Matrix: A matrix is a nectengular armay of numbers (neal on complex) enclosed by a pain of Brockets and the numbers in the armay are called the entities on the elements of the matrix.

of the form Tan are and is called a matrix

Rectangulari matrinic

If the numbers of trow and columns are not the same the matrix is called a rectangular matrix. [1 23]

Square matrix!

If the trow and columns are same.

made windows and in the state of the

Diagonal Matning-

$$\begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{bmatrix}$$

A squarre matrix whose elements a ij=0 if 1+j is called diagonal matrix.

$$\beta = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 4 & 0 \\ 0 & 0 & 3 \end{bmatrix}$$

Identity matrin: A square matrin whose elements aij=0 if i*=j and aij=1 if i=j is called the identity matrix on unit matrix.

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

Zerro colled a null matrix on Zerro matrix.

if ATEA.

$$A = \begin{bmatrix} 1 & 4 & 3 \\ 4 & 2 & 6 \\ 3 & 6 & 3 \end{bmatrix}$$

Skew-Symetric Motrinie A matrin un is called Skew-symetric if AT -A

$$A^{T} = \begin{bmatrix} 0 & -1 & 2 \\ 1 & 0 & -5 \\ -2 & 3 & 0 \end{bmatrix} = -\begin{bmatrix} 0 & 1 & -2 \\ -1 & 0 & 3 \\ 2 & -3 & 0 \end{bmatrix}$$

Hen milian matrix: If a matrix "A" is A-A" (A)"
Then it is called hermitian matrix

$$A = \begin{pmatrix} 2 & 2-3i & 3 \\ 2i & 3i & 5 & i+1 \\ 3 & 1-i & 0 \end{pmatrix}$$

$$A = \begin{pmatrix} 2 & 2+3i & 3 \\ 2-3i & 5 & 1-i \\ 3 & 1+i & 0 \end{pmatrix}$$

$$A = \begin{pmatrix} 2 & 2+3i & 3 \\ 2+3i & 5 & 1+i \\ 3 & 1-i & 0 \end{pmatrix}$$

$$A = A$$

Skew Herr mition matrix $A = -A^{*} = -(\bar{A})^{+}$

$$A = \begin{pmatrix} 2i & 2-3i & 3 \\ -2-3i & 5i & 1+i \\ -3 & -1+i & 0 \end{pmatrix}$$

$$\bar{A} = \begin{pmatrix}
-2i & 2+3i & 3 \\
-2+3i & -5i & -4 \\
-3 & -1-1 & 0
\end{pmatrix}$$

$$(\bar{A})^{T} = \begin{pmatrix}
-2i & -2+3i & -3 \\
2+3i & -5i & -4-1 \\
3 & 1-1 & 0
\end{pmatrix}$$

$$-(\bar{A})^{T} = \begin{pmatrix}
2i & 2+3i & 3 \\
-2-3i & 5i & 4+i \\
3 & -1+i & 0
\end{pmatrix}$$

Onthogonal Mathing A real square mathin with be A is said to be onthogonal if AAT = ATA=I

CS CamScanner

Idempetent matrix A square matrix A is called an idempetent matrix if A=A.

Nilpotent mother. A square A is called a nelpotent matrix of order n it An=0 and An-1+0 where n is positive integer and 0 is the null matrix.

Unitaly matrix: AA = A A = I where A = (A) T.

5,1

again,
$$(A^T)^T = [ajj]^T = [aij] = A$$

Where,
$$i = 1, 2, ... m$$
 $j = 1, 2, ... n$

Now,
$$(A+B)^T = C^T = [Cij]^T$$

$$= [Oji] + [bji]$$

$$= A^T + B^T$$

$$(AB)^T = B^T A^T$$

ereth iggain:

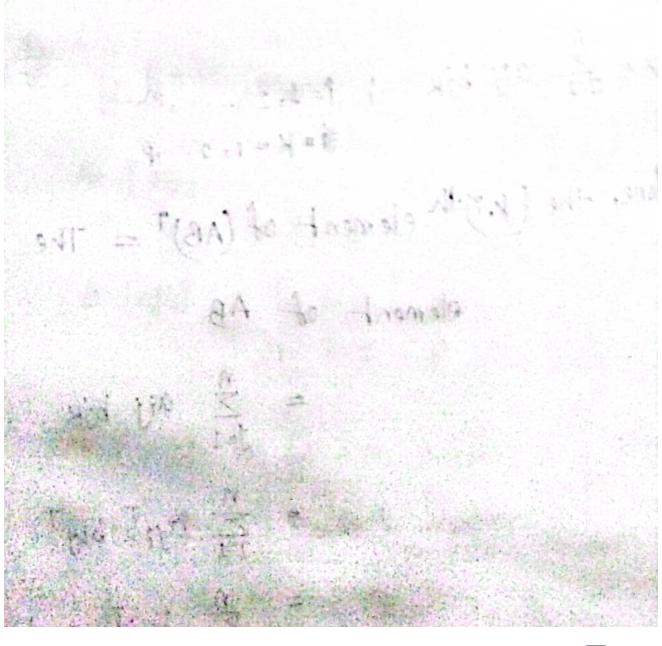
Therefore, the (k, i)th element of (AB) - The (i. K)th

$$= \sum_{j=1}^{n} a_{ij} b_{jk}$$

$$= \sum_{j=1}^{n} b_{ij} \Gamma a_{ji} \Gamma$$

Singular and Non-Singular Matrix

$$A^{-1} = \frac{1}{|A|} Aij IAI$$



Page: 1992

Date: 10/06/23

Poll + dass: 03

Eumple 126)

step:

$$= 0 - (-3)$$

= 3

$$C(1,2) = (-1)^{1+2} \begin{vmatrix} 4 & -1 \\ 3 & 2 \end{vmatrix}$$

$$C(2,1) = -5$$
 $C(2,2) = -5$
 $C(2,3) = -9$
 $C(3,1) = 1$
 $C(3,2) = 4$

cononical form.

Matrin =
$$A = \begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} .$$

Now,

$$= \begin{bmatrix} 1 & 3 & 0 & 1 \\ 0 & -1 & 1 & -2 \end{bmatrix} \rightarrow R_1' = R_1 + 3R_2$$

$$\begin{bmatrix}
A & J_{L} \\
 \end{bmatrix} = \begin{bmatrix}
 1 & 0 & | & 3 & -5 \\
 0 & -1 & | & 1 & -2
\end{bmatrix} - P_{L} = P_{L} x_{-1} x_{-1} \\
 = \begin{bmatrix}
 1 & 0 & | & 3 & -5 \\
 0 & | & 1 & 2
\end{bmatrix}$$

Proving:

$$\binom{25}{13}\binom{3}{-12}$$

$$= \begin{pmatrix} 6-5 & -10+10 \\ 3-3 & -5+6 \end{pmatrix}$$

(Proved)

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Enample 17 - Solve the Unear Egyation

Solution!

rethod +

From, 2m+y=1 N-2y=3

$$\begin{pmatrix} 2 & 1 \\ 1 & -2 \end{pmatrix} \begin{pmatrix} y \\ y \end{pmatrix} = \begin{pmatrix} 1 \\ 3 \end{pmatrix}$$

मवसमम वाम जावर THE STA DEL MISHEL ATA.X = ATL [ESTAULT TANALISE]

IX = A-1L

first we have to find the A-1

here,
$$A^{-1} = \begin{bmatrix} \frac{2}{5} & \frac{1}{5} \\ \frac{4}{5} & \frac{-2}{5} \end{bmatrix}$$

Hence. From equi)

$$\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} \frac{2}{5} & \frac{1}{5} \\ \frac{4}{5} & \frac{-2}{5} \end{pmatrix} \begin{pmatrix} 1 \\ 3 \end{pmatrix}$$

$$=$$
 $\left(\begin{array}{cc} \frac{2}{5} & \frac{2}{5} \\ \frac{1}{5} & -\frac{6}{5} \end{array}\right)$

$$=\left(\begin{array}{c}1\\-1\end{array}\right)$$

Hence,

An

Pank of a Matrix - Bye = 159 1 Echelon Matrin frot zene element of their rout marist Trail to more the following the $\begin{pmatrix}
0 & 0 & 3 & -2 \\
0 & 0 & 0 & 3 & 1 \\
0 & 0 & 0 & 4
\end{pmatrix}$ $\begin{pmatrix}
0 & 0 & 2 & 3 \\
0 & 0 & 0 & 4 \\
0 & 0 & 0 & 3
\end{pmatrix}$ [Echelon Matrin] [Nin Echelon Matrin] Page: 171] Frample 4 $A = \begin{pmatrix} 1 & 2 & -1 & 21 \\ 2 & 4 & 1 & -23 \\ 3 & 6 & 2 - 65 \end{pmatrix} \rightarrow \text{ find the}$ row echelon from.

$$\begin{pmatrix}
1 & 2 & -1 & 2 & 1 \\
0 & 0 & 3 & -6 & 1 \\
0 & 0 & 5 & -12 & 2
\end{pmatrix}$$

This Matrin is in Echolon John.

Mow Reduce echolon form:

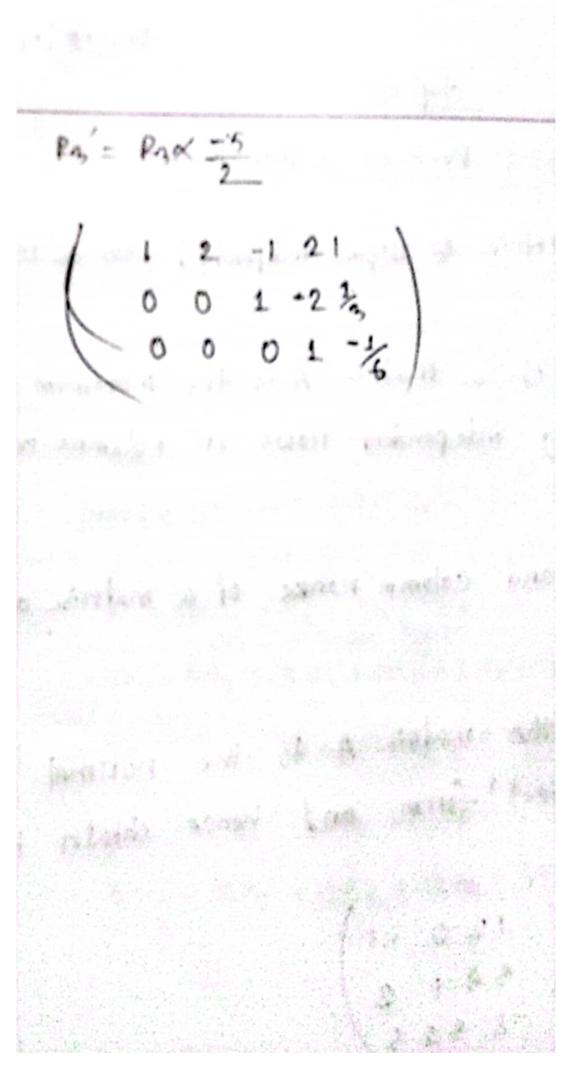
AZZITIAT AN MOST RETTO FORM ON 1 23AZ

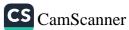
From eq (A)

$$\begin{pmatrix} 1 & 2 & -1 & 21 \\ 0 & 0 & 1 & -2 & 1 \\ 0 & 0 & 1 & \frac{-12}{5} & \frac{2}{5} \end{pmatrix}$$

P3 = P3-P2

$$\begin{pmatrix} 1 & 2 & -1 & 2 & 1 \\ 0 & 0 & 1 & -2 & \frac{1}{5} \\ 0 & 0 & 0 & \frac{-2}{5} & \frac{1}{15} \end{pmatrix}$$





Page: 199 Park of a Matrix

on Ponk.

The trank of a Matrin A is the Marimum Humbs of linearly independent rows or columns in the matrin,

The row and column ranks of a matrin are equal.

trank.

$$A = \begin{pmatrix} 12.0 & -1 \\ 34.1 & 2 \\ -2.325 \end{pmatrix}$$

5017:

The canonical form of the given matrix.

Hence the mank of the given matrix is 3.

Enample 72 - A JEBY STINTER: HUNK.

 $x_{1}+2x_{2}+3x_{3}+4x_{4}+5x_{5}=1$ $2x_{1}+3x_{2}+4x_{3}+5x_{4}+6x_{5}=-1$ $3x_{1}+3x_{2}+6x_{3}+7x_{4}+4x_{5}=2$ $4x_{1}+7x_{2}+6x_{3}+7x_{4}+6x_{5}=1$ $5x_{1}+8x_{2}+9x_{3}+10x_{4}+3x_{5}=3$