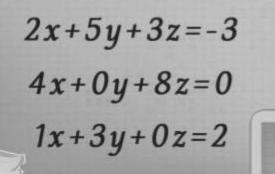
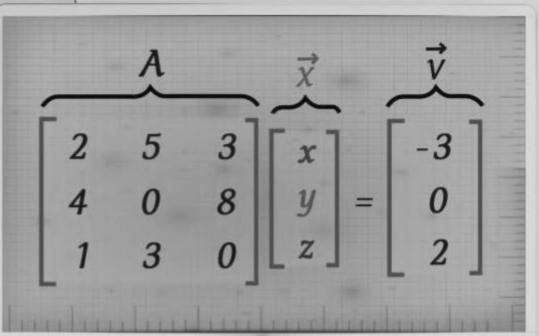
Welcome to



Matrices & Determinants





 $A^{-1}A = 1$ 

## Table of contents

Session 01	03	Session 04	64	Session 08	141
Introduction	04	Co-factor of an Element	65	Properties of Inverse of Matrix	143
Order of Matrix	08	Value of 3 x 3 Matrix Determinant	67		
<u>Types of Matrices</u>	09	Value of Determinant in terms of Minor and Cofactor	69	Cossion 00	163
Principal Diagonal of Matrix	15	Properties of Determinant	74	Session 09	103
Trace of Matrix	16	Session <b>05</b>	81	Inverse of a Matrix by elementary transformations	164
<u>Types of Matrices</u>	18	Properties of Determinant	82	System of Linear Equations	175
Session 02	27	Properties of Determinant	87	Cramer's Rule	179
Algebra of Matrices	28	Some important Formulae	97		2 <del>00</del> 4 52
Properties of Addition/ Subtraction of Matrices	32	Session 06	98	Session 10	190
Matrix Multiplication	34	Some important Determinants	99	<u>Cramer's Rule</u>	195
Properties of Matrix	37	Product of Two Determinants	103	System of Linear Equations(	203
Multiplication  Device of a Servera Matrix	41	Application of Determinants	107	Matrix Inversion)	
<u>Power of a Square Matrix</u>	41	<u>Differentiation of Determinant</u>	112	<u>Homogeneous System of</u> Linear Equations( Matrix	206
Session 03	48	Integration/ Summation of Determinant	114	Inversion)	
Polynomial Equation in Matrix	45	Coopies OT	119		
<u>Transpose of a Matrix</u>	47	Session 07	119	Session 11	208
Symmetric and Skew	51	Singular/Non-Singular Matrix	120		200
Symmetric Matrices		Cofactor Matrix & Adjoint Matrix	121	Characteristic Polynomial and Characteristic Equation	209
Properties of Trace of a Matrix	60	Properties of Adjoint Matrix	124		210
<u>Determinants</u>	62	<u>Inverse of a Matrix</u>	134	<u>Cayley-Hamilton Theorem</u>	
Minor of an element	63	Matrix Properties	138	Special Types of Matrices	216







• A rectangular arrangement of  $m \cdot n$  numbers (real or complex) or expressions (real or complex valued), having m rows and n columns is called a matrix.  $(m, n \in N)$ 

$$A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \cdots a_{1n} \\ a_{21} & a_{22} & a_{23} \cdots a_{2n} \\ \vdots & \vdots & \vdots \\ a_{m1} & a_{m2} & a_{m3} \cdots a_{mn} \end{bmatrix}$$
Rows

Columns

• An element of a matrix is denoted by  $a_{ij}$ : Element of  $i^{th}$  row &  $j^{th}$  column.



• A rectangular arrangement of  $m \cdot n$  numbers (real or complex) or expressions (real or complex valued), having m rows and n columns is called a matrix.  $(m, n \in N)$ 

$$A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \cdots a_{1n} \\ a_{21} & a_{22} & a_{23} \cdots a_{2n} \\ \vdots & \vdots & \vdots \\ a_{m1} & a_{m2} & a_{m3} \cdots a_{mn} \end{bmatrix}$$

$$\uparrow \qquad \uparrow \qquad \uparrow \qquad \uparrow$$

$$\uparrow \qquad \uparrow \qquad \uparrow$$

$$\downarrow \qquad \uparrow \qquad \downarrow$$

- Number of elements in a matrix
  - = Number of rows x Number of columns
  - $= m \times n$