Course Outcome: Students will have understanding about existence of inverse, Crouss-Jordan method to bind the inverse of square matrices and transpose of matrices.

Existence of Inverse:

Inverse et a squeere matrix À exist it it it es monsingular i.e. (AI) ‡0. It is denoted by AT!.

It a square matrix has bull set et pivots, then it is monsingular. So, inverse et a square matrix exist it it has bull set et pivots.

Era :
$$A = \begin{bmatrix} 3 & 4 \end{bmatrix}$$
.

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

Minor of $A = M = \begin{bmatrix} 2 & 3 & 4 \end{bmatrix}$

Coboctor of $A = C = \begin{bmatrix} 4 & -3 & 4 \end{bmatrix}$

Adjoint of $A = C = \begin{bmatrix} 4 & -3 & 4 \end{bmatrix}$
 $A = \begin{bmatrix} 1 & 4 & 4 \end{bmatrix}$
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Ex: A= [a b]

1A1 = ad - bc \$0

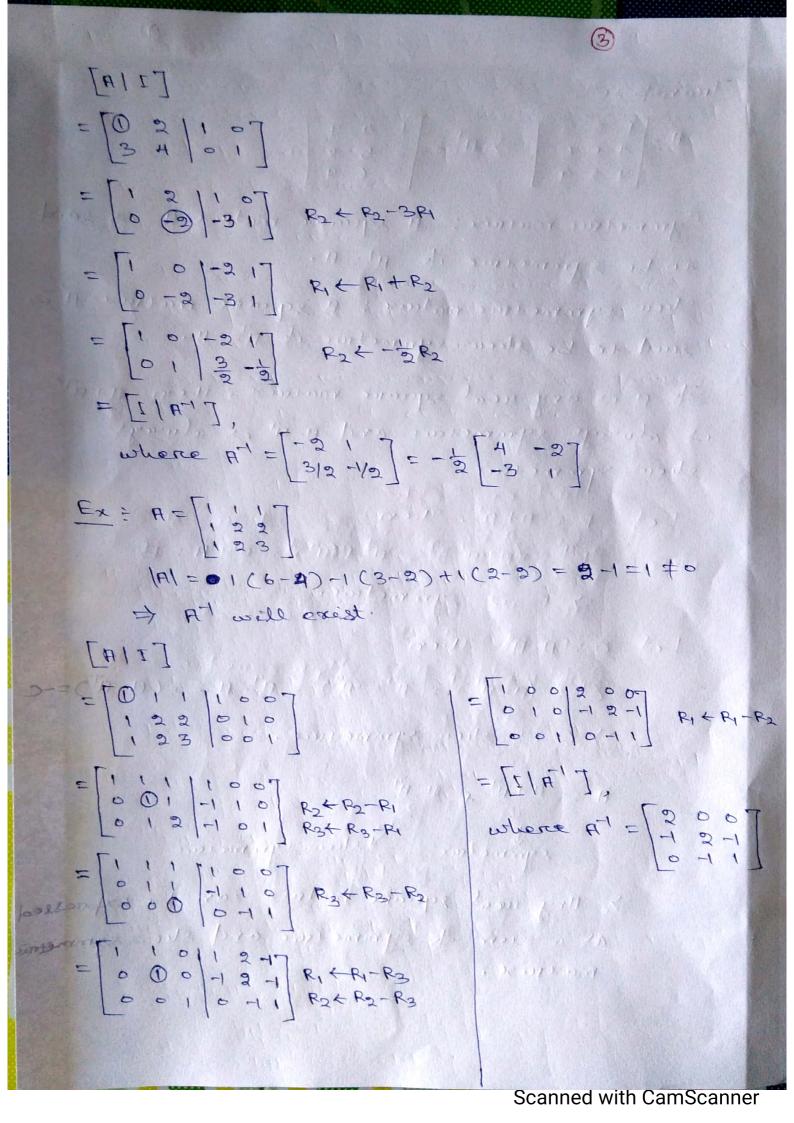
minor of $R = M = \begin{bmatrix} d & c \end{bmatrix}$ coborton of $R = C = \begin{bmatrix} d & -c \end{bmatrix}$

coboctor of A = c = [d -c]

Adj. A = cT = [d -b]

-c a]

 $H^{-1} = \frac{Adj \cdot A}{|A|} = \frac{1}{ad-bc} \begin{bmatrix} al -b \\ -c & a \end{bmatrix}$



$$\dot{A} = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

$$\dot{A}^T = \begin{bmatrix} 1 & 4 & 7 \\ 2 & 5 & 8 \\ 3 & 6 & 9 \end{bmatrix}.$$

Symmetric matrix: A square matrix À is said to be symmetric it AT=A.

Show-eymmetric matrix: A square matrix A is soud to be show-symmetric it AE-A.

9t A is any roal square matrix, then A+AT is always show-symmetric.

Let $B = A + A^T$. Then $B^T = (A + A^T)^T = A^T + (A^T)^T = A^T + A = B$ $\Rightarrow B \Rightarrow symmetric.$

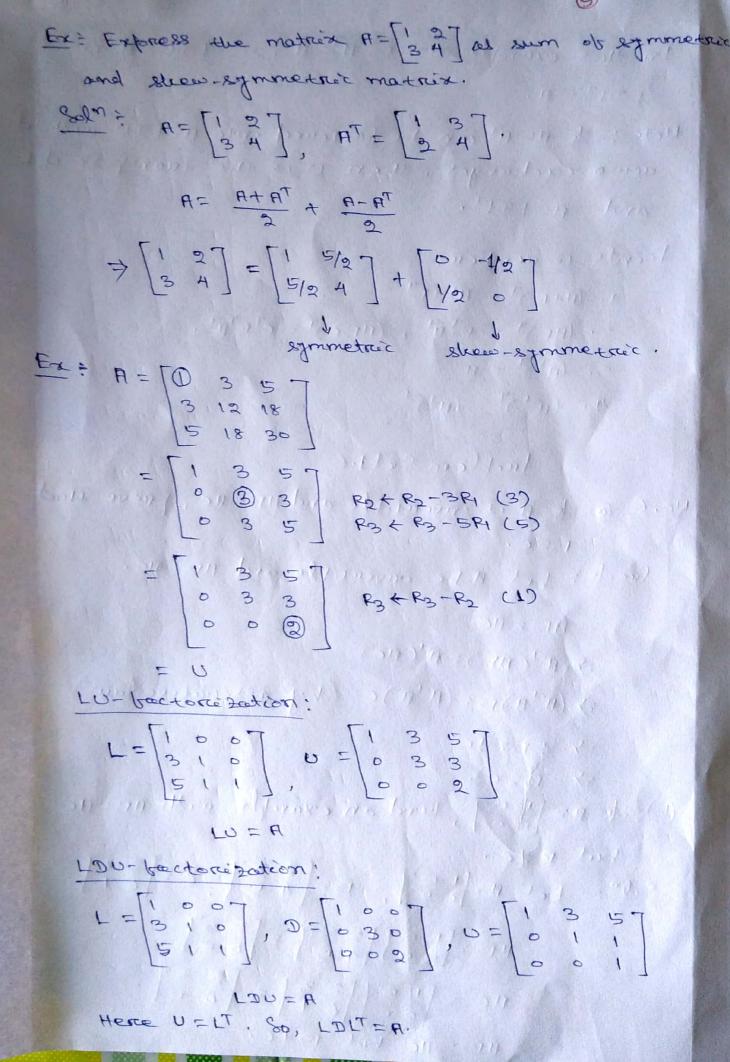
Let C=A-AT. Then

 $C^{T} = (A - A^{T})^{T} = A^{T} - (A^{T})^{T} = A^{T} - A = -(A - A^{T}) = -C$ $\Rightarrow C \text{ is show-expression}.$

A = A+AT + A-AT

Symmetric & Shew-Symmetric

Any real square matrix can be expressed as a sum of symmetric and shew-symmetric matrix.



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Mote: 9/ A=AT can be factored into A=LDU without now o exchanges, then U is the transpose of L and A=LDLT.

Points to rember:

Problem Set 1.6

Mo. 6. @ 3/ A is invertible and AB=AC, prove that
B=C.

Proof: Let A be invertible and AB = AC.

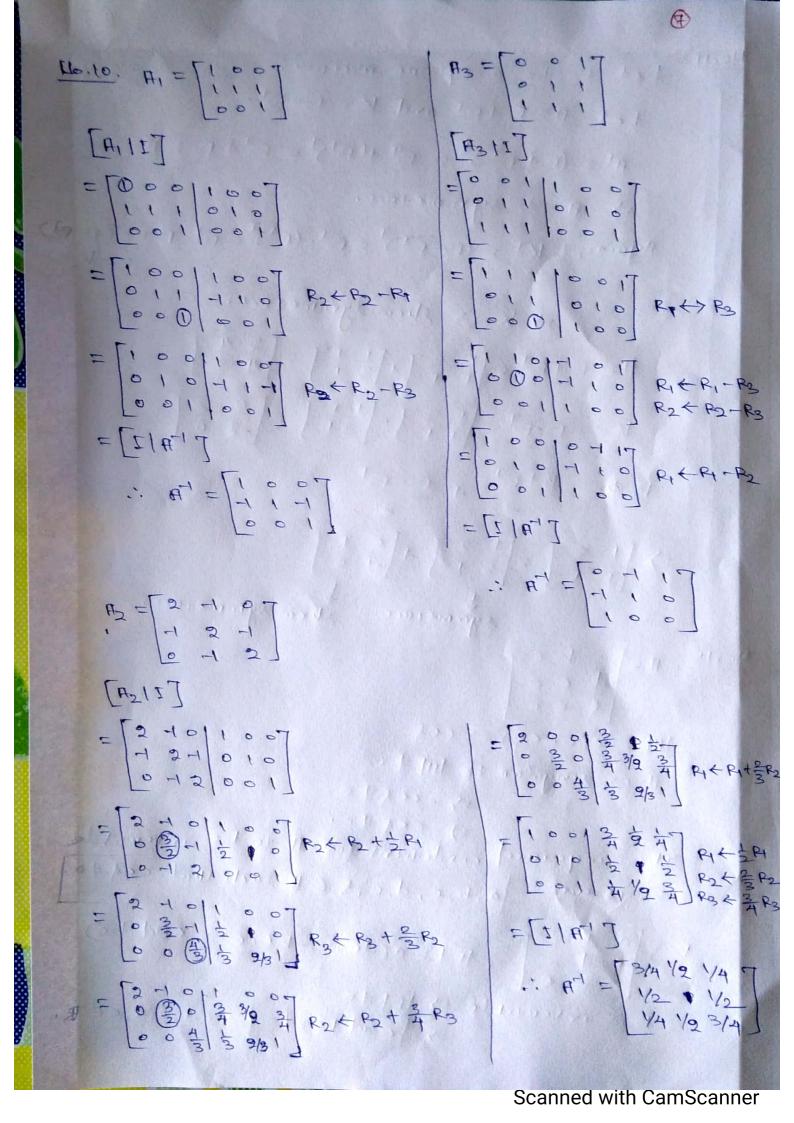
AB = AC

6) 3/5 A=[00], beind on example with AB=AC
but B #C.

$$Sol^n = Let A = [00], B = [00], C = [00]$$

AB = AC but B + C.

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Let B be a square matrix. Let A = B + BT and K = B - BT. AT = (B+BT) = BT+(BT) = BT+B=A A is symmetric. Agen, KT = (B-BT) = BT-(BT) = BT-B = - (B-BT) > K is show-symmetric. R= B+BT = [1 3] + [3 1] = [2 4] K = B-BT = [13] = [-20] B = B+BT + B-BT 7 [3] = [2] + [-1 0] symmetrice shew-symmetrice. 1A1 = c(0-ex) =- cex A is singular it IAI + 0 => -cef +0 = cef +0. The required conditions for A to be invertible a, b, c, d, e, & ER such that cet to D corre B=[a b o] e d o], 131 = a(de-o)-b(ce) = e(ed-bc) B is invertible > 1B1 to > [e (od-bo) to], a,b,c,d,eER

H+B = / 1

A+B is not invertible although A and B are invertible.

A+B= [0]

A+B is invertible although A and B are not in vertable.

All of A, B and A+B are invertible.

For c=0, 2,7, the matrix is not invertible, as for these three values of a the daterminant of the marrix is sono.

C=0 => Ferro coliemn (00 Ferro Do row).

c=2 > identical rows

c= 7 > identical columns.