

MATHEMATICS · JEE MAIN

Determinants

Chapter-wise previous year questions, with answer key

166

PYQS

2020–2025

PAPERS

5

TOPICS

Consistency of Linear Equations

Adjoint and Inverse

Properties of Determinants

Cramer's Rule

Minors and Cofactors

- 1 Attempt each question on paper first — they're grouped by topic, newest papers first.
- 2 Check yourself against the answer key at the end.
- 3 Got one wrong? Tap “Step-by-step solution” under it for the full working.

Stuck on a question?

Every question has a free step-by-step solution on PrepWiser — tap “Step-by-step solution” under it.

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Consistency of Linear Equations · 82 PYQs

Q1 JEE Main 2025 · 7 Apr · Shift 1

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 :

(A) $\frac{7}{5}$

(B) $\frac{21}{5}$

(C) 7

(D) $\frac{17}{5}$

[Step-by-step solution ► prepwiser.in/questions/7sfuiW2zs_](https://www.prepwiser.in/questions/7sfuiW2zs_)

Q2 JEE Main 2025 · 7 Apr · Shift 2

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 :

(A) 4

(B) 5

(C) 3

(D) 6

[Step-by-step solution ► prepwiser.in/questions/GLXj7AQcgD](https://www.prepwiser.in/questions/GLXj7AQcgD)

Q3 JEE Main 2025 · 2 Apr · Shift 1

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 :

(A) 31

(B) 37

(C) 43

(D) 49

[Step-by-step solution ► prepwiser.in/questions/E-SMAIsOza](https://www.prepwiser.in/questions/E-SMAIsOza)

Q4 JEE Main 2025 · 2 Apr · Shift 2

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 :

(A) 30

(B) 26

(C) 22

(D) 18

[Step-by-step solution ► prepwisar.in/questions/HuxeIn92om](https://www.prepwisar.in/questions/HuxeIn92om)

Q5 JEE Main 2025 · 29 Jan · Shift 2

Let $\alpha, \beta (\alpha \neq \beta)$ be the values of m , for which the equations $x + y + z = 1$, $x + 2y + 4z = m$ and $x + 4y + 10z = m^2$ have infinitely many solutions. Then the value of $\sum_{n=1}^{10} (n^\alpha + n^\beta)$ is equal to :

(A) 3410

(B) 560

(C) 3080

(D) 440

[Step-by-step solution ► prepwisar.in/questions/-urv7B1DHu](https://www.prepwisar.in/questions/-urv7B1DHu)

Q6 JEE Main 2025 · 24 Jan · Shift 1

If the system of equations

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

$$5x + \lambda y + 3z = 12$$

$$100x - 47y + \mu z = 212$$

has infinitely many solutions, then $\mu - 2\lambda$ is equal to

(A) 56

(B) 59

(C) 57

(D) 55

[Step-by-step solution ► prepwisar.in/questions/8XHGVtXPU0](https://www.prepwisar.in/questions/8XHGVtXPU0)

Q7 JEE Main 2025 · 24 Jan · Shift 2

If the system of equations

$$\begin{aligned}x + 2y - 3z &= 2 \\ 2x + \lambda y + 5z &= 5 \\ 14x + 3y + \mu z &= 33\end{aligned}$$

has infinitely many solutions, then $\lambda + \mu$ is equal to :

- (A) 13 (B) 10
(C) 12 (D) 11

[Step-by-step solution ► prepwisser.in/questions/kf8h_KNX9u](https://www.prepwisser.in/questions/kf8h_KNX9u)

Q8 JEE Main 2025 · 23 Jan · Shift 2

The system of equations

$$\begin{aligned}x + y + z &= 6, \\ x + 2y + 5z &= 9, \\ x + 5y + \lambda z &= \mu,\end{aligned}$$

has no solution if

- (A) $\lambda = 17, \mu = 18$ (B) $\lambda = 17, \mu \neq 18$
(C) $\lambda = 15, \mu \neq 17$ (D) $\lambda \neq 17, \mu \neq 18$

[Step-by-step solution ► prepwisser.in/questions/WDbTCgLxo0](https://www.prepwisser.in/questions/WDbTCgLxo0)

Q9 JEE Main 2025 · 23 Jan · Shift 1

If the system of equations

$$\begin{aligned}(\lambda - 1)x + (\lambda - 4)y + \lambda z &= 5 \\ \lambda x + (\lambda - 1)y + (\lambda - 4)z &= 7 \\ (\lambda + 1)x + (\lambda + 2)y - (\lambda + 2)z &= 9\end{aligned}$$

has infinitely many solutions, then $\lambda^2 + \lambda$ is equal to

- (A) 20 (B) 10
(C) 6 (D) 12

[Step-by-step solution ► prepwisser.in/questions/B4Snob3EKD](https://www.prepwisser.in/questions/B4Snob3EKD)

Q10 JEE Main 2025 · 22 Jan · Shift 2

If the system of linear equations :

$$\begin{aligned}x + y + 2z &= 6 \\2x + 3y + az &= a + 1 \\-x - 3y + bz &= 2b\end{aligned}$$

where $a, b \in \mathbf{R}$, has infinitely many solutions, then $7a + 3b$ is equal to :

- (A) 12 (B) 9
(C) 22 (D) 16

[Step-by-step solution ► prepwisser.in/questions/A4vge7OQwg](https://www.prepwisser.in/questions/A4vge7OQwg)

Q11 JEE Main 2024 · 9 Apr · Shift 1

Let $\lambda, \mu \in \mathbf{R}$. If the system of equations

$$\begin{aligned}3x + 5y + \lambda z &= 3 \\7x + 11y - 9z &= 2 \\97x + 155y - 189z &= \mu\end{aligned}$$

has infinitely many solutions, then $\mu + 2\lambda$ is equal to :

- (A) 24 (B) 25
(C) 27 (D) 22

[Step-by-step solution ► prepwisser.in/questions/r2igEYTHYr](https://www.prepwisser.in/questions/r2igEYTHYr)

Q12 JEE Main 2024 · 8 Apr · Shift 2

If the system of equations $x + 4y - z = \lambda$, $7x + 9y + \mu z = -3$, $5x + y + 2z = -1$ has infinitely many solutions, then $(2\mu + 3\lambda)$ is equal to :

- (A) -2 (B) 2
(C) 3 (D) -3

[Step-by-step solution ► prepwisser.in/questions/b1mmgMtUpk](https://www.prepwisser.in/questions/b1mmgMtUpk)

Q13 JEE Main 2024 · 6 Apr · Shift 2

If the system of equations

$$\begin{aligned}2x + 7y + \lambda z &= 3 \\3x + 2y + 5z &= 4 \\x + \mu y + 32z &= -1\end{aligned}$$

has infinitely many solutions, then $(\lambda - \mu)$ is equal to _____ :

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/gP6cesQ2ik](https://www.prepwisser.in/questions/gP6cesQ2ik)

Q14 JEE Main 2024 · 5 Apr · Shift 1

If the system of equations

$$\begin{aligned}11x + y + \lambda z &= -5 \\ 2x + 3y + 5z &= 3 \\ 8x - 19y - 39z &= \mu\end{aligned}$$

has infinitely many solutions, then $\lambda^4 - \mu$ is equal to :

- (A) 51 (B) 45
(C) 47 (D) 49

[Step-by-step solution ► prepwisser.in/questions/iE7yCGhFNh](https://www.prepwisser.in/questions/iE7yCGhFNh)

Q15 JEE Main 2024 · 5 Apr · Shift 2

The values of m, n , for which the system of equations

$$\begin{aligned}x + y + z &= 4, \\ 2x + 5y + 5z &= 17, \\ x + 2y + mz &= n\end{aligned}$$

has infinitely many solutions, satisfy the equation :

- (A) $m^2 + n^2 - m - n = 46$
(B) $m^2 + n^2 + mn = 68$
(C) $m^2 + n^2 - mn = 39$
(D) $m^2 + n^2 + m + n = 64$

[Step-by-step solution ► prepwisser.in/questions/5tZgXFtDSx](https://www.prepwisser.in/questions/5tZgXFtDSx)

Q16 JEE Main 2024 · 4 Apr · Shift 1

If the system of equations

$$\begin{aligned}x + (\sqrt{2} \sin \alpha)y + (\sqrt{2} \cos \alpha)z &= 0 \\ x + (\cos \alpha)y + (\sin \alpha)z &= 0 \\ x + (\sin \alpha)y - (\cos \alpha)z &= 0\end{aligned}$$

has a non-trivial solution, then $\alpha \in (0, \frac{\pi}{2})$ is equal to :

- (A) $\frac{5\pi}{24}$ (B) $\frac{11\pi}{24}$
(C) $\frac{7\pi}{24}$ (D) $\frac{3\pi}{4}$

[Step-by-step solution ► prepwisser.in/questions/g8v87FnVUi](https://www.prepwisser.in/questions/g8v87FnVUi)

Q17 JEE Main 2024 · 1 Feb · Shift 2

Let the system of equations $x + 2y + 3z = 5, 2x + 3y + z = 9, 4x + 3y + \lambda z = \mu$ have infinite number of solutions. Then $\lambda + 2\mu$ is equal to :

- (A) 22 (B) 17
(C) 15 (D) 28

[Step-by-step solution ► prepwisser.in/questions/TH50WeIUW9](https://www.prepwisser.in/questions/TH50WeIUW9)

Q18 JEE Main 2024 · 1 Feb · Shift 1

If the system of equations

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

$$x + \alpha y + 3z = -4$$

$$3x - y + \beta z = 7$$

has infinitely many solutions, then $13\alpha\beta$ is equal to :

(A) 1110

(B) 1120

(C) 1210

(D) 1220

Step-by-step solution ► prepwisser.in/questions/I8qwItQwbp

Q19 JEE Main 2024 · 31 Jan · Shift 1

If the system of linear equations

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

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

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

has infinitely many solutions, then $12\alpha + 13\beta$ is equal to

(A) 60

(B) 54

(C) 64

(D) 58

Step-by-step solution ► prepwisser.in/questions/1-iQVPksMD

Q20 JEE Main 2024 · 30 Jan · Shift 2

Consider the system of linear equations $x + y + z = 5$, $x + 2y + \lambda^2 z = 9$, $x + 3y + \lambda z = \mu$, where $\lambda, \mu \in \mathbb{R}$. Then, which of the following statement is NOT correct?

(A) System is consistent if $\lambda \neq 1$ and $\mu = 13$

(B) System is inconsistent if $\lambda = 1$ and $\mu \neq 13$

(C) System has unique solution if $\lambda \neq 1$ and $\mu \neq 13$

(D) System has infinite number of solutions if $\lambda = 1$ and $\mu = 13$

Step-by-step solution ► prepwisser.in/questions/IPNtUKmGUe

Q21 JEE Main 2024 · 30 Jan · Shift 1

Consider the system of linear equations $x + y + z = 4\mu$, $x + 2y + 2\lambda z = 10\mu$, $x + 3y + 4\lambda^2 z = \mu^2 + 15$ where $\lambda, \mu \in \mathbf{R}$. Which one of the following statements is NOT correct?

- (A) The system has unique solution if $\lambda \neq \frac{1}{2}$ and $\mu \neq 1, 15$
(B) The system has infinite number of solutions if $\lambda = \frac{1}{2}$ and $\mu = 15$
(C) The system is consistent if $\lambda \neq \frac{1}{2}$
(D) The system is inconsistent if $\lambda = \frac{1}{2}$ and $\mu \neq 1$

[Step-by-step solution ► prepwisser.in/questions/uSrGcmkg25](https://www.prepwisser.in/questions/uSrGcmkg25)

Q22 JEE Main 2023 · 15 Apr · Shift 1

Let the system of linear equations

$$-x + 2y - 9z = 7$$

$$-x + 3y + 7z = 9$$

$$-2x + y + 5z = 8$$

$$-3x + y + 13z = \lambda$$

has a unique solution $x = \alpha, y = \beta, z = \gamma$. Then the distance of the point

(α, β, γ) from the plane $2x - 2y + z = \lambda$ is :

- (A) 11 (B) 7
(C) 13 (D) 9

[Step-by-step solution ► prepwisser.in/questions/KEB5FOJQzu](https://www.prepwisser.in/questions/KEB5FOJQzu)

Q23 JEE Main 2023 · 13 Apr · Shift 2

If the system of equations

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

$$2x - 5y + \lambda z = \mu$$

$$x + 2y - 5z = 7$$

has infinitely many solutions, then $(\lambda + \mu)^2 + (\lambda - \mu)^2$ is equal to

- (A) 916 (B) 912
(C) 920 (D) 904

[Step-by-step solution ► prepwisser.in/questions/KUFr58okog](https://www.prepwisser.in/questions/KUFr58okog)

Q24 JEE Main 2023 · 13 Apr · Shift 1

For the system of linear equations

$$2x + 4y + 2az = b$$

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

$$2x - 5y + 2z = 8$$

which of the following is NOT correct?

- (A) It has infinitely many solutions if $a = 3, b = 8$
- (B) It has infinitely many solutions if $a = 3, b = 6$
- (C) It has unique solution if $a = b = 8$
- (D) It has unique solution if $a = b = 6$

[Step-by-step solution ► prepwisar.in/questions/a49XREILvT](https://www.prepwisar.in/questions/a49XREILvT)

Q25 JEE Main 2023 · 11 Apr · Shift 2

If the system of linear equations

$$7x + 11y + \alpha z = 13$$

$$5x + 4y + 7z = \beta$$

$$175x + 194y + 57z = 361$$

has infinitely many solutions, then $\alpha + \beta + 2$ is equal to :

- (A) 6
- (B) 4
- (C) 5
- (D) 3

[Step-by-step solution ► prepwisar.in/questions/G4PbfFynYF](https://www.prepwisar.in/questions/G4PbfFynYF)

Q26 JEE Main 2023 · 10 Apr · Shift 1

For the system of linear equations

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

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

$$4x + 5y + \alpha z = \beta,$$

which of the following is **NOT** correct?

- (A) The system has infinitely many solutions for $\alpha = -6$ and $\beta = 9$
- (B) The system has a unique solution for $\alpha \neq -5$ and $\beta = 8$
- (C) The system is inconsistent for $\alpha = -5$ and $\beta = 8$
- (D) The system has infinitely many solutions for $\alpha = -5$ and $\beta = 9$

[Step-by-step solution ► prepwisar.in/questions/c_h4Uuy9UQ](https://www.prepwisar.in/questions/c_h4Uuy9UQ)

Q27 JEE Main 2023 · 10 Apr · Shift 2

Let S be the set of values of λ , for which the system of equations

$$6\lambda x - 3y + 3z = 4\lambda^2,$$

$$2x + 6\lambda y + 4z = 1,$$

$$3x + 2y + 3\lambda z = \lambda \text{ has no solution. Then } 12 \sum_{i \in S} |\lambda| \text{ is equal to } \underline{\hspace{2cm}}.$$

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/6vXjI6FqWx](https://www.prepwisar.in/questions/6vXjI6FqWx)

Q28 JEE Main 2023 · 8 Apr · Shift 2

Let S be the set of all values of $\theta \in [-\pi, \pi]$ for which the system of linear equations

$$x + y + \sqrt{3}z = 0$$

$$-x + (\tan \theta)y + \sqrt{7}z = 0$$

$$x + y + (\tan \theta)z = 0$$

has non-trivial solution. Then $\frac{120}{\pi} \sum_{\theta \in S} \theta$ is equal to :

(A) 40

(B) 30

(C) 10

(D) 20

[Step-by-step solution ► prepwisar.in/questions/eMMJ-KMFy0](https://www.prepwisar.in/questions/eMMJ-KMFy0)

Q29 JEE Main 2023 · 6 Apr · Shift 2

For the system of equations

$$x + y + z = 6$$

$$x + 2y + \alpha z = 10$$

$$x + 3y + 5z = \beta, \text{ which one of the following is **NOT** true?}$$

(A) System has a unique solution for $\alpha = 3, \beta \neq 14$.

(B) System has infinitely many solutions for $\alpha = 3, \beta = 14$.

(C) System has no solution for $\alpha = 3, \beta = 24$.

(D) System has a unique solution for $\alpha = -3, \beta = 14$.

[Step-by-step solution ► prepwisar.in/questions/DxuMMbTD22](https://www.prepwisar.in/questions/DxuMMbTD22)

Q30 JEE Main 2023 · 6 Apr · Shift 1

If the system of equations

$$x + y + az = b$$

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

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

has infinitely many solutions, then $2a + 3b$ is equal to :

(A) 28

(B) 25

(C) 20

(D) 23

[Step-by-step solution ► prepwisar.in/questions/zSI_B1TGL6](https://www.prepwisar.in/questions/zSI_B1TGL6)

Q31 JEE Main 2023 · 1 Feb · Shift 2

For the system of linear equations $\alpha x + y + z = 1$, $x + \alpha y + z = 1$, $x + y + \alpha z = \beta$, which one of the following statements is **NOT** correct?

- (A) It has infinitely many solutions if $\alpha = 1$ and $\beta = 1$
- (B) It has infinitely many solutions if $\alpha = 2$ and $\beta = -1$
- (C) $x + y + z = \frac{3}{4}$ if $\alpha = 2$ and $\beta = 1$
- (D) It has no solution if $\alpha = -2$ and $\beta = 1$

[Step-by-step solution ► prepwisar.in/questions/6P8Q2cCnB5](https://www.prepwisar.in/questions/6P8Q2cCnB5)

Q32 JEE Main 2023 · 1 Feb · Shift 1

Let S denote the set of all real values of λ such that the system of equations

$$\lambda x + y + z = 1$$

$$x + \lambda y + z = 1$$

$$x + y + \lambda z = 1$$

is inconsistent, then $\sum_{\lambda \in S} (|\lambda|^2 + |\lambda|)$ is equal to

- (A) 12
- (B) 2
- (C) 4
- (D) 6

[Step-by-step solution ► prepwisar.in/questions/LHSyDu1kf7](https://www.prepwisar.in/questions/LHSyDu1kf7)

Q33 JEE Main 2023 · 31 Jan · Shift 1

For the system of linear equations

$$x + y + z = 6$$

$$\alpha x + \beta y + 7z = 3$$

$$x + 2y + 3z = 14$$

which of the following is **NOT** true?

- (A) If $\alpha = \beta = 7$, then the system has no solution
- (B) For every point $(\alpha, \beta) \neq (7, 7)$ on the line $x - 2y + 7 = 0$, the system has infinitely many solutions
- (C) There is a unique point (α, β) on the line $x + 2y + 18 = 0$ for which the system has infinitely many solutions
- (D) If $\alpha = \beta$ and $\alpha \neq 7$, then the system has a unique solution

[Step-by-step solution ► prepwisar.in/questions/P0NKKoDeevQ](https://www.prepwisar.in/questions/P0NKKoDeevQ)

Q34 JEE Main 2023 · 30 Jan · Shift 2

For $\alpha, \beta \in \mathbb{R}$, suppose the system of linear equations

$$\begin{aligned}x - y + z &= 5 \\2x + 2y + \alpha z &= 8 \\3x - y + 4z &= \beta\end{aligned}$$

has infinitely many solutions. Then α and β are the roots of :

- (A) $x^2 + 18x + 56 = 0$ (B) $x^2 - 10x + 16 = 0$
(C) $x^2 + 14x + 24 = 0$ (D) $x^2 - 18x + 56 = 0$

[Step-by-step solution ► prepwisar.in/questions/FeSynoi9lQ](https://www.prepwisar.in/questions/FeSynoi9lQ)

Q35 JEE Main 2023 · 30 Jan · Shift 1

Let the system of linear equations

$$\begin{aligned}x + y + kz &= 2 \\2x + 3y - z &= 1 \\3x + 4y + 2z &= k\end{aligned}$$

have infinitely many solutions. Then the system

$$\begin{aligned}(k+1)x + (2k-1)y &= 7 \\(2k+1)x + (k+5)y &= 10\end{aligned}$$

has :

- (A) unique solution satisfying $x - y = 1$ (B) infinitely many solutions
(C) no solution (D) unique solution satisfying $x + y = 1$

[Step-by-step solution ► prepwisar.in/questions/7jo1qe8UKT](https://www.prepwisar.in/questions/7jo1qe8UKT)

Q36 JEE Main 2023 · 29 Jan · Shift 1

Consider the following system of equations

$$\begin{aligned}\alpha x + 2y + z &= 1 \\2\alpha x + 3y + z &= 1 \\3x + \alpha y + 2z &= \beta\end{aligned}$$

for some $\alpha, \beta \in \mathbb{R}$. Then which of the following is NOT correct.

- (A) It has a solution for all $\alpha \neq -1$ and $\beta = 2$
(B) It has no solution if $\alpha = -1$ and $\beta \neq 2$
(C) It has no solution for $\alpha = -1$ and for all $\beta \in \mathbb{R}$
(D) It has no solution for $\alpha = 3$ and for all $\beta \neq 2$

[Step-by-step solution ► prepwisar.in/questions/r0VmUdLsFt](https://www.prepwisar.in/questions/r0VmUdLsFt)

Q37 JEE Main 2023 · 25 Jan · Shift 1

Let S_1 and S_2 be respectively the sets of all $a \in \mathbb{R} - \{0\}$ for which the system of linear equations

$$ax + 2ay - 3az = 1$$

$$(2a + 1)x + (2a + 3)y + (a + 1)z = 2$$

$$(3a + 5)x + (a + 5)y + (a + 2)z = 3$$

has unique solution and infinitely many solutions. Then

(A) $n(S_1) = 2$ and S_2 is an infinite set

(B) $S_1 = \Phi$ and $S_2 = \mathbb{R} - \{0\}$

(C) $S_1 = \mathbb{R} - \{0\}$ and $S_2 = \Phi$

(D) S_1 is an infinite set and $n(S_2) = 2$

[Step-by-step solution ► prepwisar.in/questions/ZV3V44GRd7](https://www.prepwisar.in/questions/ZV3V44GRd7)

Q38 JEE Main 2023 · 24 Jan · Shift 2

If the system of equations

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

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

$$8x + 4y - \lambda z = 9 + \mu$$

has infinitely many solutions, then the ordered pair (λ, μ) is equal to :

(A) $(\frac{72}{5}, \frac{21}{5})$

(B) $(-\frac{72}{5}, -\frac{21}{5})$

(C) $(-\frac{72}{5}, \frac{21}{5})$

(D) $(\frac{72}{5}, -\frac{21}{5})$

[Step-by-step solution ► prepwisar.in/questions/-OTFc9ZbID](https://www.prepwisar.in/questions/-OTFc9ZbID)

Q39 JEE Main 2022 · 29 Jul · Shift 2

If the system of equations

$$x + y + z = 6$$

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

$$x + 2y + 3z = 14$$

has infinitely many solutions, then $\alpha + \beta$ is equal to

(A) 8

(B) 36

(C) 44

(D) 48

[Step-by-step solution ► prepwisar.in/questions/Gct3EuG7HE](https://www.prepwisar.in/questions/Gct3EuG7HE)

Q40 JEE Main 2022 · 26 Jul · Shift 1

If the system of linear equations.

$$8x + y + 4z = -2$$

$$x + y + z = 0$$

$$\lambda x - 3y = \mu$$

has infinitely many solutions, then the distance of the point $(\lambda, \mu, -\frac{1}{2})$ from the plane $8x + y + 4z + 2 = 0$ is :

(A) $3\sqrt{5}$

(B) 4

(C) $\frac{26}{9}$

(D) $\frac{10}{3}$

[Step-by-step solution ► prepwisser.in/questions/XX9rWGlrRm](https://www.prepwisser.in/questions/XX9rWGlrRm)

Q41 JEE Main 2022 · 25 Jul · Shift 1

The number of $\theta \in (0, 4\pi)$ for which the system of linear equations

$$3(\sin 3\theta)x - y + z = 2$$

$$3(\cos 2\theta)x + 4y + 3z = 3$$

$$6x + 7y + 7z = 9$$

has no solution, is :

(A) 6

(B) 7

(C) 8

(D) 9

[Step-by-step solution ► prepwisser.in/questions/qZDFEA60eF](https://www.prepwisser.in/questions/qZDFEA60eF)

Q42 JEE Main 2022 · 25 Jul · Shift 2

The number of real values of λ , such that the system of linear equations

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

$$x + 3y - z = -18$$

$$3x - y + (\lambda^2 - |\lambda|)z = 16$$

has no solutions, is

(A) 0

(B) 1

(C) 2

(D) 4

[Step-by-step solution ► prepwisser.in/questions/KfZgYcYP8k](https://www.prepwisser.in/questions/KfZgYcYP8k)

Q43 JEE Main 2022 · 29 Jun · Shift 1

If the system of linear equations

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

$$x - 3y + 2z = 1$$

$x + 4y + \delta z = k$, where $\delta, k \in \mathbb{R}$ has infinitely many solutions, then $\delta + k$ is equal to:

(A) -3

(B) 3

(C) 6

(D) 9

[Step-by-step solution ► prepwisser.in/questions/ptOSIIP5ID](https://www.prepwisser.in/questions/ptOSIIP5ID)

Q44 JEE Main 2022 · 28 Jun · Shift 1

If the system of linear equations

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

$$x + y + z = 4$$

$$x - y + |\lambda|z = 4\lambda - 4$$

where, $\lambda \in \mathbb{R}$, has no solution, then

(A) $\lambda = 7$

(B) $\lambda = -7$

(C) $\lambda = 8$

(D) $\lambda^2 = 1$

[Step-by-step solution ► prepwiser.in/questions/aA0Y-thOYd](https://www.prepwiser.in/questions/aA0Y-thOYd)

Q45 JEE Main 2022 · 28 Jun · Shift 2

If the system of linear equations

$$2x - 3y = \gamma + 5,$$

$\alpha x + 5y = \beta + 1$, where $\alpha, \beta, \gamma \in \mathbb{R}$ has infinitely many solutions then the value of $|9\alpha + 3\beta + 5\gamma|$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/CScVI5Dvpz](https://www.prepwiser.in/questions/CScVI5Dvpz)

Q46 JEE Main 2022 · 27 Jun · Shift 1

Let the system of linear equations

$$x + 2y + z = 2,$$

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

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

be inconsistent. Then α is equal to :

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

(B) $-\frac{5}{2}$

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

(D) $-\frac{7}{2}$

[Step-by-step solution ► prepwiser.in/questions/S_Jni49N36](https://www.prepwiser.in/questions/S_Jni49N36)

Q47 JEE Main 2022 · 27 Jun · Shift 2

Let for some real numbers α and β , $a = \alpha - i\beta$. If the system of equations $4ix + (1 + i)y = 0$ and

$$8 \left(\cos \frac{2\pi}{3} + i \sin \frac{2\pi}{3} \right) x + \bar{a}y = 0$$

has more than one solution, then $\frac{\alpha}{\beta}$ is equal to

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

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

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

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

[Step-by-step solution ► prepwiser.in/questions/xLZXNqhPNB](https://www.prepwiser.in/questions/xLZXNqhPNB)

Q48 JEE Main 2022 · 26 Jun · Shift 1

The ordered pair (a, b) , for which the system of linear equations

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

$$5x - 8y + 9z = 3$$

$$2x + y + az = -1$$

has no solution, is :

(A) $(3, \frac{1}{3})$

(B) $(-3, \frac{1}{3})$

(C) $(-3, -\frac{1}{3})$

(D) $(3, -\frac{1}{3})$

[Step-by-step solution ► prepwiser.in/questions/QQc9hhwv1k](https://www.prepwiser.in/questions/QQc9hhwv1k)

Q49 JEE Main 2022 · 26 Jun · Shift 2

If the system of equations

$$\alpha x + y + z = 5, x + 2y + 3z = 4, x + 3y + 5z = \beta$$

has infinitely many solutions, then the ordered pair (α, β) is equal to :

(A) $(1, -3)$

(B) $(-1, 3)$

(C) $(1, 3)$

(D) $(-1, -3)$

[Step-by-step solution ► prepwiser.in/questions/s5JLcqmuCL](https://www.prepwiser.in/questions/s5JLcqmuCL)

Q50 JEE Main 2022 · 25 Jun · Shift 2

The system of equations

$$-kx + 3y - 14z = 25$$

$$-15x + 4y - kz = 3$$

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

is consistent for all k in the set

(A) $\mathbb{R}$

(B) $\mathbb{R} - \{-11, 13\}$

(C) $\mathbb{R} - \{13\}$

(D) $\mathbb{R} - \{-11, 11\}$

[Step-by-step solution ► prepwiser.in/questions/vJaV8SGm2N](https://www.prepwiser.in/questions/vJaV8SGm2N)

Q51 JEE Main 2022 · 24 Jun · Shift 1

The number of values of α for which the system of equations :

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

$$\alpha x + 2\alpha y + 3z = -1$$

$$x + 3\alpha y + 5z = 4$$

is inconsistent, is

(A) 0

(B) 1

(C) 2

(D) 3

[Step-by-step solution ► prepwiser.in/questions/6tA7-Lnkm4](https://www.prepwiser.in/questions/6tA7-Lnkm4)

Consider the system of linear equations

$$-x + y + 2z = 0$$

$$3x - ay + 5z = 1$$

$$2x - 2y - az = 7$$

Let S_1 be the set of all $a \in \mathbb{R}$ for which the system is inconsistent and S_2 be the set of all $a \in \mathbb{R}$ for which the system has infinitely many solutions. If $n(S_1)$ and $n(S_2)$ denote the number of elements in S_1 and S_2 respectively, then

(A) $n(S_1) = 2, n(S_2) = 2$

(B) $n(S_1) = 1, n(S_2) = 0$

(C) $n(S_1) = 2, n(S_2) = 0$

(D) $n(S_1) = 0, n(S_2) = 2$

[Step-by-step solution ► prepwiser.in/questions/fK9y-QVwIZ](https://www.prepwiser.in/questions/fK9y-QVwIZ)

If the following system of linear equations

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

$$x - y + z = 3$$

$$x + y + az = b$$

has no solution, then :

(A) $a = -\frac{1}{3}, b \neq \frac{7}{3}$

(B) $a \neq \frac{1}{3}, b = \frac{7}{3}$

(C) $a \neq -\frac{1}{3}, b = \frac{7}{3}$

(D) $a = \frac{1}{3}, b \neq \frac{7}{3}$

[Step-by-step solution ► prepwiser.in/questions/EYMerWGaKk](https://www.prepwiser.in/questions/EYMerWGaKk)

Q54 JEE Main 2021 · 31 Aug · Shift 2

If $\alpha + \beta + \gamma = 2\pi$, then the system of equations

$$x + (\cos \gamma)y + (\cos \beta)z = 0$$

$$(\cos \gamma)x + y + (\cos \alpha)z = 0$$

$$(\cos \beta)x + (\cos \alpha)y + z = 0$$

has :

(A) no solution

(B) infinitely many solution

(C) exactly two solutions

(D) a unique solution

[Step-by-step solution ► prepwisar.in/questions/dXKQg2BRPu](https://www.prepwisar.in/questions/dXKQg2BRPu)

Q55 JEE Main 2021 · 27 Aug · Shift 1

If the system of linear equations

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

$$x - y - z = \alpha$$

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

has infinitely many solution, then $\alpha + \beta - \alpha\beta$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/r4S7v0y6xA](https://www.prepwisar.in/questions/r4S7v0y6xA)

Q56 JEE Main 2021 · 27 Aug · Shift 2

Let $[\lambda]$ be the greatest integer less than or equal to λ . The set of all values of λ for which the system of linear equations

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

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

$$9x + 4y + (28 + [\lambda])z = [\lambda]$$
 has a solution is :

(A) $\mathbb{R}$

(B) $(-\infty, -9) \cup (-9, \infty)$

(C) $[-9, -8)$

(D) $(-\infty, -9) \cup [-8, \infty)$

[Step-by-step solution ► prepwisar.in/questions/FcJgn9inGn](https://www.prepwisar.in/questions/FcJgn9inGn)

Q57 JEE Main 2021 · 27 Jul · Shift 1

For real numbers α and β , consider the following system of linear equations :

$x + y - z = 2$, $x + 2y + \alpha z = 1$, $2x - y + z = \beta$. If the system has infinite solutions, then $\alpha + \beta$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/mnwCorfVj_](https://www.prepwiser.in/questions/mnwCorfVj_)

Q58 JEE Main 2021 · 25 Jul · Shift 1

The values of a and b, for which the system of equations

$$2x + 3y + 6z = 8$$

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

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

has no solution, are :

(A) $a = 3, b \neq 13$

(B) $a \neq 3, b \neq 13$

(C) $a \neq 3, b = 3$

(D) $a = 3, b = 13$

[Step-by-step solution ► prepwiser.in/questions/v8F15WJTyX](https://www.prepwiser.in/questions/v8F15WJTyX)

Q59 JEE Main 2021 · 22 Jul · Shift 2

The values of λ and μ such that the system of equations $x + y + z = 6$, $3x + 5y + 5z = 26$, $x + 2y + \lambda z = \mu$ has no solution, are :

(A) $\lambda = 3, \mu = 5$

(B) $\lambda = 3, \mu \neq 10$

(C) $\lambda \neq 2, \mu = 10$

(D) $\lambda = 2, \mu \neq 10$

[Step-by-step solution ► prepwiser.in/questions/vlDXTEaGMC](https://www.prepwiser.in/questions/vlDXTEaGMC)

Q60 JEE Main 2021 · 20 Jul · Shift 2

The value of $k \in \mathbb{R}$, for which the following system of linear equations

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

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

$$6x + 5y + kz = -3,$$

has infinitely many solutions, is :

(A) 3

(B) -5

(C) 5

(D) -3

[Step-by-step solution ► prepwiser.in/questions/e7x-BDPMK2](https://www.prepwiser.in/questions/e7x-BDPMK2)

Q61 JEE Main 2021 · 18 Mar · Shift 2

Let the system of linear equations

$$4x + \lambda y + 2z = 0$$

$$2x - y + z = 0$$

$$\mu x + 2y + 3z = 0, \lambda, \mu \in \mathbb{R}.$$

has a non-trivial solution. Then which of the following is true?

(A) $\mu = 6, \lambda \in \mathbb{R}$

(B) $\lambda = 3, \mu \in \mathbb{R}$

(C) $\mu = -6, \lambda \in \mathbb{R}$

(D) $\lambda = 2, \mu \in \mathbb{R}$

[Step-by-step solution ► prepwisar.in/questions/PNayGcDZG_](https://www.prepwisar.in/questions/PNayGcDZG_)

Q62 JEE Main 2021 · 18 Mar · Shift 1

Let α, β, γ be the real roots of the equation, $x^3 + ax^2 + bx + c = 0$, ($a, b, c \in \mathbb{R}$ and $a, b \neq 0$). If the system of equations (in u, v, w) given by $\alpha u + \beta v + \gamma w = 0$, $\beta u + \gamma v + \alpha w = 0$; $\gamma u + \alpha v + \beta w = 0$ has non-trivial solution, then the value of $\frac{a^2}{b}$ is

(A) 5

(B) 3

(C) 1

(D) 0

[Step-by-step solution ► prepwisar.in/questions/h3USk-8Iso](https://www.prepwisar.in/questions/h3USk-8Iso)

Q63 JEE Main 2021 · 17 Mar · Shift 1

The system of equations $kx + y + z = 1$, $x + ky + z = k$ and $x + y + zk = k^2$ has no solution if k is equal to :

(A) 0

(B) -1

(C) -2

(D) 1

[Step-by-step solution ► prepwisar.in/questions/4Gaf9c81Ri](https://www.prepwisar.in/questions/4Gaf9c81Ri)

Q64 JEE Main 2021 · 16 Mar · Shift 1

Let

$$A = \begin{bmatrix} i & -i \\ -i & i \end{bmatrix}, i = \sqrt{-1}$$

. Then, the system of linear equations

$$A^8 \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 8 \\ 64 \end{bmatrix}$$

has :

(A) Exactly two solutions

(B) Infinitely many solutions

(C) A unique solution

(D) No solution

[Step-by-step solution ► prepwisar.in/questions/pHUb-czb69](https://www.prepwisar.in/questions/pHUb-czb69)

Q65 JEE Main 2021 · 26 Feb · Shift 2

Consider the following system of equations :

$$x + 2y - 3z = a$$

$$2x + 6y - 11z = b$$

$$x - 2y + 7z = c,$$

where a , b and c are real constants. Then the system of equations :

- (A) has no solution for all a , b and c
- (B) has a unique solution when $5a = 2b + c$
- (C) has infinite number of solutions when $5a = 2b + c$
- (D) has a unique solution for all a , b and c

[Step-by-step solution ► prepwisser.in/questions/FH5mhg8O0Z](https://www.prepwisser.in/questions/FH5mhg8O0Z)

Q66 JEE Main 2021 · 25 Feb · Shift 1

If the system of equations

$$kx + y + 2z = 1$$

$$3x - y - 2z = 2$$

$$-2x - 2y - 4z = 3$$

has infinitely many solutions, then k is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/0j4C3Z1YTX](https://www.prepwisser.in/questions/0j4C3Z1YTX)

Q67 JEE Main 2021 · 24 Feb · Shift 2

Let A and B be 3×3 real matrices such that A is symmetric matrix and B is skew-symmetric matrix. Then the system of linear equations $(A^2B^2 - B^2A^2)X = O$, where X is a 3×1 column matrix of unknown variables and O is a 3×1 null matrix, has :

- (A) no solution
- (B) exactly two solutions
- (C) infinitely many solutions
- (D) a unique solution

[Step-by-step solution ► prepwisser.in/questions/-f6K0YWZCH](https://www.prepwisser.in/questions/-f6K0YWZCH)

Q68 JEE Main 2021 · 24 Feb · Shift 2

For the system of linear equations:

$$x - 2y = 1, x - y + kz = -2, ky + 4z = 6, k \in R,$$

consider the following statements :

- (A) The system has unique solution if $k \neq 2, k \neq -2$.
- (B) The system has unique solution if $k = -2$
- (C) The system has unique solution if $k = 2$
- (D) The system has no solution if $k = 2$
- (E) The system has infinite number of solutions if $k \neq -2$.

Which of the following statements are correct?

- (A) (B) and (E) only
- (B) (C) and (D) only
- (C) (A) and (E) only
- (D) (A) and (D) only

[Step-by-step solution ► prepwisar.in/questions/HR0LcgVXWc](https://www.prepwisar.in/questions/HR0LcgVXWc)

Q69 JEE Main 2021 · 24 Feb · Shift 1

The system of linear equations

$$3x - 2y - kz = 10$$

$$2x - 4y - 2z = 6$$

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

is inconsistent if :

- (A) $k \neq 3, m \in \mathbf{R}$
- (B) $k = 3, m \neq \frac{4}{5}$
- (C) $k = 3, m = \frac{4}{5}$
- (D) $k \neq 3, m \neq \frac{4}{5}$

[Step-by-step solution ► prepwisar.in/questions/-Sy-caS0BF](https://www.prepwisar.in/questions/-Sy-caS0BF)

Q70 JEE Main 2020 · 6 Sep · Shift 2

The sum of distinct values of λ for which the system of equations

$$(\lambda - 1)x + (3\lambda + 1)y + 2\lambda z = 0$$

$$(\lambda - 1)x + (4\lambda - 2)y + (\lambda + 3)z = 0$$

$$2x + (3\lambda + 1)y + 3(\lambda - 1)z = 0$$

has non-zero solutions, is _____ .

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/K4fAvMMGvY](https://www.prepwiser.in/questions/K4fAvMMGvY)

Q71 JEE Main 2020 · 6 Sep · Shift 1

The values of λ and μ for which the system of linear equations

$$x + y + z = 2$$

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

$$x + 3y + \lambda z = \mu$$

has infinitely many solutions are, respectively:

(A) 6 and 8

(B) 5 and 8

(C) 5 and 7

(D) 4 and 9

[Step-by-step solution ► prepwiser.in/questions/iz5dMKEE7M](https://www.prepwiser.in/questions/iz5dMKEE7M)

Q72 JEE Main 2020 · 5 Sep · Shift 1

Let $\lambda \in \mathbb{R}$. The system of linear equations

$$2x_1 - 4x_2 + \lambda x_3 = 1$$

$$x_1 - 6x_2 + x_3 = 2$$

$$\lambda x_1 - 10x_2 + 4x_3 = 3$$

is inconsistent for:

(A) exactly one positive value of λ

(B) exactly one negative value of λ

(C) exactly two values of λ

(D) every value of λ

[Step-by-step solution ► prepwiser.in/questions/ZZi38BzYr5](https://www.prepwiser.in/questions/ZZi38BzYr5)

Q73 JEE Main 2020 · 5 Sep · Shift 2

If the system of linear equations

$$x + y + 3z = 0$$

$$x + 3y + k^2z = 0$$

$$3x + y + 3z = 0$$

has a non-zero solution (x, y, z) for some $k \in \mathbb{R}$, then $x + \left(\frac{y}{z}\right)$ is equal to :

(A) 9

(B) 3

(C) -9

(D) -3

[Step-by-step solution ► prepwiser.in/questions/PD81C3zGqL](https://www.prepwiser.in/questions/PD81C3zGqL)

Q74 JEE Main 2020 · 4 Sep · Shift 2

If the system of equations

$$x+y+z=2$$

$$2x+4y-z=6$$

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

has infinitely many solutions, then

(A) $2\lambda - \mu = 5$

(B) $\lambda - 2\mu = -5$

(C) $2\lambda + \mu = 14$

(D) $\lambda + 2\mu = 14$

[Step-by-step solution ► prepwiser.in/questions/k0qYVoRCx3](https://www.prepwiser.in/questions/k0qYVoRCx3)

Q75 JEE Main 2020 · 4 Sep · Shift 1

If the system of equations

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

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

$$x - 7y + az = 24,$$

has infinitely many solutions, then $a - b$ is equal to.....

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/MvjSX2Q_gb](https://www.prepwiser.in/questions/MvjSX2Q_gb)

Q76 JEE Main 2020 · 4 Sep · Shift 2

Suppose the vectors x_1 , x_2 and x_3 are the

solutions of the system of linear equations,

$Ax = b$ when the vector b on the right side is equal to b_1 , b_2 and b_3 respectively. if

$$x_1 = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}, x_2 = \begin{bmatrix} 0 \\ 2 \\ 1 \end{bmatrix}, x_3 = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$$

$$b_1 = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}, b_2 = \begin{bmatrix} 0 \\ 2 \\ 0 \end{bmatrix} \text{ and } b_3 = \begin{bmatrix} 0 \\ 0 \\ 2 \end{bmatrix},$$

then the determinant of A is equal to :

(A) $\frac{3}{2}$

(B) 4

(C) 2

(D) $\frac{1}{2}$

[Step-by-step solution ► prepwiser.in/questions/uOyDijT7NX](https://www.prepwiser.in/questions/uOyDijT7NX)

Q77 JEE Main 2020 · 2 Sep · Shift 1

Let S be the set of all $\lambda \in \mathbb{R}$ for which the system of linear equations

$$2x - y + 2z = 2$$

$$x - 2y + \lambda z = -4$$

$$x + \lambda y + z = 4$$

has no solution. Then the set S :

(A) contains more than two elements.

(B) contains exactly two elements.

(C) is a singleton.

(D) is an empty set.

[Step-by-step solution ► prepwisar.in/questions/9ha08T2Dyl](https://www.prepwisar.in/questions/9ha08T2Dyl)

Q78 JEE Main 2020 · 9 Jan · Shift 2

The following system of linear equations

$$7x + 6y - 2z = 0$$

$$3x + 4y + 2z = 0$$

$$x - 2y - 6z = 0, \text{ has}$$

(A) no solution

(B) infinitely many solutions, (x, y, z) satisfying $y = 2z$

(C) infinitely many solutions, (x, y, z) satisfying $x = 2z$

(D) only the trivial solution

[Step-by-step solution ► prepwisar.in/questions/bfTTY8Ikzo](https://www.prepwisar.in/questions/bfTTY8Ikzo)

Q79 JEE Main 2020 · 8 Jan · Shift 1

For which of the following ordered pairs (μ, δ) , the system of linear equations

$$x + 2y + 3z = 1$$

$$3x + 4y + 5z = \mu$$

$$4x + 4y + 4z = \delta$$

is inconsistent ?

(A) $(1, 0)$

(B) $(4, 3)$

(C) $(4, 6)$

(D) $(3, 4)$

[Step-by-step solution ► prepwisar.in/questions/vsy8lY6NsF](https://www.prepwisar.in/questions/vsy8lY6NsF)

Q80 JEE Main 2020 · 8 Jan · Shift 2

The system of linear equations

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

$$2\lambda x + 3y + 5z = 8$$

$$4x + \lambda y + 6z = 10 \text{ has}$$

(A) a unique solution when $\lambda = -8$

(B) no solution when $\lambda = 2$

(C) infinitely many solutions when $\lambda = 2$

(D) no solution when $\lambda = 8$

[Step-by-step solution ► prepwisar.in/questions/NAuCKuce5t](https://www.prepwisar.in/questions/NAuCKuce5t)

Q81 JEE Main 2020 · 7 Jan · Shift 1

If the system of linear equations

$$2x + 2ay + az = 0$$

$$2x + 3by + bz = 0$$

$$2x + 4cy + cz = 0,$$

where $a, b, c \in \mathbb{R}$ are non-zero distinct; has a non-zero solution, then:

(A) $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are in A.P.

(B) $a + b + c = 0$

(C) a, b, c are in G.P.

(D) a, b, c are in A.P.

Step-by-step solution ► [prepwisser.in/questions/hAgDZnGAdL](https://www.prepwisser.in/questions/hAgDZnGAdL)

Q82 JEE Main 2020 · 7 Jan · Shift 2

If the system of linear equations,

$$x + y + z = 6$$

$$x + 2y + 3z = 10$$

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

has more than two solutions, then $\mu - \lambda^2$ is equal to ____.

Numerical answer — enter the value.

Step-by-step solution ► [prepwisser.in/questions/v0oS38ccw9](https://www.prepwisser.in/questions/v0oS38ccw9)

Adjoint and Inverse · 26 PYQs

Q83 JEE Main 2025 · 8 Apr · Shift 2

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

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

(A) 22

(B) 20

(C) 24

(D) 26

Step-by-step solution ► [prepwisser.in/questions/5ha8RhnUqY](https://www.prepwisser.in/questions/5ha8RhnUqY)

Q84 JEE Main 2025 · 7 Apr · Shift 1

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 :

(A) 820

(B) 866

(C) 750

(D) 732

Step-by-step solution ► [prepwisser.in/questions/F3FsolZCvn](https://www.prepwisser.in/questions/F3FsolZCvn)

Q85 JEE Main 2025 · 3 Apr · Shift 2

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 _____

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/HqJU6uTHz7](https://www.prepwisar.in/questions/HqJU6uTHz7)

Q86 JEE Main 2025 · 24 Jan · Shift 1

Let A be a 3×3 matrix such that $X^T A X = O$ for all nonzero 3×1 matrices $X = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$. If $A \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} = \begin{bmatrix} 1 \\ 4 \\ -5 \end{bmatrix}$, $A \begin{bmatrix} 1 \\ 2 \\ 1 \end{bmatrix} = \begin{bmatrix} 0 \\ 4 \\ -8 \end{bmatrix}$, and $\det(\text{adj}(2(A + I))) = 2^\alpha 3^\beta 5^\gamma$, $\alpha, \beta, \gamma \in N$, then $\alpha^2 + \beta^2 + \gamma^2$ is

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/C63LHtaeeS](https://www.prepwisar.in/questions/C63LHtaeeS)

Q87 JEE Main 2025 · 22 Jan · Shift 2

For a 3×3 matrix M , let $\text{trace}(M)$ denote the sum of all the diagonal elements of M . Let A be a 3×3 matrix such that $|A| = \frac{1}{2}$ and $\text{trace}(A) = 3$. If $B = \text{adj}(\text{adj}(2A))$, then the value of $|B| + \text{trace}(B)$ equals :

- (A) 56 (B) 132
(C) 174 (D) 280

[Step-by-step solution ► prepwisar.in/questions/eHIQYQq7iZ](https://www.prepwisar.in/questions/eHIQYQq7iZ)

Q88 JEE Main 2024 · 4 Apr · Shift 1

Let $\alpha \in (0, \infty)$ and

$$A = \begin{bmatrix} 1 & 2 & \alpha \\ 1 & 0 & 1 \\ 0 & 1 & 2 \end{bmatrix}$$

. If

$$\det(\text{adj}(2A - A^T) \cdot \text{adj}(A - 2A^T)) = 2^8$$

, then $(\det(A))^2$ is equal to:

- (A) 16 (B) 36
(C) 49 (D) 1

[Step-by-step solution ► prepwisar.in/questions/i6dDeZ-6Bi](https://www.prepwisar.in/questions/i6dDeZ-6Bi)

Q89 JEE Main 2024 · 31 Jan · Shift 2

Let A be a 3×3 matrix and $\det(A) = 2$. If

$$n = \det(\underbrace{\text{adj}(\text{adj}(\dots(\text{adj } A)))}_{2024\text{--times}})$$

, then the remainder when n is divided by 9 is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/hJjkCHKItS](https://www.prepwiser.in/questions/hJjkCHKItS)

Q90 JEE Main 2023 · 13 Apr · Shift 1

Let

$$B = \begin{bmatrix} 1 & 3 & \alpha \\ 1 & 2 & 3 \\ \alpha & \alpha & 4 \end{bmatrix}, \alpha > 2$$

be the adjoint of a matrix A and $|A| = 2$. Then

$$\begin{bmatrix} \alpha & -2\alpha & \alpha \end{bmatrix} B \begin{bmatrix} \alpha \\ -2\alpha \\ \alpha \end{bmatrix}$$

is equal to :

(A) 32

(B) -16

(C) 0

(D) 16

[Step-by-step solution ► prepwiser.in/questions/qMvUUMeVgR](https://www.prepwiser.in/questions/qMvUUMeVgR)

Q91 JEE Main 2023 · 10 Apr · Shift 2

If

$$A = \frac{1}{5!6!7!} \begin{bmatrix} 5! & 6! & 7! \\ 6! & 7! & 8! \\ 7! & 8! & 9! \end{bmatrix}$$

, then $|\text{adj}(\text{adj}(2A))|$ is equal to :

(A) 2^{12}

(B) 2^{20}

(C) 2^8

(D) 2^{16}

[Step-by-step solution ► prepwiser.in/questions/zH9jDExEXw](https://www.prepwiser.in/questions/zH9jDExEXw)

Q92 JEE Main 2023 · 8 Apr · Shift 1

Let

$$A = \begin{bmatrix} 2 & 1 & 0 \\ 1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$$

. If $|\text{adj}(\text{adj}(\text{adj } 2A))| = (16)^n$, then n is equal to :

(A) 9

(B) 8

(C) 10

(D) 12

[Step-by-step solution ► prepwisser.in/questions/Nl6cmSdQtm](https://www.prepwisser.in/questions/Nl6cmSdQtm)

Q93 JEE Main 2023 · 30 Jan · Shift 1

Let

$$A = \begin{pmatrix} m & n \\ p & q \end{pmatrix}, d = |A| \neq 0$$

and $|A - d(\text{Adj } A)| = 0$. Then

(A) $1 + d^2 = m^2 + q^2$

(B) $1 + d^2 = (m + q)^2$

(C) $(1 + d)^2 = m^2 + q^2$

(D) $(1 + d)^2 = (m + q)^2$

[Step-by-step solution ► prepwisser.in/questions/Ot8SAElrsg](https://www.prepwisser.in/questions/Ot8SAElrsg)

Q94 JEE Main 2023 · 25 Jan · Shift 1

Let $x, y, z > 1$ and

$$A = \begin{bmatrix} 1 & \log_x y & \log_x z \\ \log_y x & 2 & \log_y z \\ \log_z x & \log_z y & 3 \end{bmatrix}$$

. Then $|\text{adj}(\text{adj } A^2)|$ is equal to

(A) 6^4

(B) 2^8

(C) 4^8

(D) 2^4

[Step-by-step solution ► prepwisser.in/questions/ecINZnfpSd](https://www.prepwisser.in/questions/ecINZnfpSd)

Q95 JEE Main 2023 · 24 Jan · Shift 2

Let A be a 3×3 matrix such that $|\text{adj}(\text{adj}(\text{adj } A))| = 12^4$. Then $|A^{-1} \text{adj } A|$ is equal to

(A) 12

(B) $2\sqrt{3}$

(C) 1

(D) $\sqrt{6}$

[Step-by-step solution ► prepwisser.in/questions/mi0JaDtYTq](https://www.prepwisser.in/questions/mi0JaDtYTq)

Q96 JEE Main 2022 · 28 Jul · Shift 1

Let the matrix

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{bmatrix}$$

and the matrix $B_0 = A^{49} + 2A^{98}$. If $B_n = \text{Adj}(B_{n-1})$ for all $n \geq 1$, then $\det(B_4)$ is equal to :

(A) 3^{28}

(B) 3^{30}

(C) 3^{32}

(D) 3^{36}

[Step-by-step solution ► prepwiser.in/questions/FtjdKiA8fX](https://www.prepwiser.in/questions/FtjdKiA8fX)

Q97 JEE Main 2022 · 26 Jul · Shift 1

Let A be a 2×2 matrix with $\det(A) = -1$ and $\det((A + I)(\text{Adj}(A) + I)) = 4$. Then the sum of the diagonal elements of A can be :

(A) -1

(B) 2

(C) 1

(D) $-\sqrt{2}$

[Step-by-step solution ► prepwiser.in/questions/n0u6n5M6rs](https://www.prepwiser.in/questions/n0u6n5M6rs)

Q98 JEE Main 2022 · 28 Jun · Shift 1

Let A be a matrix of order 3×3 and $\det(A) = 2$. Then $\det(\det(A) \text{adj}(5 \text{adj}(A^3)))$ is equal to _____.

(A) 512×10^6

(B) 256×10^6

(C) 1024×10^6

(D) 256×10^{11}

[Step-by-step solution ► prepwiser.in/questions/24Botz3hbz](https://www.prepwiser.in/questions/24Botz3hbz)

Q99 JEE Main 2022 · 27 Jun · Shift 2

Let A and B be two 3×3 matrices such that $AB = I$ and $|A| = \frac{1}{8}$. Then $|\text{adj}(B \text{adj}(2A))|$ is equal to

(A) 16

(B) 32

(C) 64

(D) 128

[Step-by-step solution ► prepwiser.in/questions/J3iCgSFUHS](https://www.prepwiser.in/questions/J3iCgSFUHS)

Q100 JEE Main 2022 · 27 Jun · Shift 1

The positive value of the determinant of the matrix A, whose $\text{Adj}(\text{Adj}(A)) =$

$$\begin{pmatrix} 14 & 28 & -14 \\ -14 & 14 & 28 \\ 28 & -14 & 14 \end{pmatrix}$$

, is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/H5-WcyXlJj](https://www.prepwiser.in/questions/H5-WcyXlJj)

Q101 JEE Main 2022 · 26 Jun · Shift 1

Let A be a 3×3 invertible matrix. If $|\text{adj}(24A)| = |\text{adj}(3 \text{adj}(2A))|$, then $|A|^2$ is equal to :

- (A) 6^6
- (B) 2^{12}
- (C) 2^6
- (D) 1

[Step-by-step solution ► prepwiser.in/questions/7W3IofJlCf](https://www.prepwiser.in/questions/7W3IofJlCf)

Q102 JEE Main 2022 · 24 Jun · Shift 1

Let $S = \{\sqrt{n} : 1 \leq n \leq 50 \text{ and } n \text{ is odd}\}$.

Let $a \in S$ and

$$A = \begin{bmatrix} 1 & 0 & a \\ -1 & 1 & 0 \\ -a & 0 & 1 \end{bmatrix}$$

.
If $\sum_{a \in S} \det(\text{adj } A) = 100\lambda$, then λ is equal to :

- (A) 218
- (B) 221
- (C) 663
- (D) 1717

[Step-by-step solution ► prepwiser.in/questions/8I7R9V7ZE2](https://www.prepwiser.in/questions/8I7R9V7ZE2)

Q103 JEE Main 2021 · 1 Sep · Shift 2

Let $J_{n,m} = \int_0^{\frac{1}{2}} \frac{x^n}{x^m - 1} dx$, $\forall n > m$ and $n, m \in \mathbb{N}$. Consider a matrix $A = [a_{ij}]_{3 \times 3}$ where

$$a_{ij} = \begin{cases} j_{6+i,3} - j_{i+3,3}, & i \leq j \\ 0, & i > j \end{cases}$$

. Then $|\text{adj } A^{-1}|$ is :

- (A) $(15)^2 \times 2^{42}$
- (B) $(15)^2 \times 2^{34}$
- (C) $(105)^2 \times 2^{38}$
- (D) $(105)^2 \times 2^{36}$

[Step-by-step solution ► prepwiser.in/questions/pzoepEmxSH](https://www.prepwiser.in/questions/pzoepEmxSH)

Q104 JEE Main 2021 · 26 Aug · Shift 2

Let A be a 3×3 real matrix. If $\det(2\text{Adj}(2 \text{Adj}(\text{Adj}(2A)))) = 2^{41}$, then the value of $\det(A^2)$ equal _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/q6fTvTX3XC](https://www.prepwiser.in/questions/q6fTvTX3XC)

Q105 JEE Main 2021 · 20 Jul · Shift 2

Let $A = \{a_{ij}\}$ be a 3×3 matrix,

where

$$a_{ij} = \begin{cases} (-1)^{j-i} & \text{if } i < j, \\ 2 & \text{if } i = j, \\ (-1)^{i+j} & \text{if } i > j \end{cases}$$

then $\det(3\text{Adj}(2A^{-1}))$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/mj4qUc57Xm](https://www.prepwisar.in/questions/mj4qUc57Xm)

Q106 JEE Main 2021 · 17 Mar · Shift 1

If $A = \begin{bmatrix} 2 & 3 \\ 0 & -1 \end{bmatrix}$, then the value of $\det(A^4) + \det(A^{10} - (\text{Adj}(2A))^{10})$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/YB8pMEpN0B](https://www.prepwisar.in/questions/YB8pMEpN0B)

Q107 JEE Main 2020 · 3 Sep · Shift 2

Let A be a 3×3 matrix such that
 $\text{adj } A =$

$$\begin{bmatrix} 2 & -1 & 1 \\ -1 & 0 & 2 \\ 1 & -2 & -1 \end{bmatrix}$$

and $B = \text{adj}(\text{adj } A)$.

If $|A| = \lambda$ and $|(B^{-1})^T| = \mu$, then the ordered pair,
 $(|\lambda|, \mu)$ is equal to :

(A) $(3, 81)$

(B) $(9, \frac{1}{9})$

(C) $(3, \frac{1}{81})$

(D) $(9, \frac{1}{81})$

[Step-by-step solution ► prepwisar.in/questions/HAz6xQjLDH](https://www.prepwisar.in/questions/HAz6xQjLDH)

Q108 JEE Main 2020 · 9 Jan · Shift 1

If the matrices $A =$

$$\begin{bmatrix} 1 & 1 & 2 \\ 1 & 3 & 4 \\ 1 & -1 & 3 \end{bmatrix}$$

,

$B = \text{adj}A$ and $C = 3A$, then $\frac{|\text{adj}B|}{|C|}$ is equal to :

(A) 8

(B) 2

(C) 72

(D) 16

[Step-by-step solution](#) ► [prepwiser.in/questions/xUkddGnDiC](https://www.prepwiser.in/questions/xUkddGnDiC)

Properties of Determinants · 52 PYQs

Q109 JEE Main 2025 · 7 Apr · Shift 1

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

Numerical answer — enter the value.

[Step-by-step solution](#) ► [prepwiser.in/questions/4wEh_puSIu](https://www.prepwiser.in/questions/4wEh_puSIu)

Q110 JEE Main 2025 · 3 Apr · Shift 1

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

(A) 26

(B) 27

(C) 25

(D) 28

[Step-by-step solution](#) ► [prepwiser.in/questions/BL0S0cEiGN](https://www.prepwiser.in/questions/BL0S0cEiGN)

Q111 JEE Main 2025 · 3 Apr · Shift 1

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

(A) 28

(B) 27

(C) -1

(D) 1

[Step-by-step solution](#) ► [prepwiser.in/questions/l9mLAl2jId](https://www.prepwiser.in/questions/l9mLAl2jId)

Q112 JEE Main 2025 · 2 Apr · Shift 1

Let $a \in \mathbb{R}$ and A be a matrix of order 3×3 such that $\det(A) = -4$ and $A + I = \begin{bmatrix} 1 & a & 1 \\ 2 & 1 & 0 \\ a & 1 & 2 \end{bmatrix}$, where I is the identity matrix of order 3×3 . If $\det((a+1) \text{adj}((a-1)A))$ is $2^m 3^n$, $m, n \in \{0, 1, 2, \dots, 20\}$, then $m + n$ is equal to :

(A) 14

(B) 17

(C) 15

(D) 16

[Step-by-step solution](#) ► [prepwiser.in/questions/F4VsVLakHr](https://www.prepwiser.in/questions/F4VsVLakHr)

Q113 JEE Main 2025 · 29 Jan · Shift 1

Let M and m respectively be the maximum and the minimum values of

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

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

(A) 1280

(B) 1040

(C) 1215

(D) 1295

[Step-by-step solution ► prepwiser.in/questions/BIUegCiaw-](https://www.prepwiser.in/questions/BIUegCiaw-)

Q114 JEE Main 2025 · 22 Jan · Shift 1

Let A be a square matrix of order 3 such that $\det(A) = -2$ and $\det(3 \operatorname{adj}(-6 \operatorname{adj}(3A))) = 2^{m+n} \cdot 3^{mn}, m > n$. Then $4m + 2n$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/GxG-3uOjZR](https://www.prepwiser.in/questions/GxG-3uOjZR)

Q115 JEE Main 2024 · 9 Apr · Shift 1

Let A be a non-singular matrix of order 3. If

$$\det(3 \operatorname{adj}(2 \operatorname{adj}((\det A)A))) = 3^{-13} \cdot 2^{-10}$$

and

$$\det(3 \operatorname{adj}(2A)) = 2^m \cdot 3^n$$

, then $|3m + 2n|$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/eAa5FBHGgd](https://www.prepwiser.in/questions/eAa5FBHGgd)

Q116 JEE Main 2024 · 8 Apr · Shift 2

If $\alpha \neq a, \beta \neq b, \gamma \neq c$ and

$$\begin{vmatrix} \alpha & b & c \\ a & \beta & c \\ a & b & \gamma \end{vmatrix} = 0$$

, then

$$\frac{a}{\alpha - a} + \frac{b}{\beta - b} + \frac{\gamma}{\gamma - c}$$

is equal to :

(A) 2

(B) 3

(C) 1

(D) 0

[Step-by-step solution ► prepwiser.in/questions/5lpzutFPD1](https://www.prepwiser.in/questions/5lpzutFPD1)

Q117 JEE Main 2024 · 6 Apr · Shift 1

For $\alpha, \beta \in \mathbb{R}$ and a natural number n , let

$$A_r = \begin{vmatrix} r & 1 & \frac{n^2}{2} + \alpha \\ 2r & 2 & n^2 - \beta \\ 3r - 2 & 3 & \frac{n(3n-1)}{2} \end{vmatrix}$$

. Then $2A_{10} - A_8$ is

(A) $4\alpha + 2\beta$

(B) 0

(C) $2n$

(D) $2\alpha + 4\beta$

[Step-by-step solution ► prepwisser.in/questions/yFfIXbjTya](https://www.prepwisser.in/questions/yFfIXbjTya)

Q118 JEE Main 2024 · 6 Apr · Shift 2

If A is a square matrix of order 3 such that $\det(A) = 3$ and

$$\det(\operatorname{adj}(-4 \operatorname{adj}(-3 \operatorname{adj}(3 \operatorname{adj}((2A)^{-1})))))) = 2^m 3^n$$

, then $m + 2n$ is equal to :

(A) 2

(B) 4

(C) 3

(D) 6

[Step-by-step solution ► prepwisser.in/questions/Egsh13SO1w](https://www.prepwisser.in/questions/Egsh13SO1w)

Q119 JEE Main 2024 · 5 Apr · Shift 1

Let A and B be two square matrices of order 3 such that $|A| = 3$ and $|B| = 2$. Then

$$|A^T A (\operatorname{adj}(2A))^{-1} (\operatorname{adj}(4B)) (\operatorname{adj}(AB))^{-1} A A^T|$$

is equal to :

(A) 32

(B) 81

(C) 64

(D) 108

[Step-by-step solution ► prepwisser.in/questions/oq3xTSES2W](https://www.prepwisser.in/questions/oq3xTSES2W)

Q120 JEE Main 2024 · 4 Apr · Shift 1

Let A be a 3×3 matrix of non-negative real elements such that

$$A \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} = 3 \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$$

. Then the maximum value of $\det(A)$ is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/TxxEgIZ2hH](https://www.prepwisser.in/questions/TxxEgIZ2hH)

Q121 JEE Main 2024 · 1 Feb · Shift 1

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 $X = A^T C^2 A$, then $\det X$ is equal to :

(A) 243 (B) 729

(C) 27 (D) 891

Step-by-step solution ► [prepwiser.in/questions/LIQWk_21V9](https://www.prepwiser.in/questions/LIQWk_21V9)

Q122 JEE Main 2024 · 31 Jan · Shift 1

If $f(x) = \begin{vmatrix} x^3 & 2x^2 + 1 & 1 + 3x \\ 3x^2 + 2 & 2x & x^3 + 6 \\ x^3 - x & 4 & x^2 - 2 \end{vmatrix}$ for all $x \in \mathbb{R}$, then $2f(0) + f'(0)$ is equal to

(A) 24 (B) 18

(C) 42 (D) 48

Step-by-step solution ► [prepwiser.in/questions/sjrli8Ttc8](https://www.prepwiser.in/questions/sjrli8Ttc8)

Q123 JEE Main 2024 · 30 Jan · Shift 1

If

$$f(x) = \begin{vmatrix} 2\cos^4 x & 2\sin^4 x & 3 + \sin^2 2x \\ 3 + 2\cos^4 x & 2\sin^4 x & \sin^2 2x \\ 2\cos^4 x & 3 + 2\sin^4 x & \sin^2 2x \end{vmatrix},$$

then $\frac{1}{5}f'(0)$ is equal to :

(A) 2 (B) 1

(C) 0 (D) 6

Step-by-step solution ► [prepwiser.in/questions/biXqkahy3c](https://www.prepwiser.in/questions/biXqkahy3c)

Q124 JEE Main 2024 · 29 Jan · Shift 1

Let $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & \alpha & \beta \\ 0 & \beta & \alpha \end{bmatrix}$ and $|2A|^3 = 2^{21}$ where $\alpha, \beta \in \mathbb{Z}$, Then a value of α is

(A) 9 (B) 17

(C) 3 (D) 5

Step-by-step solution ► [prepwiser.in/questions/d1x0wwTm-2](https://www.prepwiser.in/questions/d1x0wwTm-2)

Let

$$A = \begin{bmatrix} 2 & 1 & 2 \\ 6 & 2 & 11 \\ 3 & 3 & 2 \end{bmatrix}$$

and

$$P = \begin{bmatrix} 1 & 2 & 0 \\ 5 & 0 & 2 \\ 7 & 1 & 5 \end{bmatrix}$$

. The sum of the prime factors of $|P^{-1}AP - 2I|$ is equal to

- (A) 66 (B) 27
(C) 23 (D) 26

[Step-by-step solution ► prepwiser.in/questions/WQu4F9eRPe](https://www.prepwiser.in/questions/WQu4F9eRPe)

The values of α , for which

$$\begin{vmatrix} 1 & \frac{3}{2} & \alpha + \frac{3}{2} \\ 1 & \frac{1}{3} & \alpha + \frac{1}{3} \\ 2\alpha + 3 & 3\alpha + 1 & 0 \end{vmatrix} = 0$$

, lie in the interval

- (A) $(-2, 1)$
(B) $(-\frac{3}{2}, \frac{3}{2})$
(C) $(-3, 0)$
(D) $(0, 3)$

[Step-by-step solution ► prepwiser.in/questions/W6PIC_pQUh](https://www.prepwiser.in/questions/W6PIC_pQUh)

Let the determinant of a square matrix A of order m be $m - n$, where m and n

satisfy $4m + n = 22$ and $17m + 4n = 93$.

If $\det(n \operatorname{adj}(\operatorname{adj}(mA))) = 3^a 5^b 6^c$ then $a + b + c$ is equal to :

- (A) 96 (B) 84
(C) 109 (D) 101

[Step-by-step solution ► prepwiser.in/questions/myoB8jMimQ](https://www.prepwiser.in/questions/myoB8jMimQ)

Q128 JEE Main 2023 · 12 Apr · Shift 1

Let

$$D_k = \begin{vmatrix} 1 & 2k & 2k-1 \\ n & n^2+n+2 & n^2 \\ n & n^2+n & n^2+n+2 \end{vmatrix}$$

. If $\sum_{k=1}^n D_k = 96$, then n is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/Sq1Cj0Rfxi](https://www.prepwisser.in/questions/Sq1Cj0Rfxi)

Q129 JEE Main 2023 · 11 Apr · Shift 2

$$\begin{vmatrix} x+1 & x & x \\ x & x+\lambda & x \\ x & x & x+\lambda^2 \end{vmatrix} = \frac{9}{8}(103x+81)$$

, then $\lambda, \frac{\lambda}{3}$ are the roots of the equation :

(A) $4x^2 + 24x - 27 = 0$

(B) $4x^2 - 24x + 27 = 0$

(C) $4x^2 - 24x - 27 = 0$

(D) $4x^2 + 24x + 27 = 0$

[Step-by-step solution ► prepwisser.in/questions/Rfh15-GPSn](https://www.prepwisser.in/questions/Rfh15-GPSn)

Q130 JEE Main 2023 · 10 Apr · Shift 1

If A is a 3×3 matrix and $|A| = 2$, then $|3 \operatorname{adj} (|3A|A^2)|$ is equal to :

(A) $3^{12} \cdot 6^{10}$

(B) $3^{11} \cdot 6^{10}$

(C) $3^{12} \cdot 6^{11}$

(D) $3^{10} \cdot 6^{11}$

[Step-by-step solution ► prepwisser.in/questions/DrnZbXckBT](https://www.prepwisser.in/questions/DrnZbXckBT)

Q131 JEE Main 2023 · 1 Feb · Shift 1

Let

$$f(x) = \begin{vmatrix} 1 + \sin^2 x & \cos^2 x & \sin 2x \\ \sin^2 x & 1 + \cos^2 x & \sin 2x \\ \sin^2 x & \cos^2 x & 1 + \sin 2x \end{vmatrix}, x \in \left[\frac{\pi}{6}, \frac{\pi}{3} \right]$$

. If α and β respectively are the maximum and the minimum values of f , then

(A) $\alpha^2 - \beta^2 = 4\sqrt{3}$

(B) $\beta^2 - 2\sqrt{\alpha} = \frac{19}{4}$

(C) $\beta^2 + 2\sqrt{\alpha} = \frac{19}{4}$

(D) $\alpha^2 + \beta^2 = \frac{9}{2}$

[Step-by-step solution ► prepwisser.in/questions/TwojcNLFSe](https://www.prepwisser.in/questions/TwojcNLFSe)

Q132 JEE Main 2023 · 24 Jan · Shift 1

Let α be a root of the equation $(a - c)x^2 + (b - a)x + (c - b) = 0$ where a, b, c are distinct real numbers such that the matrix

$$\begin{bmatrix} \alpha^2 & \alpha & 1 \\ 1 & 1 & 1 \\ a & b & c \end{bmatrix}$$

is singular. Then, the value of

$$\frac{(a - c)^2}{(b - a)(c - b)} + \frac{(b - a)^2}{(a - c)(c - b)} + \frac{(c - b)^2}{(a - c)(b - a)}$$

is

(A) 3

(B) 6

(C) 12

(D) 9

[Step-by-step solution ► prepwisar.in/questions/gp5lqjII-a](https://www.prepwisar.in/questions/gp5lqjII-a)

Q133 JEE Main 2022 · 29 Jul · Shift 1

Let p and $p + 2$ be prime numbers and let

$$\Delta = \begin{vmatrix} p! & (p+1)! & (p+2)! \\ (p+1)! & (p+2)! & (p+3)! \\ (p+2)! & (p+3)! & (p+4)! \end{vmatrix}$$

Then the sum of the maximum values of α and β , such that p^α and $(p+2)^\beta$ divide Δ , is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/Zzc2pTnz4U](https://www.prepwisar.in/questions/Zzc2pTnz4U)

Q134 JEE Main 2022 · 27 Jul · Shift 2

Consider a matrix

$$A = \begin{bmatrix} \alpha & \beta & \gamma \\ \alpha^2 & \beta^2 & \gamma^2 \\ \beta + \gamma & \gamma + \alpha & \alpha + \beta \end{bmatrix}$$

, where α, β, γ are three distinct natural numbers.

If

$$\frac{\det(\text{adj}(\text{adj}(\text{adj}(\text{adj } A))))}{(\alpha - \beta)^{16}(\beta - \gamma)^{16}(\gamma - \alpha)^{16}} = 2^{32} \times 3^{16}$$

, then the number of such 3 - tuples (α, β, γ) is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/yqxdegj-pt](https://www.prepwisar.in/questions/yqxdegj-pt)

Let

$$A = \begin{bmatrix} 1 & -2 & \alpha \\ \alpha & 2 & -1 \end{bmatrix}$$

and

$$B = \begin{bmatrix} 2 & \alpha \\ -1 & 2 \\ 4 & -5 \end{bmatrix}, \alpha \in \mathbb{C}$$

. Then the absolute value of the sum of all values of α for which $\det(AB) = 0$ is :

- (A) 3 (B) 4
(C) 2 (D) 5

Step-by-step solution ► [prepwisar.in/questions/8R7TP-VHuz](https://www.prepwisar.in/questions/8R7TP-VHuz)

Let A and B be two square matrices of order 2. If $\det(A) = 2$, $\det(B) = 3$ and $\det((\det 5(\det A)B)A^2) = 2^a 3^b 5^c$ for some $a, b, c, \in \mathbb{N}$, then $a + b + c$ is equal to :

- (A) 10 (B) 12
(C) 13 (D) 14

Step-by-step solution ► [prepwisar.in/questions/KS85N8zOhP](https://www.prepwisar.in/questions/KS85N8zOhP)

Let

$$f(x) = \begin{vmatrix} a & -1 & 0 \\ ax & a & -1 \\ ax^2 & ax & a \end{vmatrix}, a \in \mathbb{R}$$

. Then the sum of the squares of all the values of a , for which $2f'(10) - f'(5) + 100 = 0$, is

- (A) 117 (B) 106
(C) 125 (D) 136

Step-by-step solution ► [prepwisar.in/questions/IIfxoRa7Fs](https://www.prepwisar.in/questions/IIfxoRa7Fs)

Q138 JEE Main 2021 · 31 Aug · Shift 1

If $a_r = \cos \frac{2r\pi}{9} + i \sin \frac{2r\pi}{9}$, $r = 1, 2, 3, \dots, i = \sqrt{-1}$, then the determinant

$$\begin{vmatrix} a_1 & a_2 & a_3 \\ a_4 & a_5 & a_6 \\ a_7 & a_8 & a_9 \end{vmatrix}$$

is equal to :

(A) $a_2a_6 - a_4a_8$

(B) a_9

(C) $a_1a_9 - a_3a_7$

(D) a_5

[Step-by-step solution ► prepwisar.in/questions/sG85C0fR7G](https://www.prepwisar.in/questions/sG85C0fR7G)

Q139 JEE Main 2021 · 27 Aug · Shift 2

Let

$$A = \begin{pmatrix} [x+1] & [x+2] & [x+3] \\ [x] & [x+3] & [x+3] \\ [x] & [x+2] & [x+4] \end{pmatrix}$$

, where $[t]$ denotes the greatest integer less than or equal to t . If $\det(A) = 192$, then the set of values of x is the interval :

(A) $[68, 69)$

(B) $[62, 63)$

(C) $[65, 66)$

(D) $[60, 61)$

[Step-by-step solution ► prepwisar.in/questions/cGW0VRKWG8](https://www.prepwisar.in/questions/cGW0VRKWG8)

Q140 JEE Main 2021 · 27 Jul · Shift 2

Let A and B be two 3×3 real matrices such that $(A^2 - B^2)$ is invertible matrix. If $A^5 = B^5$ and $A^3B^2 = A^2B^3$, then the value of the determinant of the matrix $A^3 + B^3$ is equal to :

(A) 2

(B) 4

(C) 1

(D) 0

[Step-by-step solution ► prepwisar.in/questions/wFHI4_CXjD](https://www.prepwisar.in/questions/wFHI4_CXjD)

Q141 JEE Main 2021 · 27 Jul · Shift 1

Let

$$f(x) = \begin{vmatrix} \sin^2 x & -2 + \cos^2 x & \cos 2x \\ 2 + \sin^2 x & \cos^2 x & \cos 2x \\ \sin^2 x & \cos^2 x & 1 + \cos 2x \end{vmatrix}, x \in [0, \pi]$$

. Then the maximum value of $f(x)$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/Krp_W7cRtS](https://www.prepwisar.in/questions/Krp_W7cRtS)

Let

$$M = \left\{ A = \begin{pmatrix} a & b \\ c & d \end{pmatrix} : a, b, c, d \in \{\pm 3, \pm 2, \pm 1, 0\} \right\}$$

. Define $f : M \rightarrow \mathbb{Z}$, as $f(A) = \det(A)$, for all $A \in M$, where $\mathbb{Z}$ is set of all integers. Then the number of $A \in M$ such that $f(A) = 15$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/ppD4O0aAJK](https://www.prepwiser.in/questions/ppD4O0aAJK)

Let a, b, c, d in arithmetic progression with common difference λ . If

$$\begin{vmatrix} x+a-c & x+b & x+a \\ x-1 & x+c & x+b \\ x-b+d & x+d & x+c \end{vmatrix} = 2$$

, then value of λ^2 is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/OHgBZdnV3C](https://www.prepwiser.in/questions/OHgBZdnV3C)

Let $A = [a_{ij}]$ be a 3×3 matrix, where

$$a_{ij} = \begin{cases} 1 & , \quad \text{if } i = j \\ -x & , \quad \text{if } |i - j| = 1 \\ 2x + 1 & , \quad \text{otherwise.} \end{cases}$$

Let a function $f : \mathbb{R} \rightarrow \mathbb{R}$ be defined as $f(x) = \det(A)$. Then the sum of maximum and minimum values of f on $\mathbb{R}$ is equal to:

(A) $-\frac{20}{27}$

(B) $\frac{88}{27}$

(C) $\frac{20}{27}$

(D) $-\frac{88}{27}$

[Step-by-step solution ► prepwiser.in/questions/-pdACNvewT](https://www.prepwiser.in/questions/-pdACNvewT)

Q145 JEE Main 2021 · 18 Mar · Shift 1

The solutions of the equation

$$\begin{vmatrix} 1 + \sin^2 x & \sin^2 x & \sin^2 x \\ \cos^2 x & 1 + \cos^2 x & \cos^2 x \\ 4 \sin 2x & 4 \sin 2x & 1 + 4 \sin 2x \end{vmatrix} = 0, (0 < x < \pi)$$

, are

(A) $\frac{\pi}{12}, \frac{\pi}{6}$

(B) $\frac{\pi}{6}, \frac{5\pi}{6}$

(C) $\frac{5\pi}{12}, \frac{7\pi}{12}$

(D) $\frac{7\pi}{12}, \frac{11\pi}{12}$

[Step-by-step solution ► prepwiser.in/questions/LBTJKnRFFw](https://www.prepwiser.in/questions/LBTJKnRFFw)

Q146 JEE Main 2021 · 17 Mar · Shift 2

If $1, \log_{10}(4^x - 2)$ and $\log_{10}(4^x + \frac{18}{5})$ are in arithmetic progression for a real number x , then the value of the determinant

$$\begin{vmatrix} 2(x - \frac{1}{2}) & x - 1 & x^2 \\ 1 & 0 & x \\ x & 1 & 0 \end{vmatrix}$$

is equal to :

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/MAcLjqtXVV](https://www.prepwiser.in/questions/MAcLjqtXVV)

Q147 JEE Main 2021 · 17 Mar · Shift 2

If x, y, z are in arithmetic progression with common difference d , $x \neq 3d$, and the determinant of the matrix

$$\begin{bmatrix} 3 & 4\sqrt{2} & x \\ 4 & 5\sqrt{2} & y \\ 5 & k & z \end{bmatrix}$$

is zero, then the value of k^2 is :

(A) 72

(B) 12

(C) 36

(D) 6

[Step-by-step solution ► prepwiser.in/questions/3kHcHPrYcm](https://www.prepwiser.in/questions/3kHcHPrYcm)

Q148 JEE Main 2021 · 17 Mar · Shift 2

Let $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ and

$$B = \begin{bmatrix} \alpha \\ \beta \end{bmatrix} \neq \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

such that $AB = B$ and $a + d = 2021$, then the value of $ad - bc$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/Kbb09W1zeH](https://www.prepwiser.in/questions/Kbb09W1zeH)

If

$$A = \begin{pmatrix} 0 & \sin \alpha \\ \sin \alpha & 0 \end{pmatrix}$$

and $\det(A^2 - \frac{1}{2}I) = 0$, then a possible value of α is :

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

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

(C) $\frac{\pi}{2}$

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

[Step-by-step solution ► prepwisser.in/questions/p8fsbGh5xt](https://www.prepwisser.in/questions/p8fsbGh5xt)

Let

$$P = \begin{bmatrix} -30 & 20 & 56 \\ 90 & 140 & 112 \\ 120 & 60 & 14 \end{bmatrix}$$

and

$$A = \begin{bmatrix} 2 & 7 & \omega^2 \\ -1 & -\omega & 1 \\ 0 & -\omega & -\omega + 1 \end{bmatrix}$$

where

 $\omega = \frac{-1+i\sqrt{3}}{2}$, and I_3 be the identity matrix of order 3. If thedeterminant of the matrix $(P^{-1}AP - I_3)^2$ is $\alpha \omega$, then the value of α is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/tqxbN0vEls](https://www.prepwisser.in/questions/tqxbN0vEls)

The maximum value of

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

is :

(A) $\sqrt{5}$

(B) $\frac{3}{4}$

(C) 5

(D) $\sqrt{7}$

[Step-by-step solution ► prepwisser.in/questions/909035_EGa](https://www.prepwisser.in/questions/909035_EGa)

The value of

$$\begin{vmatrix} (a+1)(a+2) & a+2 & 1 \\ (a+2)(a+3) & a+3 & 1 \\ (a+3)(a+4) & a+4 & 1 \end{vmatrix}$$

is :

(A) -2

(B) 0

(C) $(a+2)(a+3)(a+4)$

(D) $(a+1)(a+2)(a+3)$

[Step-by-step solution ► prepwiser.in/questions/AMmj0XtgAc](https://www.prepwiser.in/questions/AMmj0XtgAc)

Let A be a 3×3 matrix with $\det(A) = 4$. Let R_i denote the i^{th} row of A . If a matrix B is obtained by performing the operation $R_2 \rightarrow 2R_2 + 5R_3$ on $2A$, then $\det(B)$ is equal to :

(A) 64

(B) 16

(C) 128

(D) 80

[Step-by-step solution ► prepwiser.in/questions/Hfg4ZX3ZKJ](https://www.prepwiser.in/questions/Hfg4ZX3ZKJ)

Let $\theta = \frac{\pi}{5}$ and

$$A = \begin{bmatrix} \cos \theta & \sin \theta \\ -\sin \theta & \cos \theta \end{bmatrix}$$

.

If $B = A + A^4$, then $\det(B)$:

(A) lies in $(1, 2)$

(B) lies in $(2, 3)$.

(C) is zero.

(D) is one.

[Step-by-step solution ► prepwiser.in/questions/oALd7Nb4IK](https://www.prepwiser.in/questions/oALd7Nb4IK)

Let m and M be respectively the minimum and maximum values of

$$\begin{vmatrix} \cos^2 x & 1 + \sin^2 x & \sin 2x \\ 1 + \cos^2 x & \sin^2 x & \sin 2x \\ \cos^2 x & \sin^2 x & 1 + \sin 2x \end{vmatrix}$$

Then the ordered pair (m, M) is equal to :

(A) $(-3, -1)$

(B) $(-4, -1)$

(C) $(1, 3)$

(D) $(-3, 3)$

[Step-by-step solution ► prepwiser.in/questions/hZ34pmxj-w](https://www.prepwiser.in/questions/hZ34pmxj-w)

Q156 JEE Main 2020 · 5 Sep · Shift 1

If the minimum and the maximum values of the function $f : \left[\frac{\pi}{4}, \frac{\pi}{2}\right] \rightarrow R$, defined by

$$f(\theta) = \begin{vmatrix} -\sin^2\theta & -1 - \sin^2\theta & 1 \\ -\cos^2\theta & -1 - \cos^2\theta & 1 \\ 12 & 10 & -2 \end{vmatrix}$$

are m and M respectively, then the ordered pair (m, M) is equal to :

(A) $(0, 2\sqrt{2})$

(B) $(-4, 0)$

(C) $(-4, 4)$

(D) $(0, 4)$

[Step-by-step solution ► prepwiser.in/questions/N06XzsTaPn](https://www.prepwiser.in/questions/N06XzsTaPn)

Q157 JEE Main 2020 · 5 Sep · Shift 2

If $a + x = b + y = c + z + 1$, where a, b, c, x, y, z are non-zero distinct real numbers, then

$$\begin{vmatrix} x & a + y & x + a \\ y & b + y & y + b \\ z & c + y & z + c \end{vmatrix}$$

is equal to :

(A) $y(b - a)$

(B) $y(a - b)$

(C) $y(a - c)$

(D) 0

[Step-by-step solution ► prepwiser.in/questions/Up-GLNebFr](https://www.prepwiser.in/questions/Up-GLNebFr)

Q158 JEE Main 2020 · 3 Sep · Shift 1

If $\Delta =$

$$\begin{vmatrix} x - 2 & 2x - 3 & 3x - 4 \\ 2x - 3 & 3x - 4 & 4x - 5 \\ 3x - 5 & 5x - 8 & 10x - 17 \end{vmatrix}$$

=

$Ax^3 + Bx^2 + Cx + D$, then $B + C$ is equal to :

(A) -1

(B) -3

(C) 9

(D) 1

[Step-by-step solution ► prepwiser.in/questions/N4zCqlq1wz](https://www.prepwiser.in/questions/N4zCqlq1wz)

Q159 JEE Main 2020 · 9 Jan · Shift 2

Let $a - 2b + c = 1$.

If

$$f(x) = \begin{vmatrix} x+a & x+2 & x+1 \\ x+b & x+3 & x+2 \\ x+c & x+4 & x+3 \end{vmatrix}$$

, then:

(A) $f(50) = 1$

(B) $f(-50) = -1$

(C) $f(50) = -501$

(D) $f(-50) = 501$

[Step-by-step solution ► prepwisser.in/questions/lkQrMy2Dfg](https://www.prepwisser.in/questions/lkQrMy2Dfg)

Q160 JEE Main 2020 · 7 Jan · Shift 2

Let $A = [a_{ij}]$ and $B = [b_{ij}]$ be two 3×3 real matrices such that $b_{ij} = (3)^{(i+j-2)}a_{ji}$, where $i, j = 1, 2, 3$. If the determinant of B is 81, then the determinant of A is:

(A) 3

(B) $\frac{1}{3}$

(C) $\frac{1}{9}$

(D) $\frac{1}{81}$

[Step-by-step solution ► prepwisser.in/questions/To4cZnwf6k](https://www.prepwisser.in/questions/To4cZnwf6k)

Cramer's Rule · 4 PYQs

Q161 JEE Main 2024 · 9 Apr · Shift 2

Consider the matrices :

$$A = \begin{bmatrix} 2 & -5 \\ 3 & m \end{bmatrix}, B = \begin{bmatrix} 20 \\ m \end{bmatrix}$$

and

$$X = \begin{bmatrix} x \\ y \end{bmatrix}$$

. Let the set of all m , for which the system of equations $AX = B$ has a negative solution (i.e., $x < 0$ and $y < 0$), be the interval (a, b) . Then $8 \int_a^b |A| dm$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/IuGmC8xtK1](https://www.prepwisser.in/questions/IuGmC8xtK1)

Q162 JEE Main 2022 · 24 Jun · Shift 2

Let the system of linear equations

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

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

$$x + 2z = 1$$

have a unique solution (x^*, y^*, z^*) . If $(\alpha, x^*), (y^*, \alpha)$ and $(x^*, -y^*)$ are collinear points, then the sum of absolute values of all possible values of α is

(A) 4

(B) 3

(C) 2

(D) 1

[Step-by-step solution ► prepwisser.in/questions/vYyT8_zulk](https://www.prepwisser.in/questions/vYyT8_zulk)

Q163 JEE Main 2021 · 26 Aug · Shift 1

Let $\theta \in (0, \frac{\pi}{2})$. If the system of linear equations

$$(1 + \cos^2 \theta)x + \sin^2 \theta y + 4 \sin 3\theta z = 0$$

$$\cos^2 \theta x + (1 + \sin^2 \theta)y + 4 \sin 3\theta z = 0$$

$$\cos^2 \theta x + \sin^2 \theta y + (1 + 4 \sin 3\theta)z = 0$$

has a non-trivial solution, then the value of θ is :

(A) $\frac{4\pi}{9}$

(B) $\frac{7\pi}{18}$

(C) $\frac{\pi}{18}$

(D) $\frac{5\pi}{18}$

[Step-by-step solution ► prepwisser.in/questions/EEdTnmz6sz](https://www.prepwisser.in/questions/EEdTnmz6sz)

Q164 JEE Main 2021 · 25 Feb · Shift 2

The following system of linear equations

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

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

$$x - y + 4z = 8$$

(A) does not have any solution

(B) has a solution (α, β, γ) satisfying $\alpha + \beta^2 + \gamma^3 = 12$

(C) has a unique solution

(D) has infinitely many solutions

[Step-by-step solution ► prepwisser.in/questions/UVTVkcL_ki](https://www.prepwisser.in/questions/UVTVkcL_ki)

Minors and Cofactors · 2 PYQs

Q165 JEE Main 2025 · 29 Jan · Shift 1

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 :

- (A) 288
- (B) 262
- (C) 222
- (D) 242

[Step-by-step solution ► prepwisser.in/questions/SNhWtWJKDD](https://www.prepwisser.in/questions/SNhWtWJKDD)

Q166 JEE Main 2024 · 5 Apr · Shift 2

Let $\alpha\beta \neq 0$ and

$$A = \begin{bmatrix} \beta & \alpha & 3 \\ \alpha & \alpha & \beta \\ -\beta & \alpha & 2\alpha \end{bmatrix}$$

. If

$$B = \begin{bmatrix} 3\alpha & -9 & 3\alpha \\ -\alpha & 7 & -2\alpha \\ -2\alpha & 5 & -2\beta \end{bmatrix}$$

is the matrix of cofactors of the elements of A , then $\det(AB)$ is equal to :

- (A) 64
- (B) 343
- (C) 125
- (D) 216

[Step-by-step solution ► prepwisser.in/questions/cs6wFBRvVf](https://www.prepwisser.in/questions/cs6wFBRvVf)

Answer key — Determinants

Numbers match the question numbers above. For full working, open the solution link under each question.

1	A	2	C	3	A	4	B	5	D	6	C	7	C	8	B
9	D	10	D	11	B	12	D	13	38	14	C	15	C	16	A
17	B	18	B	19	D	20	C	21	D	22	B	23	A	24	B
25	B	26	A	27	24	28	D	29	A	30	D	31	B	32	D
33	B	34	D	35	D	36	C	37	C	38	D	39	C	40	D
41	B	42	C	43	B	44	B	45	58	46	D	47	B	48	C
49	C	50	D	51	B	52	C	53	D	54	B	55	5	56	A
57	5	58	A	59	D	60	B	61	A	62	B	63	C	64	D
65	C	66	21	67	C	68	D	69	B	70	3	71	B	72	B
73	D	74	C	75	5	76	C	77	B	78	C	79	B	80	B
81	A	82	13	83	C	84	D	85	38	86	44	87	D	88	A
89	7	90	B	91	D	92	C	93	D	94	B	95	B	96	C
97	B	98	A	99	C	100	14	101	C	102	B	103	C	104	4
105	108	106	16	107	C	108	A	109	36	110	B	111	C	112	D
113	A	114	34	115	14	116	D	117	A	118	B	119	C	120	27
121	B	122	C	123	C	124	D	125	D	126	C	127	A	128	6
129	B	130	B	131	B	132	A	133	4	134	42	135	A	136	B
137	C	138	C	139	B	140	D	141	6	142	16	143	1	144	D
145	D	146	2	147	A	148	2020	149	A	150	36	151	A	152	A
153	A	154	A	155	A	156	B	157	B	158	B	159	A	160	C
161	450	162	C	163	B	164	C	165	D	166	D				

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