I: If

$$\begin{vmatrix} 1 & \cos \alpha & \cos \beta \\ \cos \alpha & 1 & \cos \gamma \\ \cos \beta & \cos \gamma & 1 \end{vmatrix} = \begin{vmatrix} 0 & \cos \alpha & \cos \beta \\ \cos \alpha & 0 & \cos \gamma \\ \cos \beta & \cos \gamma & 0 \end{vmatrix},$$

then $\cos^2 \alpha + \cos^2 \beta + \cos^2 \gamma = \frac{3}{2}$, and

II: If $\begin{vmatrix} x^2 + x & x + 1 & x - 2 \\ 2x^2 + 3x - 1 & 3x & 3x - 3 \\ x^2 + 2x + 3 & 2x - 1 & 2x - 1 \end{vmatrix} = px + q$, then $p^2 = 196q^2$.

[JEE Main 2026 (Online) 23rd January Morning Shift]

- (1) both are true (2) both are false
(3) only I is true (4) only II is true

Scan or tap for the full solution



Q.15 The system of linear equations

$$x + y + z = 6$$

$$2x + 5y + az = 6$$

$$x + 2y + 3z = b$$

has : [JEE Main 2026 (Online) 23rd January Evening Shift]

- (1) unique solution for $a = 8$ and $b = 16$
(2) infinitely many solutions for $a = 8$ and $b = 14$
(3) infinitely many solutions for $a = 8$ and $b = 16$
(4) unique solution for $a = 8$ and $b = 14$

Scan or tap for the full solution



Q.16 Let n be the number obtained on rolling a fair die. If the probability that the system

$$x - ny + z = 6$$

$$x + (n - 2)y + (n + 1)z = 8$$

$$(n - 1)y + z = 1$$

has a unique solution is $\frac{k}{6}$, then the sum of k and all possible values of n is :

[JEE Main 2026 (Online) 22nd January Evening Shift]

- (1) 22 (2) 20 (3) 24 (4) 21

Scan or tap for the full solution



Q.17 If $X = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$ is a solution of the system of equations

$$AX = B, \text{ where } \text{adj } A = \begin{bmatrix} 4 & 2 & 2 \\ -5 & 0 & 5 \\ 1 & -2 & 3 \end{bmatrix} \text{ and } B = \begin{bmatrix} 4 \\ 0 \\ 2 \end{bmatrix},$$

then $|x + y + z|$ is equal to :

[JEE Main 2026 (Online) 22nd January Evening Shift]

- (1) 3 (2) 2 (3) $\frac{3}{2}$ (4) 1

Scan or tap for the full solution



Q.18 If the system of equations

$$3x + y + 4z = 3$$

$$2x + \alpha y - z = -3$$

$$x + 2y + z = 4$$

has no solution, then the value of α is equal to:

[JEE Main 2026 (Online) 21st January Evening Shift]

- (1) 13 (2) 4 (3) 19 (4) 23

Scan or tap for the full solution



Q.19 Let $A = \begin{bmatrix} 2 & 2+p & 2+p+q \\ 4 & 6+2p & 8+3p+2q \\ 6 & 12+3p & 20+6p+3q \end{bmatrix}$.

If $\det(\text{adj}(\text{adj}(3A))) = 2^m \cdot 3^n$, $m, n \in \mathbb{N}$, then $m + n$ is equal to

[JEE Main 2025 (Online) 8th April Evening Shift]

- (1) 22 (2) 20 (3) 24 (4) 26

Scan or tap for the full solution



Q.20 Let A be a 3×3 matrix such that

$$|\text{adj}(\text{adj}(\text{adj } A))| = 81.$$

If $S = \left\{ n \in \mathbb{Z} : (|\text{adj}(\text{adj } A)|)^{\frac{(n-1)^2}{2}} = |A|^{(3n^2-5n-4)} \right\}$, then $\sum_{n \in S} |A|^{(n^2+n)}$ is equal to :

[JEE Main 2025 (Online) 7th April Morning Shift]

- (1) 820 (2) 866 (3) 750 (4) 732

Scan or tap for the full solution



Q.21 Let the system of equations :

$$2x + 3y + 5z = 9$$

$$7x + 3y - 2z = 8$$

$$12x + 3y - (4 + \lambda)z = 16 - \mu$$

have infinitely many solutions. Then the radius of the circle centred at (λ, μ) and touching the line $4x = 3y$ is :

[JEE Main 2025 (Online) 7th April Morning Shift]

- (1) $\frac{7}{5}$ (2) $\frac{21}{5}$ (3) 7 (4) $\frac{17}{5}$

Scan or tap for the full solution



Q.22 Let the system of equations

$$x + 5y - z = 1$$

$$4x + 3y - 3z = 7$$

$$24x + y + \lambda z = \mu$$

$\lambda, \mu \in \mathbb{R}$, have infinitely many solutions. Then the number of the solutions of this system,

if x, y, z are integers and satisfy $7 \leq x + y + z \leq 77$, is :

[JEE Main 2025 (Online) 7th April Evening Shift]

- (1) 4 (2) 5 (3) 3 (4) 6

Scan or tap for the full solution



Q.23 If $y(x) = \begin{vmatrix} \sin x & \cos x & \sin x + \cos x + 1 \\ 27 & 28 & 27 \\ 1 & 1 & 1 \end{vmatrix}$, $x \in \mathbb{R}$, then $\frac{d^2y}{dx^2} + y$ is equal to

[JEE Main 2025 (Online) 3rd April Morning Shift]

- (1) 28 (2) 27 (3) -1 (4) 1

Scan or tap for the full solution



Q.24 Let A be a matrix of order 3×3 and $|A| = 5$. If $|2 \text{adj}(3A \text{adj}(2A))| = 2^\alpha \cdot 3^\beta \cdot 5^\gamma$, $\alpha, \beta, \gamma \in \mathbb{N}$, then $\alpha + \beta + \gamma$ is equal to

[JEE Main 2025 (Online) 3rd April Morning Shift]

- (1) 26 (2) 27 (3) 25 (4) 28

Scan or tap for the full solution



Q.25 Let $a \in \mathbb{R}$ and A be a matrix of order 3×3 such that

$$\det(A) = -4 \text{ and } A + I = \begin{bmatrix} 1 & a & 1 \\ 2 & 1 & 0 \\ a & 1 & 2 \end{bmatrix}, \text{ where } I \text{ is the}$$

identity matrix of order 3×3 . If

$$\det((a+1) \text{adj}((a-1)A)) \text{ is } 2^m 3^n,$$

$m, n \in \{0, 1, 2, \dots, 20\}$, then $m + n$ is equal to :

[JEE Main 2025 (Online) 2nd April Morning Shift]

- (1) 14 (2) 17 (3) 15 (4) 16

Scan or tap for the full solution



Q.26 If the system of linear equations

$$3x + y + \beta z = 3$$

$$2x + \alpha y - z = -3$$

$$x + 2y + z = 4$$

has infinitely many solutions, then the value of $22\beta - 9\alpha$ is :

[JEE Main 2025 (Online) 2nd April Morning Shift]

- (1) 31 (2) 37 (3) 43 (4) 49

Scan or tap for the full solution



Q.27 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 :

[JEE Main 2025 (Online) 2nd April Evening Shift]

- (1) 30 (2) 26 (3) 22 (4) 18

Scan or tap for the full solution



Q.28 Let $A = [a_{ij}] = \begin{bmatrix} \log_5 128 & \log_4 5 \\ \log_5 8 & \log_4 25 \end{bmatrix}$. If A_{ij} is the cofactor of a_{ij} , $C_{ij} = \sum_{k=1}^2 a_{ik} A_{jk}$, $1 \leq i, j \leq 2$, and $C = [C_{ij}]$, then $8|C|$ is equal to :

[JEE Main 2025 (Online) 29th January Morning Shift]

(1) 288 (2) 262 (3) 222 (4) 242

Scan or tap for the
full solution

Q.29 Let M and m respectively be the maximum and the minimum values of

$$f(x) = \begin{vmatrix} 1 + \sin^2 x & \cos^2 x & 4\sin 4x \\ \sin^2 x & 1 + \cos^2 x & 4\sin 4x \\ \sin^2 x & \cos^2 x & 1 + 4\sin 4x \end{vmatrix}, x \in \mathbb{R}$$

Then $M^4 - m^4$ is equal to :

[JEE Main 2025 (Online) 29th January Morning Shift]

(1) 1280 (2) 1040 (3) 1215 (4) 1295

Scan or tap for the
full solution

Section B (Numerical)

Q.30 Let $A = \begin{bmatrix} -1 & 1 & -1 \\ 1 & 0 & 1 \\ 0 & 0 & 1 \end{bmatrix}$ satisfy

$$A^2 + \alpha(\text{adj}(\text{adj}(A))) + \beta(\text{adj}(A)(\text{adj}(\text{adj}(A)))) = \begin{bmatrix} 2 & -2 & 2 \\ -2 & 0 & -1 \\ 0 & 0 & -1 \end{bmatrix} \text{ for}$$

some $\alpha, \beta \in \mathbb{R}$.

Then $(\alpha - \beta)^2$ is equal to _____.

[JEE Main 2026 (Online) 6th April Morning Shift]

Scan or tap for the
full solution

Q.31 Let $|A| = 6$, where A is a 3×3 matrix. If $|\text{adj}(3\text{adj}(A^2 \cdot \text{adj}(2A)))| = 2^m \cdot 3^n$, $m, n \in \mathbb{N}$, then $m + n$ is equal to _____.

[JEE Main 2026 (Online) 23rd January Morning Shift]

Scan or tap for the
full solution

Q.32 Let A be a 3×3 matrix such that $A + A^T = O$. If

$$A \begin{bmatrix} 1 \\ -1 \\ 0 \end{bmatrix} = \begin{bmatrix} 3 \\ 3 \\ 2 \end{bmatrix}, A^2 \begin{bmatrix} 1 \\ -1 \\ 0 \end{bmatrix} = \begin{bmatrix} -3 \\ 19 \\ -24 \end{bmatrix} \text{ and}$$

$$\det(\text{adj}(2\text{adj}(A + I))) = (2)^\alpha \cdot (3)^\beta \cdot (11)^\gamma, \alpha, \beta, \gamma \text{ are}$$

non-negative integers, then $\alpha + \beta + \gamma$ is equal to _____

[JEE Main 2026 (Online) 22nd January Morning Shift]

Scan or tap for the
full solution

Q.33 The number of singular matrices of order 2, whose elements are from the set $\{2, 3, 6, 9\}$, is _____.

[JEE Main 2025 (Online) 7th April Morning Shift]

Scan or tap for the
full solution

Q.34 Let I be the identity matrix of order 3×3 and for the matrix $A = \begin{bmatrix} \lambda & 2 & 3 \\ 4 & 5 & 6 \\ 7 & -1 & 2 \end{bmatrix}$, $|A| = -1$. Let B be the inverse of the matrix $\text{adj}(A\text{adj}(A^2))$. Then $|(\lambda B + I)|$ is equal to _____

[JEE Main 2025 (Online) 3rd April Evening Shift]

Scan or tap for the
full solution

ANSWER KEY

Section A (MCQ)

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	3	3	4	4	2	1	4	2	3	2	2
Ques.	12	13	14	15	16	17	18	19	20	21	22
Ans.	2	2	2	2	1	2	3	3	4	1	3
Ques.	23	24	25	26	27	28	29				
Ans.	3	2	4	1	2	4	1				

Section B (Numerical)

Ques.	30	31	32	33
Ans.	4	62	18	36
Ques.	34			
Ans.	38 or -38			