EngineeringRise

Adjoint, inverse and linear systems

Formulas and units, JEE Main. Status: Reviewed on 2026-11-20.

Result	Formula	Units or note
Adjoint	adj A = transpose of the cofactor matrix Valid when: square matrix A	dimensionless
Key identity	A (adj A) = (adj A) A = (det A) I Valid when: square matrix A of any order	dimensionless
Inverse	A^(-1) = adj A / det A, defined if det A is not 0 Valid when: square matrix with det A not equal to 0	dimensionless
2 x 2 inverse	inverse of [[a,b],[c,d]] = (1/(ad - bc)) [[d,-b],[-c,a]] Valid when: 2 x 2 matrix with ad - bc not equal to 0	dimensionless
Determinant of adjoint	det(adj A) = (det A)^(n-1) Valid when: n x n matrix	dimensionless
Adjoint of a scalar multiple	adj(kA) = k^(n-1) adj A Valid when: n x n matrix, any scalar k	dimensionless
Inverse of a product	(AB)^(-1) = B^(-1) A^(-1); det(A^(-1)) = 1 / det A Valid when: A and B invertible, same order	dimensionless
Solving AX = B	det A not 0: X = A^(-1) B; for XA = B: X = B A^(-1) Valid when: A invertible; the inverse goes on the same side as A	dimensionless
Homogeneous system	AX = 0 has a non-trivial solution if and only if det A = 0 Valid when: square system (as many equations as unknowns)	dimensionless

Full lesson with worked examples:
https://www.engineeringrise.in/learn/learn/jee-main/mathematics/matrices-and-determinants/adjoint-inverse-and-linear-systems

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