+ ULTIMATE MATHE MATIES - (BY: AJAY MITTAL) Pay=1

Solutions of M-3 (Matrices)

DNI 1 A =
$$\begin{bmatrix} -1 & 2 & 3 \\ 5 & 7 & 9 \end{bmatrix}$$
 B = $\begin{bmatrix} -4 & 1 & -5 \\ 1 & 2 & 0 \\ 1 & 3 & 1 \end{bmatrix}$

(ii)
$$A-B = \begin{bmatrix} 3 & 1 & 8 \\ 4 & 5 & 9 \\ -3 & -2 & 0 \end{bmatrix}$$

$$(A-13)^{1} = \begin{bmatrix} 3 & 4 & -3 \\ 1 & 5 & -2 \\ 8 & 9 & 0 \end{bmatrix}$$

$$A' = \begin{bmatrix} -1 & 5 & -2 \\ 2 & 7 & 1 \\ 3 & 9 & 1 \end{bmatrix}$$

$$B^{1} = \begin{bmatrix} -4 & 1 & 1 \\ 1 & 2 & 3 \\ -5 & 0 & 1 \end{bmatrix}$$

$$A^{1} - B^{1} = \begin{cases} 3 & 4 & -3 \\ 1 & 5 & -2 \\ 8 & 9 & 0 \end{cases}$$

(i) oo yousey

$$\begin{bmatrix}
9 & 12 & 8 \\
-47 & 46 & -16 \\
10 & 3 & 11
\end{bmatrix}$$

$$(A13)' = \begin{pmatrix} 9 & -41 & 10 \\ 12 & 46 & 3 \\ 8 & -16 & 11 \end{pmatrix}$$

$$3' = \begin{bmatrix} -4 & 1 & 1 \\ -7 & 2 & 3 \end{bmatrix} \qquad 2 \quad A' = \begin{bmatrix} -1 & 5 & -2 \\ 2 & 7 & 1 \\ 3 & 9 & 1 \end{bmatrix}$$

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$$B^{\dagger}A^{\dagger} = \begin{pmatrix} -1 \\ 2 \\ 1 \end{pmatrix} \begin{pmatrix} -1 & 4 & 3 \\ 1 & 1 & 3 \end{pmatrix}$$

$$8^{1}A^{1} = \begin{bmatrix} 1 & -4 & -3 \\ -2 & 8 & 6 \\ -3 & 4 & 3 \end{bmatrix}$$

(M-3) Solutions

ONS3+ Glum
$$A = \begin{bmatrix} 1 & 5 \\ 6 & 7 \end{bmatrix}$$

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

(i) let
$$P = A + A^{\dagger}$$

$$P' = \begin{bmatrix} 2 & 11 \\ 11 & 14 \end{bmatrix}$$

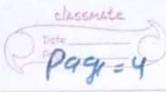
(i)
$$w = 0 = A - A^{1}$$

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

$$\begin{bmatrix} 2 \cos x & 0 \\ 0 & 2 \cos x \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$O_{1} = \begin{cases} G_{1} & G_{1} \\ G_{2} & G_{1} \\ G_{2} & G_{1} \end{cases}$$

(M-3) Solutions

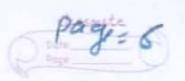


(M-3) solutions



ON 6 + DO youry (Same as ar NO 5)
ON: 7 = gruen A'= A and B'= B
(1) LU P=AB+BA
$P' = (AB + BA)^{\dagger}$
7 P'= (AB) + (BA)
PIEBAI + A'B'
- pl= BA + A13 { Sicen }
-> PI = AB+BA
=> pl=P
: Paa Symm. Matrix
(ii) U+ O= AB-BA
-9 O' = (AB - BA)'
= O = (AB)' - (BA)'
P 0 = B/A - A'B'
= 0 = BA - AB (91un)
$\Rightarrow 0' = -(AB - BA)$
7 01 = -0
: O u a slaw-symm Matrix
ON. 8 to Case I le A > Symm. Matrix
=> Al=A
Lut P= B! AB
$=PP'=(B^{\dagger}AB)'$
A PI = B' A' B
= P1_ BI AB (91ren= Al=A)
= PI=P
= P > Symm Maky
Can I let A - Slaw symm Mahn

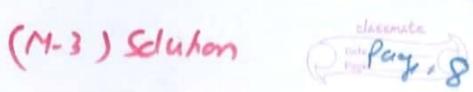
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ter O= B'AB
= 01 = (B' AB)
$\Rightarrow O' = B'A'B$
=> a' = B' (-A)B (91un A' = -A)
$\Rightarrow \alpha l = -BlAB$
a 0 = -0
i- O a a slaw symm Matry Am
ONI 9 > 914m A= O 24 Z X Y -Z X -Y Z
$A = \begin{bmatrix} 0 & y & x \\ 2y & y & -y \end{bmatrix}$
2-2-2
91 cm A'A = I
$= \begin{cases} 0 \times 1 \\ 29 & 4 \end{cases} = \begin{cases} 0 & 29 \\ 29 & 4 \end{cases} = \begin{cases} 1 & 0 & 0 \\ 0 & 1 & 0 \end{cases}$
29 9 -9 x y -Z = 0 0
Z-Z Z] X -Y Z] 00 1
7 [242 007 [106]
$\begin{bmatrix} 0 & 6y^2 & 0 & = & 0 & 1 & 0 \\ 0 & 6 & 3z^2 & 0 & 0 & 1 \end{bmatrix}$
= 2x2=1 = x2=1 = x= ±1/2
8y2=1 = 4 4 = 1/2 = 1/2
322=1 = 22=1/3 = 2= ±1/3 Ang
$Omlo > 9ren A = \begin{cases} 1 & 2 & 2 \\ 2 & 1 & -2 \\ a & 2 & 6 \end{cases}$
$A^{\dagger} = \begin{bmatrix} 1 & 2 & q \\ 2 & 1 & 2 \\ 2 & -2 & 5 \end{bmatrix}$
91 m AA = 9I

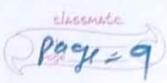
(M-3) selutions Pay, 2

elassmate



	8.8
04	2 + 91cm A'= A and B'= B
and the same of th	case I gian AB=DA
	To pray AB -> Symm Makey
	lu P= AB
	$\Rightarrow P = (AB)$
	-> PI= BIAI
	-7 Pl- BA (91cm)
	= P1 = AB (91 cm)
	=P P1=P
	= P - Tymm Mafra
(onversely Sicen, AD -+ Symm Marky
	I-P AB=BA
	we have AB es a symm Making
	=P (AB) = AB
	= BIAL AB
	=> BA = AB (Sinen)
	= A one B commule proved
On B	*i) Sum A > Symm Making
	A A = A(i)
	also Trun A - Slew Symm Marry
	- Al= -A - (")
	Fan (1/2(2)
	A = -A
	7 A1A=0
	A 2A = 0 A B a NULL makes Are
	a [A-0] is A es q Null mation And
7551	9 12-1
(ii)	91cm A2 = A (P+A)3-7A
The same of the same of	

(14-3) Schuhon



$$= (I+A)(I+A)(I+A) - 7A$$

$$= (I+A+A+A^{2})(I+A) - 7A$$

$$= (I+A+A+A^{2})(I+A) - 7A - - (5)un_{A^{2}=A}$$

$$= (I+3A)(I+A) - 7A$$

$$= I+A + 3A + 3A^{2} - 7A$$

$$= I+A + 3A + 73A - 7A - - (5)un_{A^{2}=A}$$

$$= I+A - 7A$$

$$= I+O$$

$$\begin{array}{l} (A - I)^{3} + (A + I)^{3} - 7A \\ = (A - I)(A - I)(A - I) + (A + I)(A + I)(A + I) - 7A \\ = (A^{2} - A - A + I)(A - I)t(A^{2} + A + A + I)(A + I) - 7A \\ = (I - 2A + I)(A - I) + (I + 2A + I)(A + I) - 7A \\ = (2I - 2A)(A - I) + (2I + 2A)(A + I) - 7A \\ = (2I - 2A)(A - I) + (2I + 2A)(A + I) - 7A \\ = 2A - 2I - 2A^{2} + 2A + 2A + 2I + 2A^{2} + 2A - 7A \\ = 2A - 2I - 2I + 2A + 2A + 2I + 2I + 2A - 7A \\ = 2A + 2 - 7A \end{array}$$

$$= A + O - 7A$$

$$= A - Any$$

$$Ons 15 \Rightarrow lu A = \left[\begin{array}{ccc} O & a & 3 \\ 2 & b & -1 \end{array}\right]$$