B

	Elimanilary Row Operations:						
	Interchange of any 8 nows Addition of any now to the other non-zero now						
	Echelon fam of a matrix: Every now must have a leading non-zero element and all the entries below that should be zero:						
	ex:						
	1 0 2 3						
	Pr= 0 0 -1 2 -0 0 0 4						
- 3	none and the state of the state						
N.J. all	Rank of a matrix: It is defined as the noof non-zero rows in the echelon form of a matrix. It is denoted by S(A) or Rank (A) for the above mentioned ex: the rank of the matrix is 3						
N-John	The echelon form of a malrix. It is denoted by S(A) or Rank (A) for the above mentioned ex: the rank of the						

Fuge No.

(i) $A = \begin{bmatrix} 1 & 4 & 0 & 1 \\ 3 & 4 & 0 & 1 \\ -1 & 0 & -9 & 7 \end{bmatrix}$ Parameter $A = \begin{bmatrix} 1 & 3 & 4 & 0 & -1 \\ -1 & 0 & -3 & 7 & 1 \\ -1 & 0 & -3 & 7 & 1 \end{bmatrix}$ Parameter $A = \begin{bmatrix} 1 & 3 & -1 & 3 \\ 0 & -3 & 3 & -10 \\ 0 & 3 & -3 & 10 \end{bmatrix}$ Parameter $A = \begin{bmatrix} 1 & 3 & -1 & 3 \\ 0 & -3 & 3 & -10 \\ 0 & 3 & -3 & 10 \end{bmatrix}$ Parameter $A = \begin{bmatrix} 1 & 2 & -1 & 3 \\ 0 & -2 & 3 & -10 \\ 0 & 0 & 0 & 0 \end{bmatrix}$ Coloumns $A = \begin{bmatrix} 1 & 3 & -1 & 3 \\ 0 & -2 & 3 & -10 \\ 0 & 0 & 0 & 0 \end{bmatrix}$ Coloumns $A = \begin{bmatrix} 1 & 3 & 3 & 3 & 4 & 3 \\ 0 & -2 & 3 & -10 & 3 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ Coloumns $A = \begin{bmatrix} 1 & 3 & 3 & 3 & 4 & 3 \\ 0 & -2 & 3 & -10 & 3 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ Coloumns $A = \begin{bmatrix} 1 & 3 & 3 & 3 & 4 & 3 \\ 0 & -2 & 3 & -10 & 3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$	1_	Problems: Reduce the following matrices to dentify the pivotal coloumns and matrix	echelon find	form. nank q
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		1 & -1 3		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	n. h		i lig	4 IUS
$R_{3} \rightarrow 1R_{3} - 3R_{1}$ $R_{3} \rightarrow R_{3} + R_{1}$ $R_{1} = \begin{bmatrix} 1 & 3 & -1 & 3 \\ -1 & 3 & -10 \\ 0 & 3 & -3 & 10 \end{bmatrix}$ $R_{3} \rightarrow R_{3} + R_{2}$ $R_{3} \rightarrow R_{3} + R_{2}$ $R_{4} = \begin{bmatrix} 1 & 3 & -1 & 3 \\ 0 & -2 & 3 & -10 \\ 0 & 0 & 0 & 0 \end{bmatrix}$ $R_{5} \rightarrow R_{3} + R_{2}$ $R_{1} = \begin{bmatrix} 1 & 3 & -1 & 3 \\ 0 & -2 & 3 & -10 \\ 0 & 0 & 0 & 0 \end{bmatrix}$ $R_{5} \rightarrow R_{3} + R_{2}$ $R_{5} \rightarrow R_{3} + R_{3}$ $R_{7} \rightarrow R_{3} + R_{3}$ $R_{7} \rightarrow R_{3} + R_{3}$ $R_{8} \rightarrow R_{3} + R_{3}$ $R_{1} \rightarrow R_{3} \rightarrow R_{3}$ $R_{2} \rightarrow R_{3} + R_{3}$ $R_{3} \rightarrow R_{3} + R_{3}$:	1 - C - Y - W	1	
$R_3 \rightarrow R_3 + R_1$ $A = \begin{bmatrix} 1 & 3 & -1 & 3 \\ 0 & 3 & -3 & 10 \end{bmatrix}$ $R_3 \rightarrow R_3 + R_3$ $A = \begin{bmatrix} 1 & 3 & -1 & 3 \\ 0 & -2 & 3 & -10 \\ 0 & 0 & 0 \end{bmatrix}$ $C = \begin{bmatrix} 0 & 0 & 0 & 0 \end{bmatrix}$ $C = \begin{bmatrix} 0 & 0 & 0 & 0 \end{bmatrix}$ $C = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ $C = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 &$		13 -1 0 -2 7]		0
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		$R_3 \rightarrow 1R_3 - 3R_1$ $R_3 \rightarrow R_3 + R_1$		
1 2 -1 3 0 -2 3 -10 0 0 0 0 .: coloumns 1 & 2 are . Pitatal coloumns and 3(A)=2.	ı	A: 0 -3 3 -10		
.: coloumns 1 & 2 are . pitrotal coloumns and 3(A)=2.		1 2 -1 3 = 0 -2 3 -10		13/
and $g(A) = g$.		1 0 0 2 21 20 30 5 2	h et	y k
		. Pitrotal colournes		J.
				XII.

0	-3	-6	4	9
-1	-3	-1	3	1
-8	-3	0	3	-1
1	4	5	-9	-#

2.

•

R4 - R4 + R1

F: 0 -3 -6 4 9

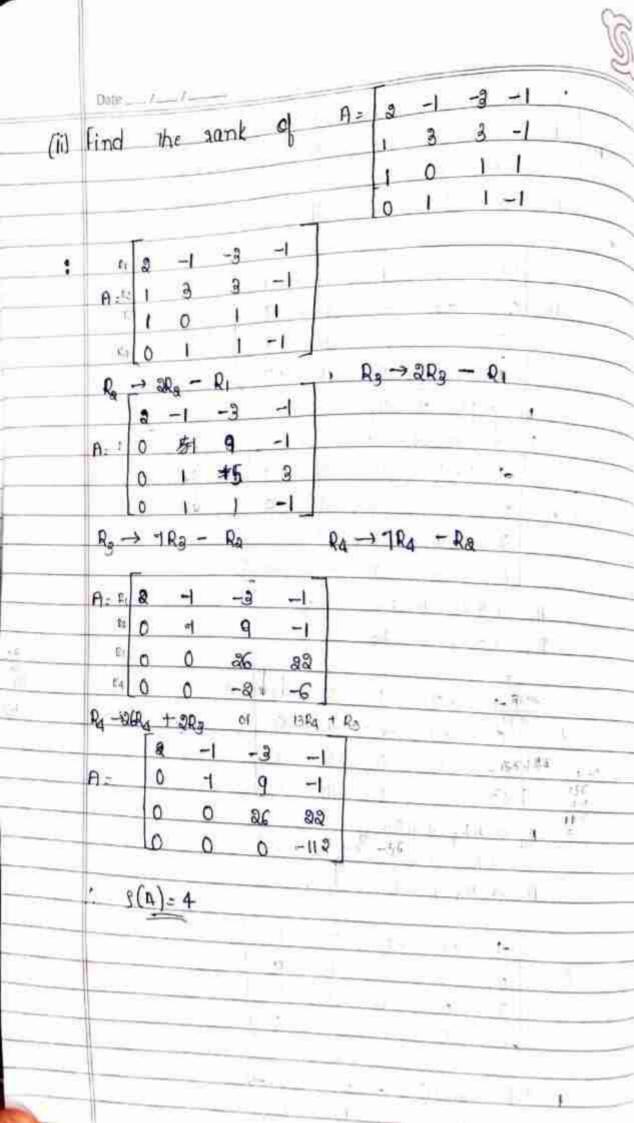
 $\begin{bmatrix} 0 & 0 & 0 & -10 & 0 \end{bmatrix}$ $R_{a} \rightarrow 5R_{4} + 10R_{5}$

OR A4 → R4 + 3 R3 .

1 -2 -1 3 1 0 -3 -6 4 9 0 0 0 -5 0

Avolal elements → -1, -3, -5 " coloumns → 1, 3, 4 9(A) = 1, 2, 3 → 3

Page No.

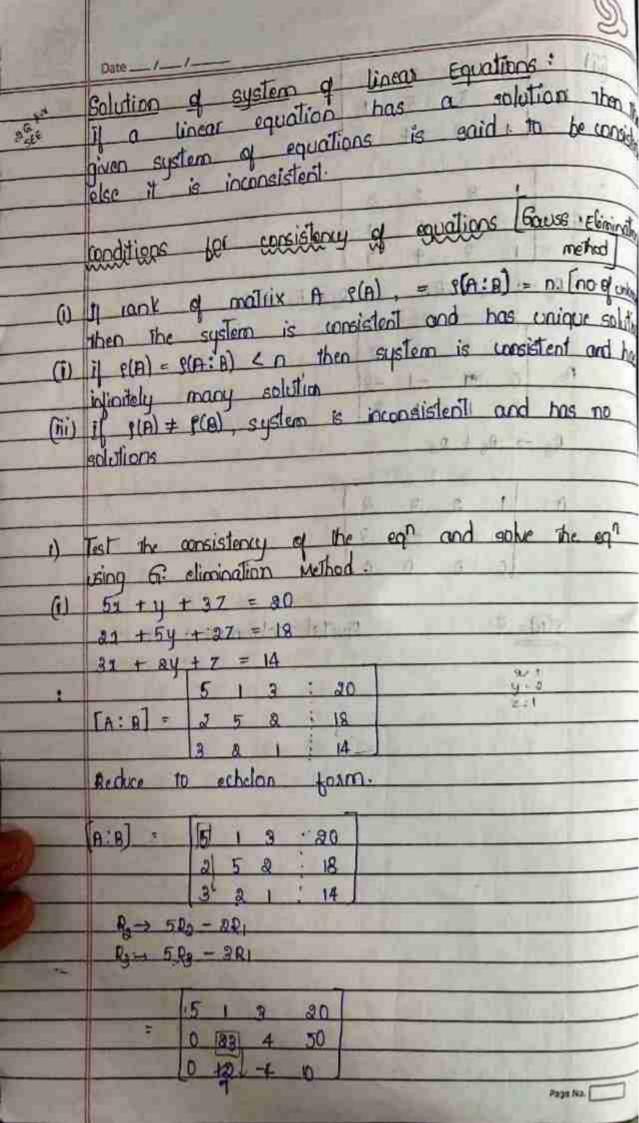


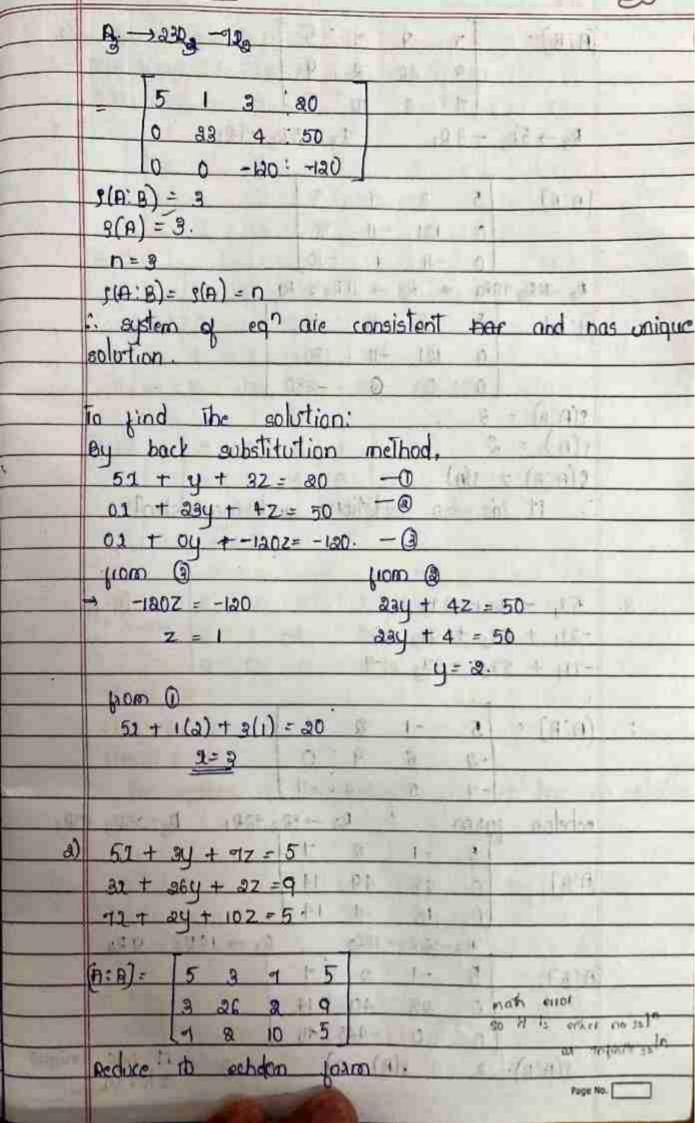
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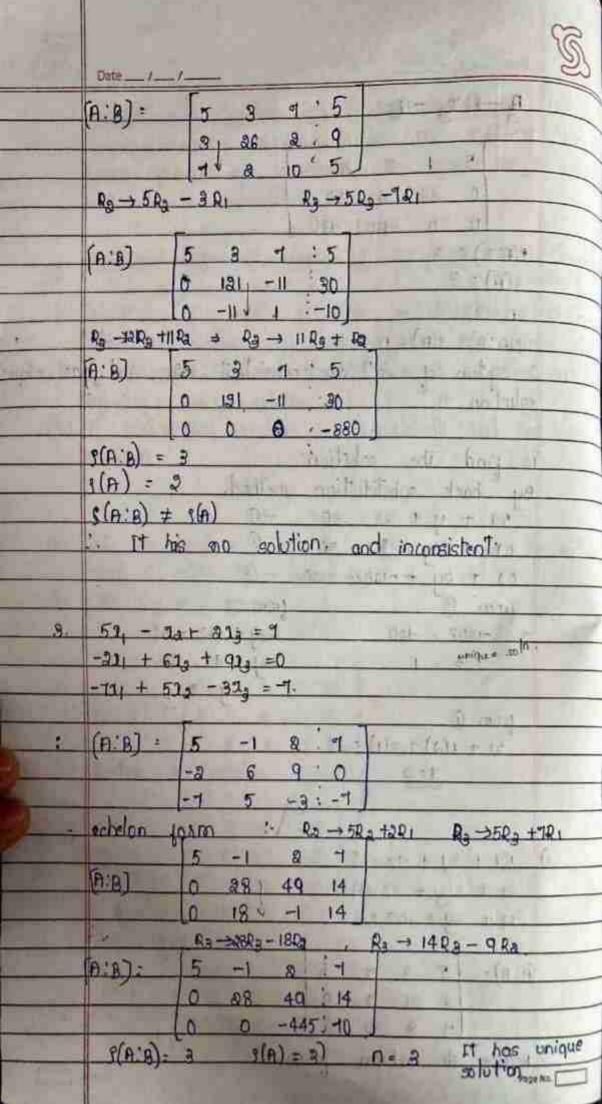
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(iii)		1	2	3	2
	A =	2	3	5	- 1
		1	_3	4	5

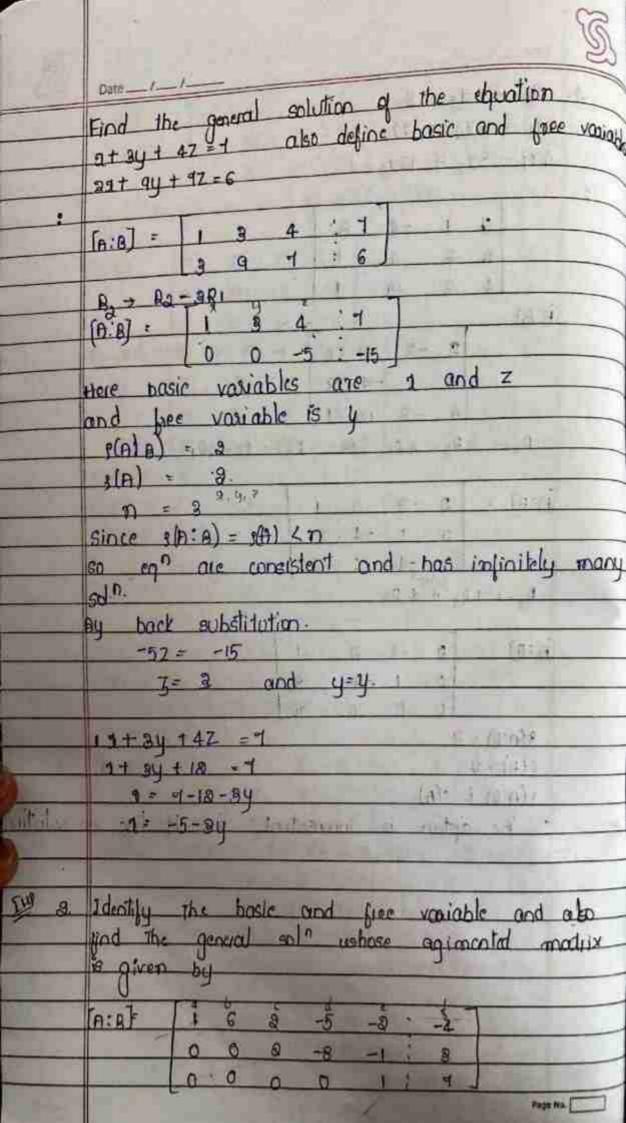
$$R_2 \rightarrow R_2 - 2R_1$$
 , $R_3 \rightarrow R_3 - R_1$

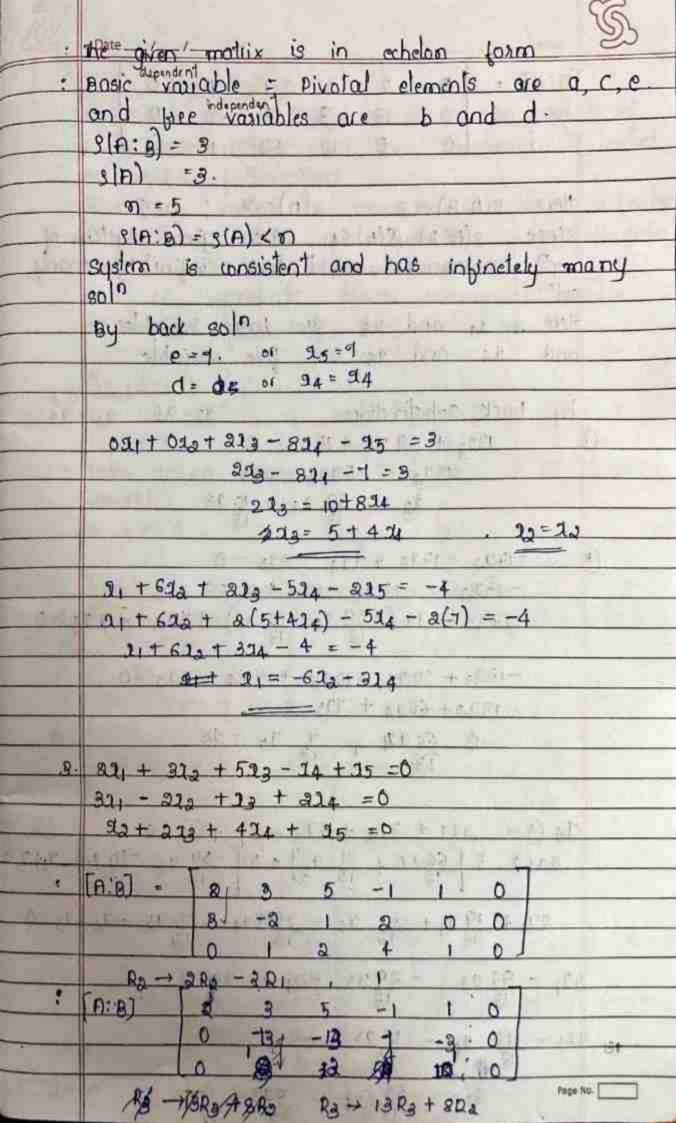






	Date/	
4.	- Ia - 41 ₃ = 8	
	91, - 37 ₂ + 32 ₃ = 1	
	411 - 812 + 1214 = 1	
		_
	0 1 -4 8	_
		_
	8 -8 8 I 4 -8 I8 I	_
	(A:B) =	_
	2 -3 2 1	-
	0 1 -4 :8	_
	[4 -8 18 1]	_
	Rg → 8 Rg - 4 R1 OR Rg - Rg - 3R1	
	Company of the compan	_
	[A:B] 2 -3 8 1	
	0 1 -4 8	
	$R_{g} \rightarrow 1R_{g} + 4R_{g}$	
	Kg - 1 Kg 1 + KG	
	(A:B) = [a - a a : 1]	
	0 1 -4 8	
	0 0 0 30	_
	3(A:B) = 3	
	ρ(A) = 2	
	s(a:g) ≠ s(a)	_
	: The system is inconsistent, i.e it has no soluti	U
		_
		_
		-
	•	_
2 7	To the second se	
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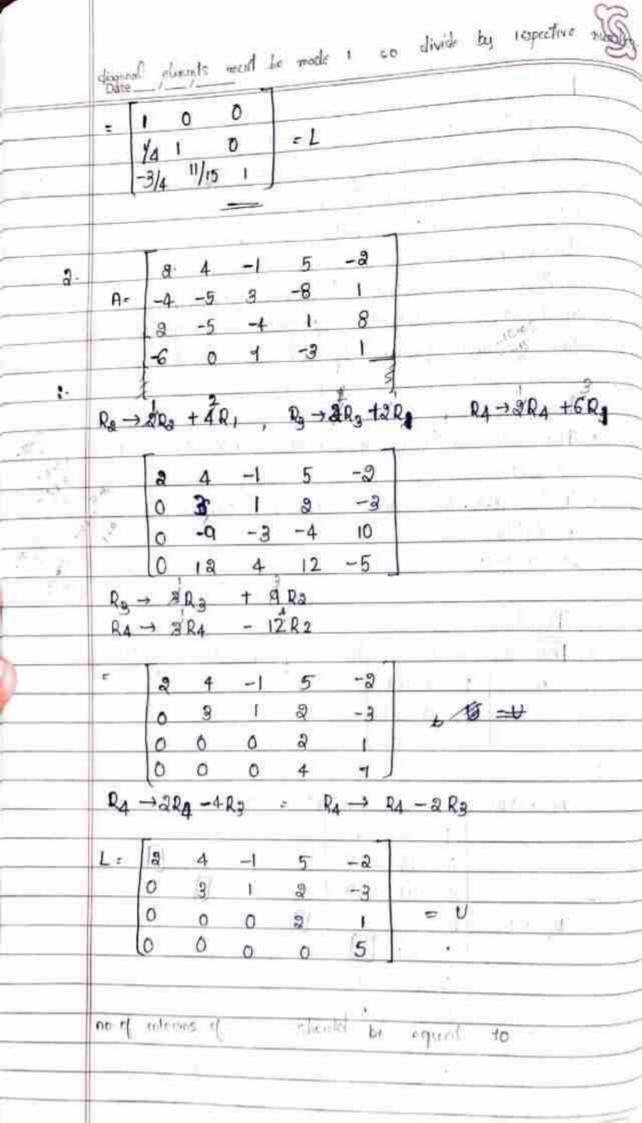


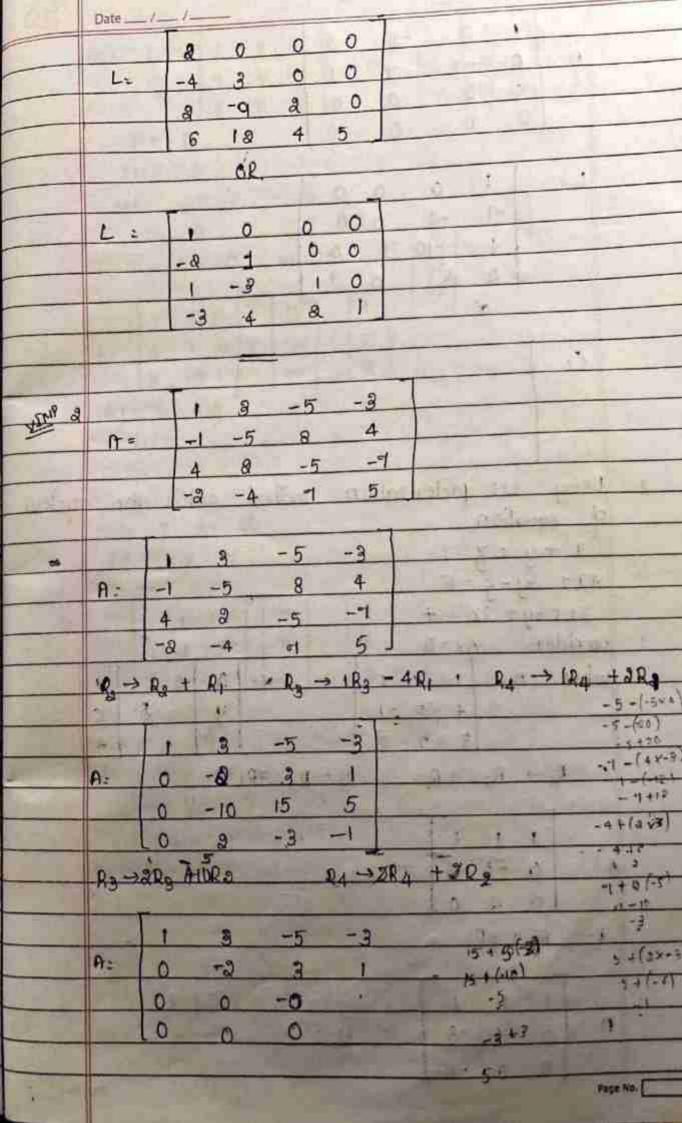


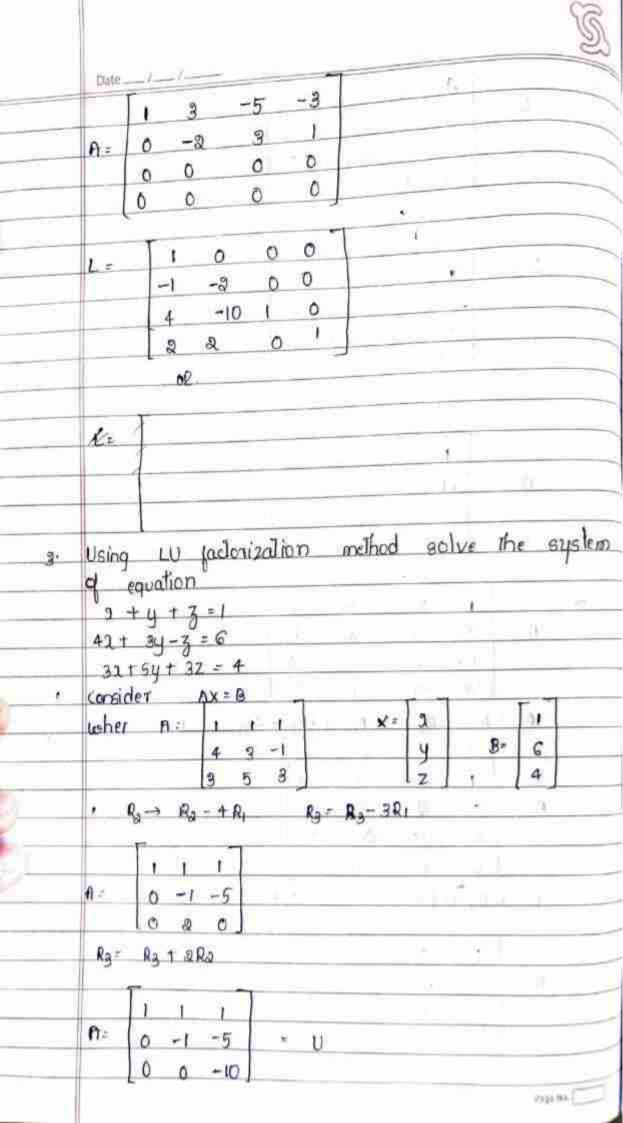
-		~
C. T	Date//	D
10 PK 1	[A:A] = 8 3 5 -1 1 0	18
	0 -13 -13 9 -3 0	1
	0 0 13 50 10 0	/
	(a)	
	there s(n:8) = 3 s(n) = 3 ; n=5	
	since slois slo) < n then given system	P
2-	eq? is consistent and has Infinitely m	any
	there at the and as are basic variables	
	and at and as are free variable	
	the state of the s	
8	by back substitution. 25=25 34=	94
	1329 + 59 94 + 10 25 - 012 - 10 11	
	13795994 -1025	
	2g = 1 = 5q 24 - 10.35	
(e	-1322 -1324 +-124 -325 = 0	eta y
	-4330 × 131=21961 2100	
	1-1372 - 18 (-59 24 -10 25) + 124 + 325	=0
	-1324 - 5924 1+ 1025 + 724 - 325 =0	
	- 1323+6624 + 125 =0	
	13 66 724 1 75 75 - 78	
	Des alle teste etc.	
	70 0 - 271 + 372 + 573 - 11 + 35 -0	
	821 + 9 [6624 + 1 25] + 5 [-59 74 -10 15]	74+3-2
	221+ 19 24+ 21 25 - 295-24 - 50 25 - 24+2	5=0
	871 - 97 24 - 29 25 - 24 + 25 =0	
	13 , 13	0
- 1	221 - 110 24 - 16 23 5 0	
	DI = 1 55 24 - 825 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	

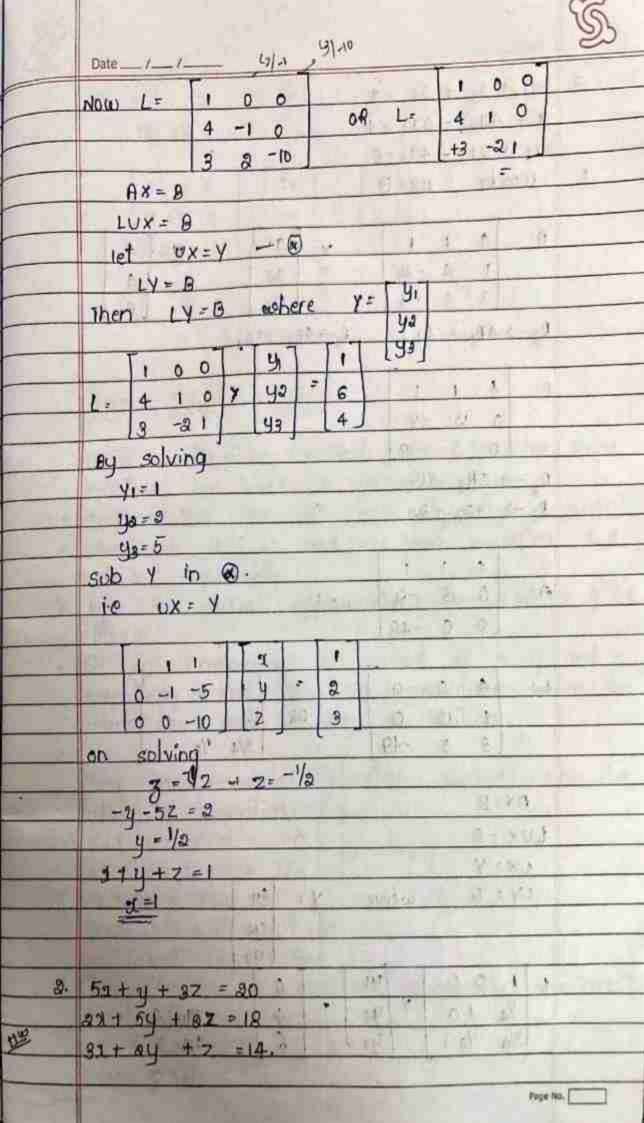
LU factorization

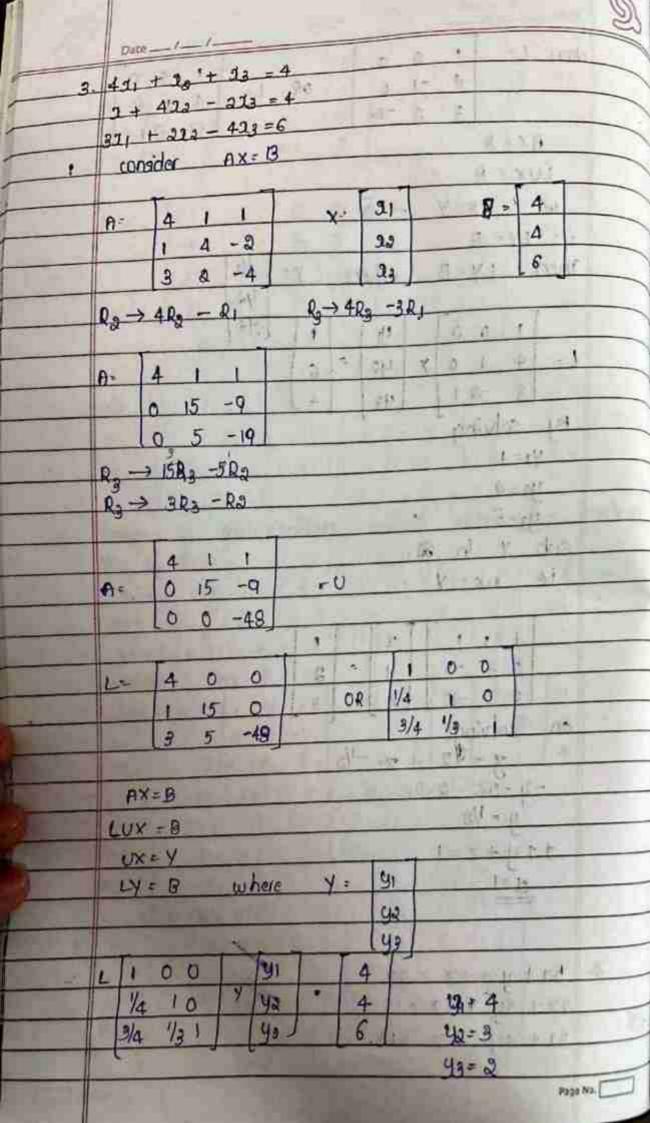
matrix can be represented as a product of e a more matrices and this conversion is called as matrix jadarization. Biven a matrix 1 can be reduced to a factor L and u where I represents tower Triangular matrix with the diagonal entries as 1 or echelon form of the matrix. Procedure: · For a system of matix AX = B, take A=LU · Take lux= B Jake ux= Y Centere y is dummy voniable) Problems: 1. For a given matrix find LU foctorization. (1) A: TA 1 1 -R1 → 4R2 - R1 , R2 → 4R3 + 3R1 - 1 0 15 -9 Rg->15Rg-11Rg 15 -9 984 givetal element and delaw aft the eight are cloth be identify first 47 010 1 Page No. - 3/4 11/2/88A /ca/214











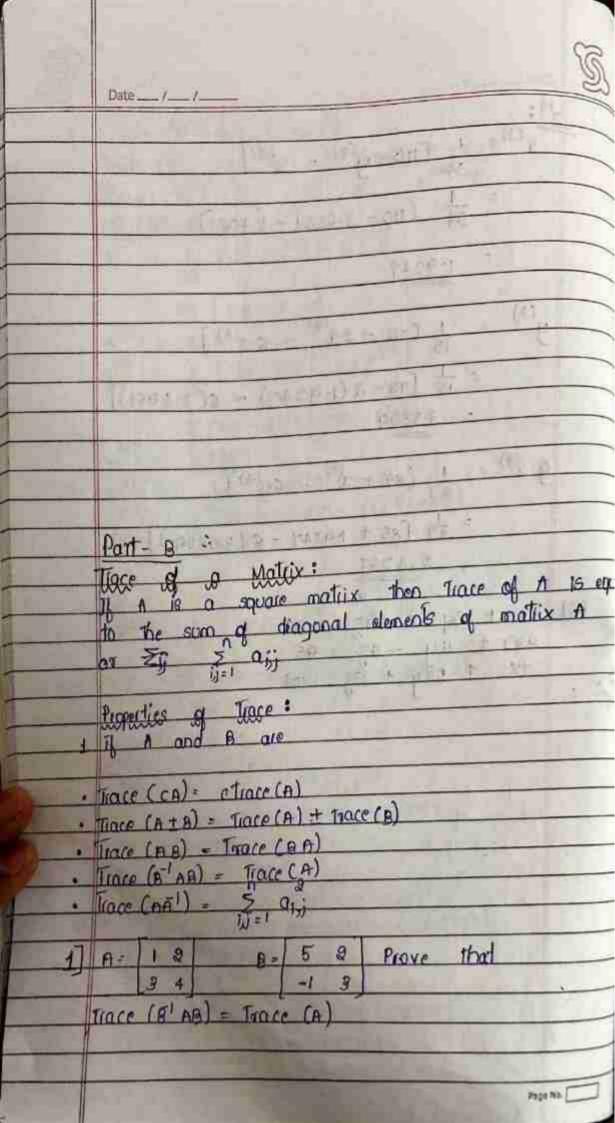
ÀT.	Date/	Ø
	# sub y in @	
	UX =V	
	4 1 1 91 4	
	0 15 -9 22 = 3	
	0 0 -48 23 2	-
	91 - 29 - 131 30 24 40 13 - 24	
	Gaus - seidel Method	
	It is a iterative method where to solve	these
	equation we need to following steps	
•	theck whether the ear are diagonally for	ninant
	solve in a u and 7 hom equations	1,0
	and a second wall	
	Take the initial approximations as 2(6) =0	y (0):0
	So on incrementing the values of 1, y respectively and stop the procedure each values are same in any a iterations.	en The
	Using gauss - seidal iterative onethods sol	ve the
1	542 + 4 + 2 = 110	
	41 + 154 T 67 = 12:	
	-7 + 60 + 872 = 85	
	-2 + 6y + 872 = 85 Sixon $x^{(0)} = y^{(0)} = z^{(0)} = 0$;	
	carry - out a iteration.	
0	Given system of eqn are diagonally olon	rimin
	7 = 1 [110 - y - 2] From (4) 54	
	Fuge No	

```
y \cdot \frac{1}{15} \left[ 78 - 89 - 62 \right]
om (3), z = \frac{1}{61} \left[ 85 + 9 - 69 \right]
iven x^{(0)} = 0; y^{(0)} = 0, z^{(0)} = 0.
From (a)
Given
Ist iteration:
                               - Z<sup>(0.)</sup>
          54 110 -0 -0
9(1)
              (12-22 -62 0
            8-03-10
           15 (12-2×2.0310-6(0)]
            4.5284
                        8.0310 - 6(4.5284
220
  (3)
                (42 -2(19121) - 6(22173
        = 1/3.6 581
5nd
                                     - 8.2113
                  12 - 22(a) - 62(1)
 (4)
                 178 - a(19121) - 6(a.2173
(2)
               [85+ 1.9121 - 6 (3.6581)]
             2.406
                                                           Pr 2 N2.
```

Fermi as but mend on and hop of It

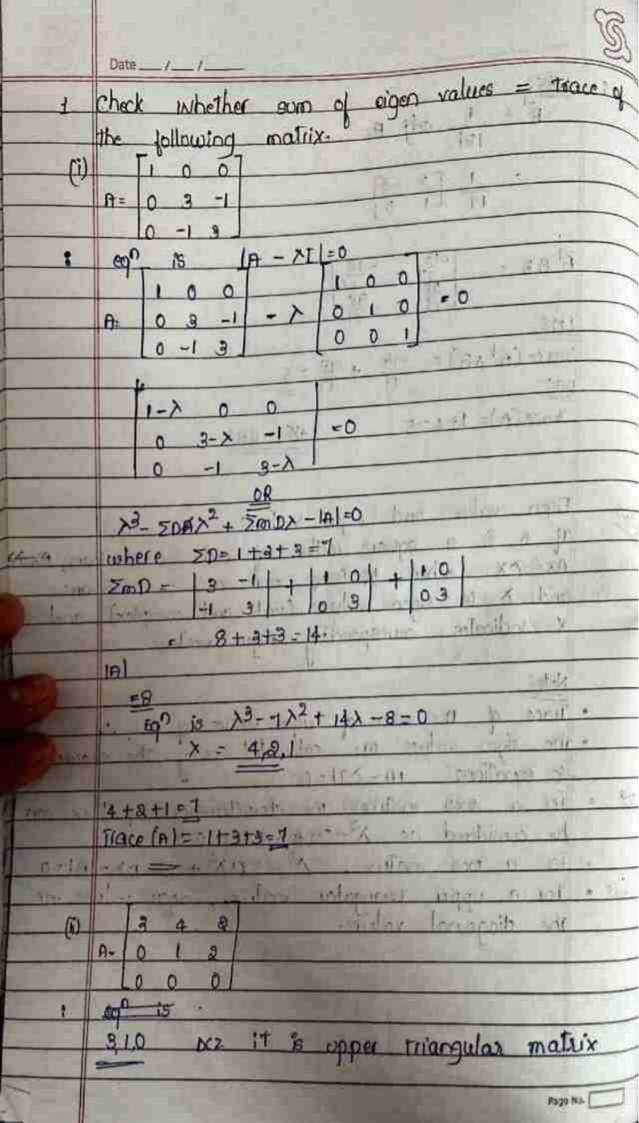
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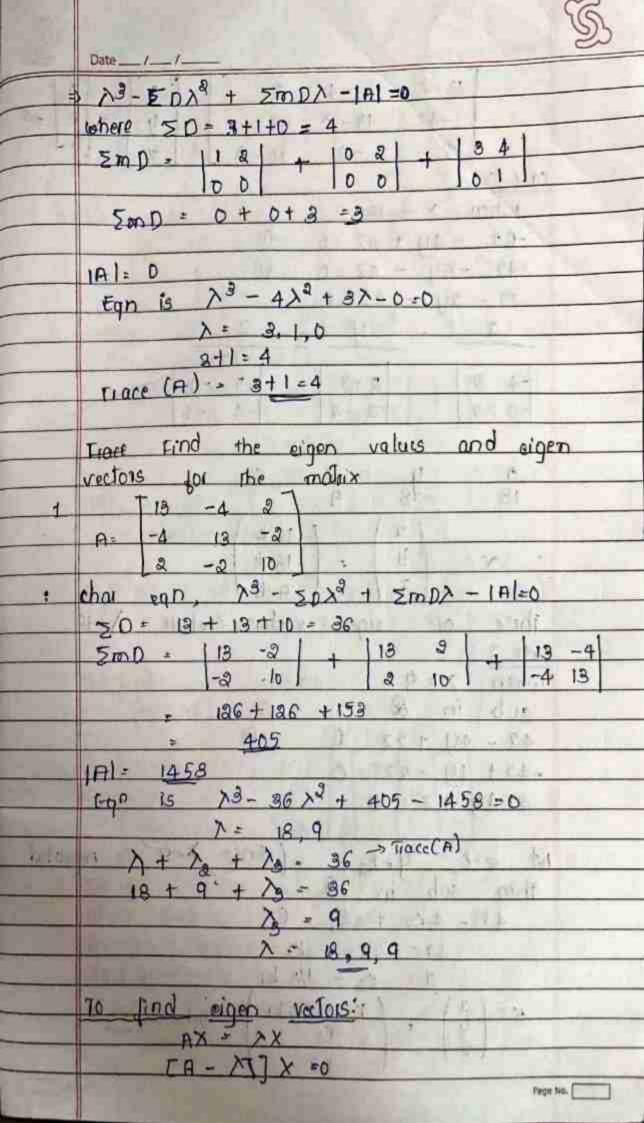
forestranged to last many o (A) THOSE - (BA A) MANUEL .

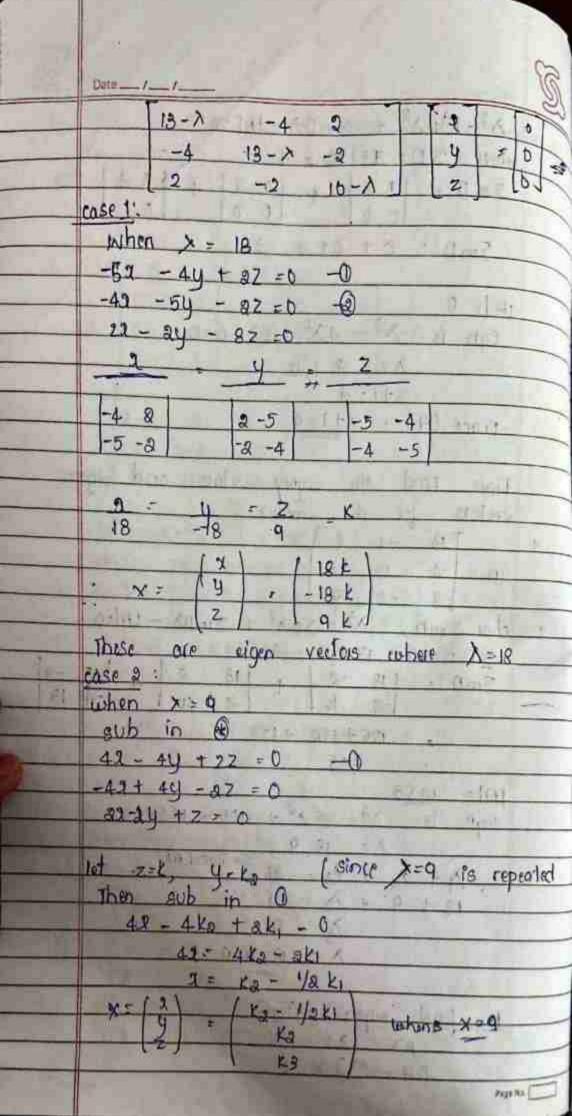


E = 1 adj B. : 1 [3-2] Trace (8 1 A8) = -13 + 98 = 5 Trace(A)= 1+4=5 LHS=- RHS Figen value and Figen Vectors: and it is eigen values (real and complex) and x indicates corresponding eigen vectors. · Trace of n = norm of eigen values of A.

· the eigen values are calculated using the characterist ic equations IA->II=0 · For a exa matrix the characteristics equations can SHIP be considered as $\lambda^2 - \sum D_0 + 1AI = 0$ · for a six a matrix, 13- 2012+ 5mp>-1A1=0 sur. For a upper Triangular matrix, eigen values are the diagonal values. Page No.

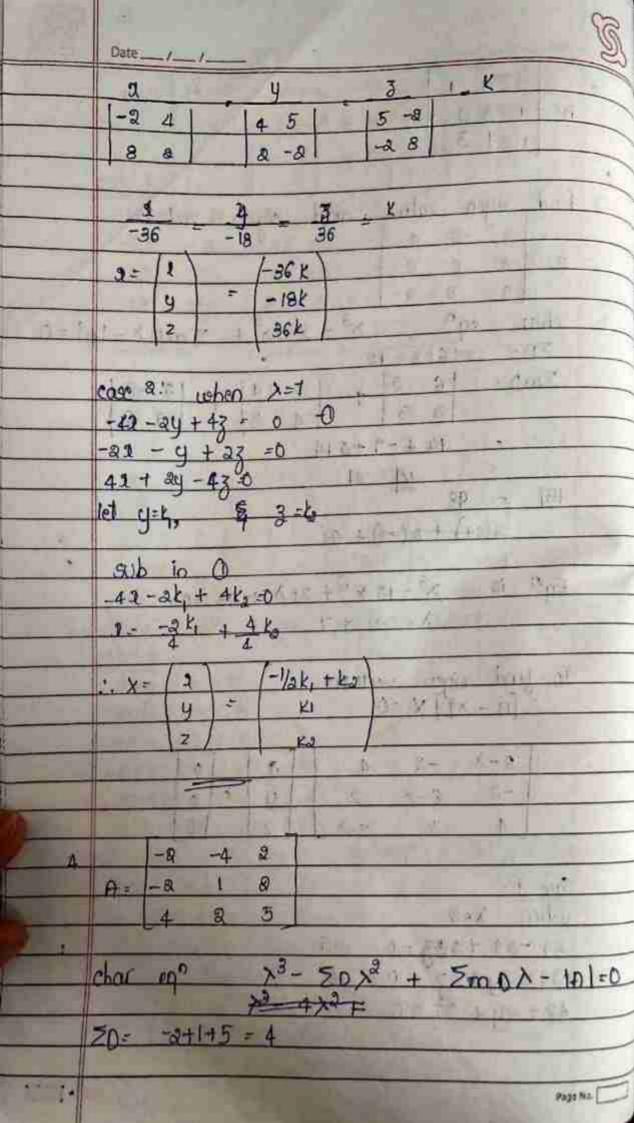


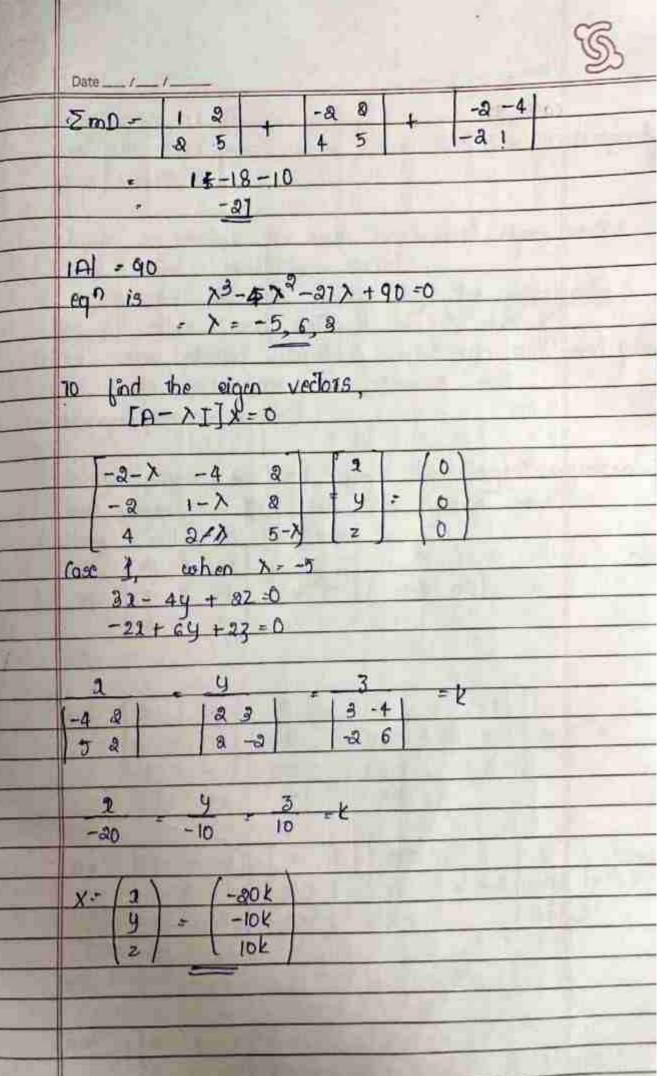




	Date//_
2.	3 1 1
a-	A= 1 3 1
(2)	
	Find ginen values and ginen vactoris
- "	Find eigen values and eigen vectors
	A: -a 6 2
	4 8 3
\$	char eqn , >3-50x2+ 5m0x-101=0
	ZD= 8+6+3 = 12
	5mD - 6 2 + 3 4 + 3 -2 -
	- 14 € -7 + 5 14
	= 4 8
	IAI = 98
	3(14) + 2(-1) + 4(
	A die
	Eqn is x3-12x2+21x+98=0
	A = -2, 7, 7 - if a midd this case should get tears
	2 m 4 k mad
	To find eigen vectors [A - XI] X = 0
	[A-XI]X=0
	9-2 -2 4 2 0
	-a 6-> 2 y 0
	4 & 3-X] [Z] [O]
_	Case L'
	when X=8
	51-84+433=0 -0
(10)	-az + 8y + az = 0 -0
	42 + 4y + 5z = 0

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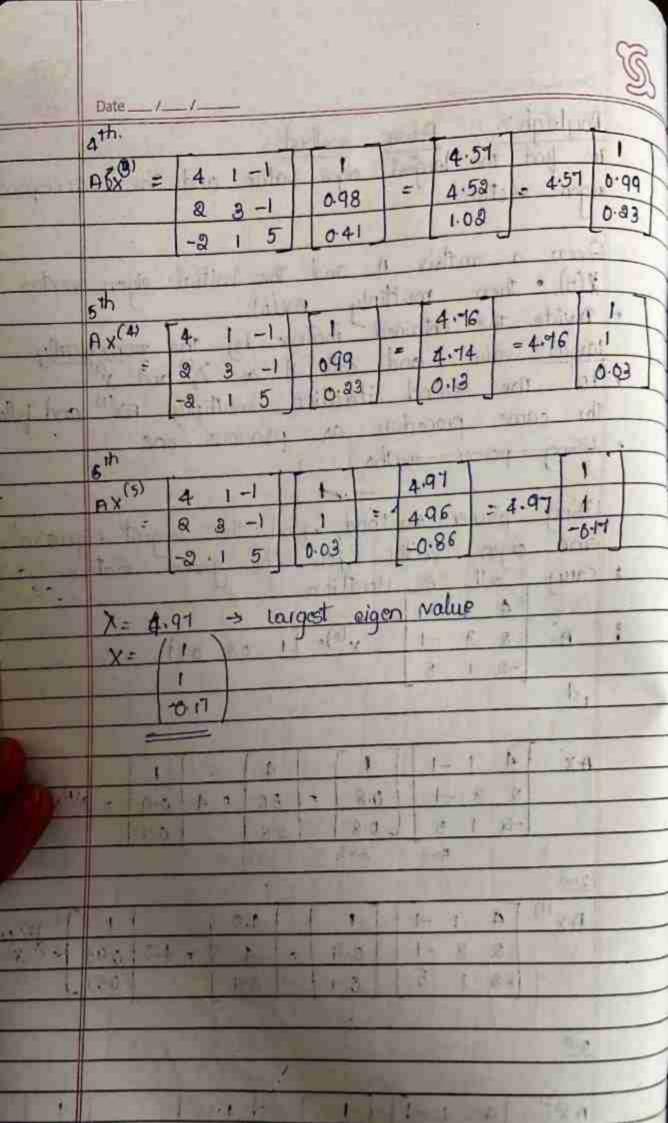


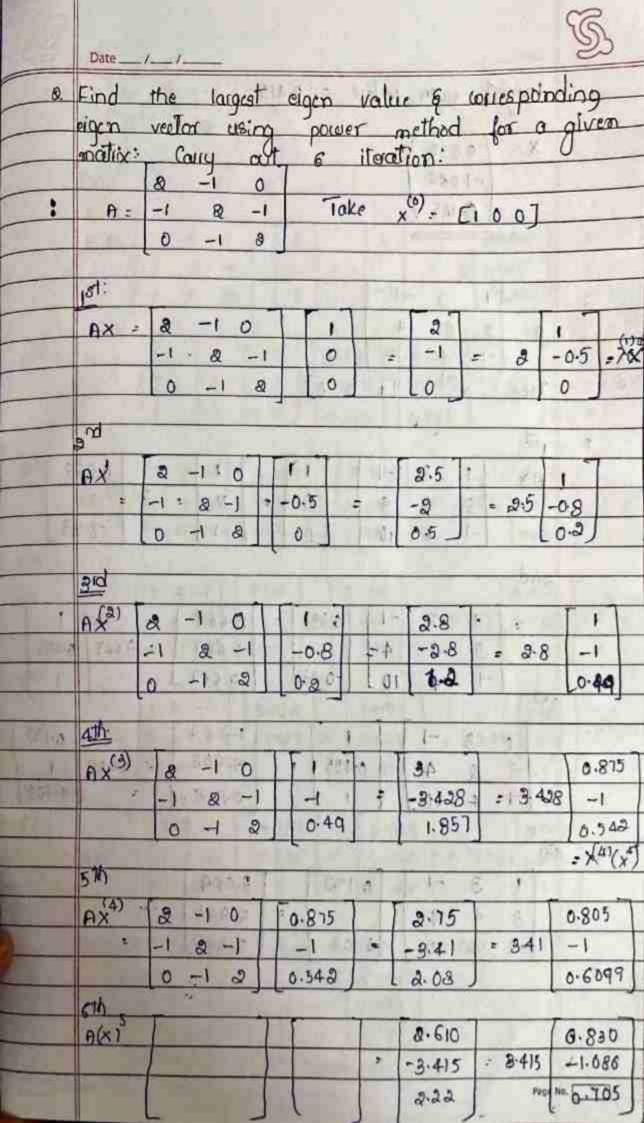


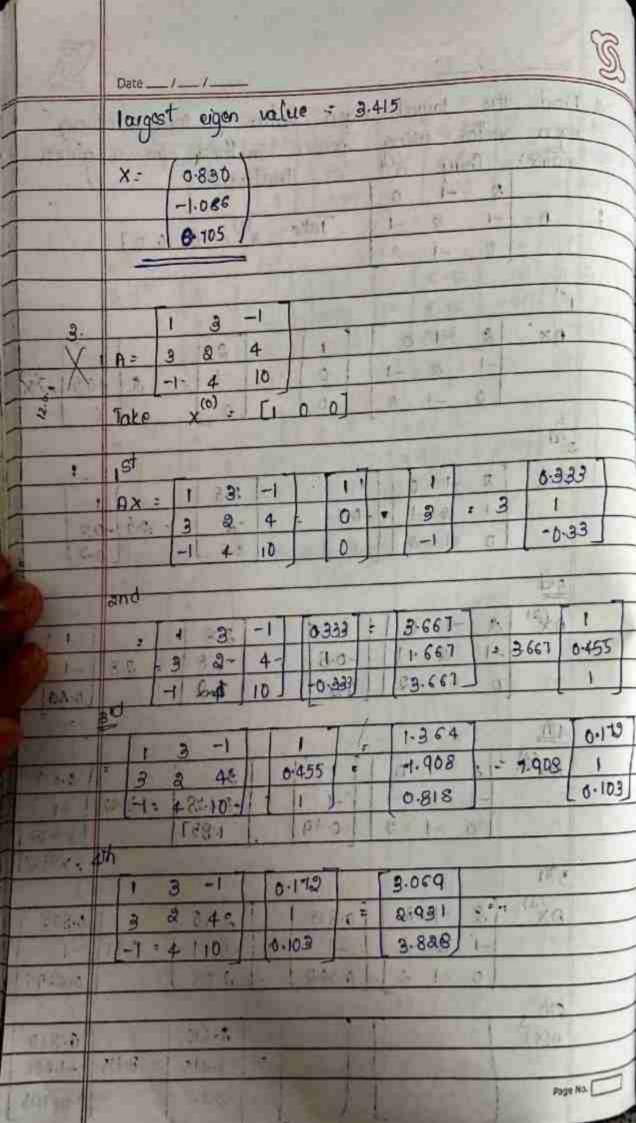
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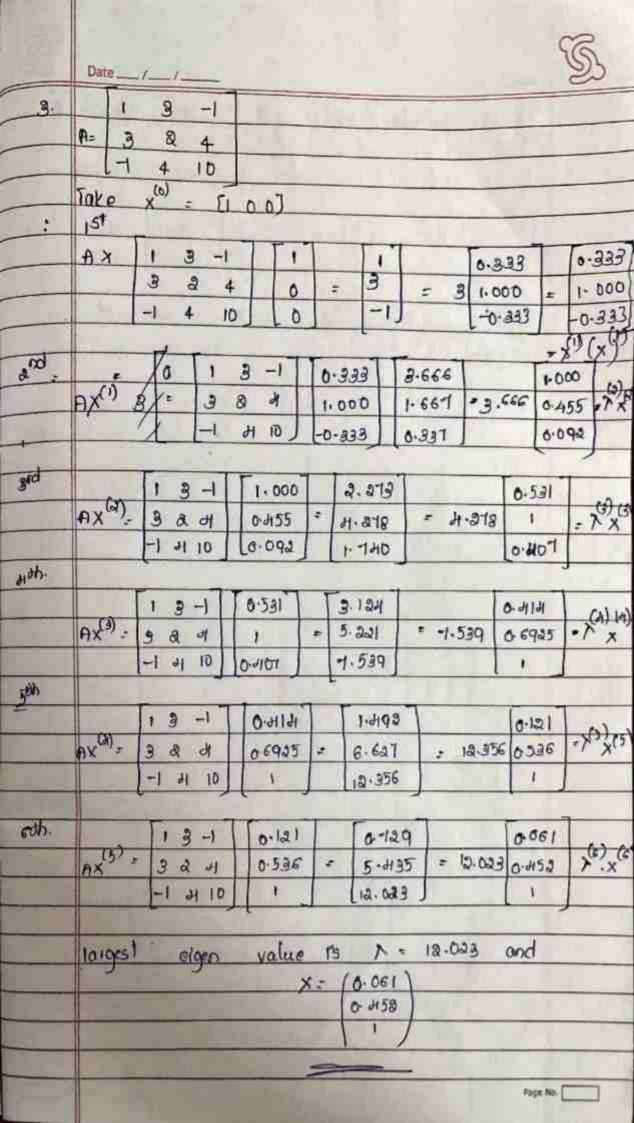
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		gh's Pour	or m	Thod				b
En	To gri	d the large	et eigen	va	lue (and the	cor	1 Ispandia
	U	39 399). 1	ET INT		1 0	84		
	Siven	a matrix	A an	d 1	ne ini	itial eig	jen v	e don_
-	X(0),	then mu	Hiply ,	AX	(0)	4	5747	off.
•	Invest	value or	ned m	GILIX	-by	the m	CO	olly
	For	the second	itan1	ion	mul	tiolu s	ax(i)	and Lollac
	the so	ome proced	ure as	ρ,	ruviou	5 one		0
		power m		- 1			1 2	
	NO. 35.	4.172			the d	*	2.01	
	Using	power m	ethod	HINC	1 the	larges	st eig	ens value
	and	sign veil	or for	1	he a	iven	matri	x -
	contry	all 6	iteratio	n	U		-	
		4 1 -1	Tele I	2018	1 (4)	7	4 6	
1	A=	all 6. 4 1 -1 8 3 -1	X (8)	- 1	0.8	0.8)	=V	
		-2 1 5				20.70		
ш	15	2			-	All of the second		
Щ			1		. 1	- 1		
-	AX	4 1 -1	1		G =	4 0.9	- >	(1) (1)
-		23-1	0.8	2	0	0.7		
		-a 1 5	1xE	l éd	3 x 1	[0, 1		
-	2nd	3518	1111			nal a	14	
	A 3 (1)	T4 1-1			4.2		1	2) (2) (4
	11.8	8 3 -1	0.9	2	4	+ 4.2	0.95	, X X
	THE	-8 1 5	0.4		8.4		0.57	J
	310	the little	I List					
	E			,	-	in .	T	. 7
	P X(2)	4 1 -1	1		4.3		. 20	OF.
	100	2 3 -1	0.95	7	4-2		_	95
		1-2 1 5	0.57	1	1-8		10	41





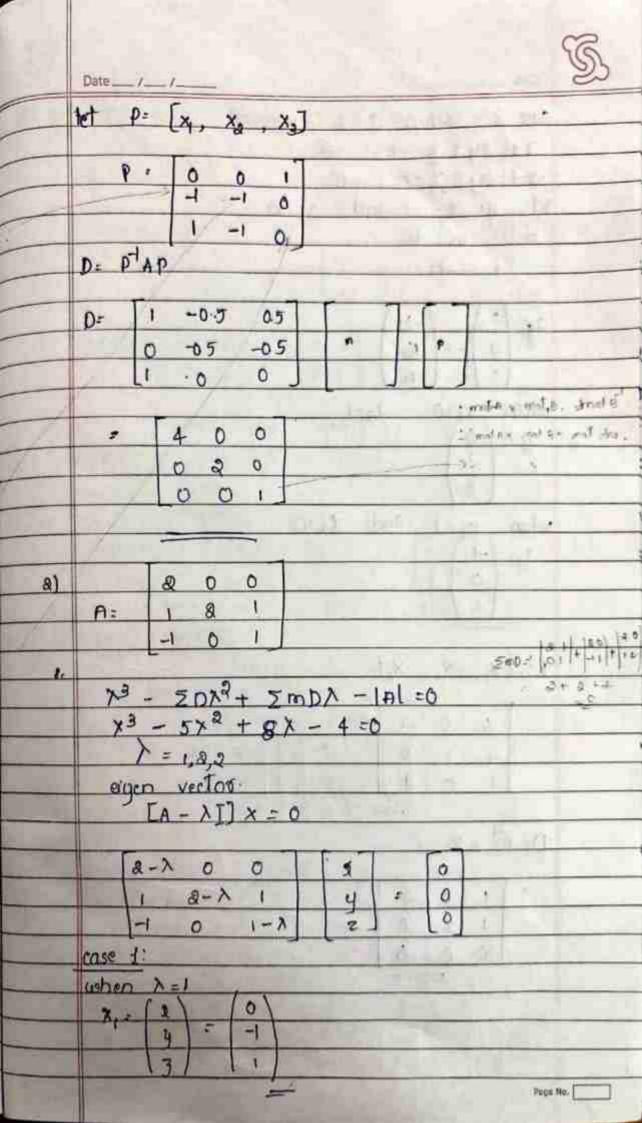


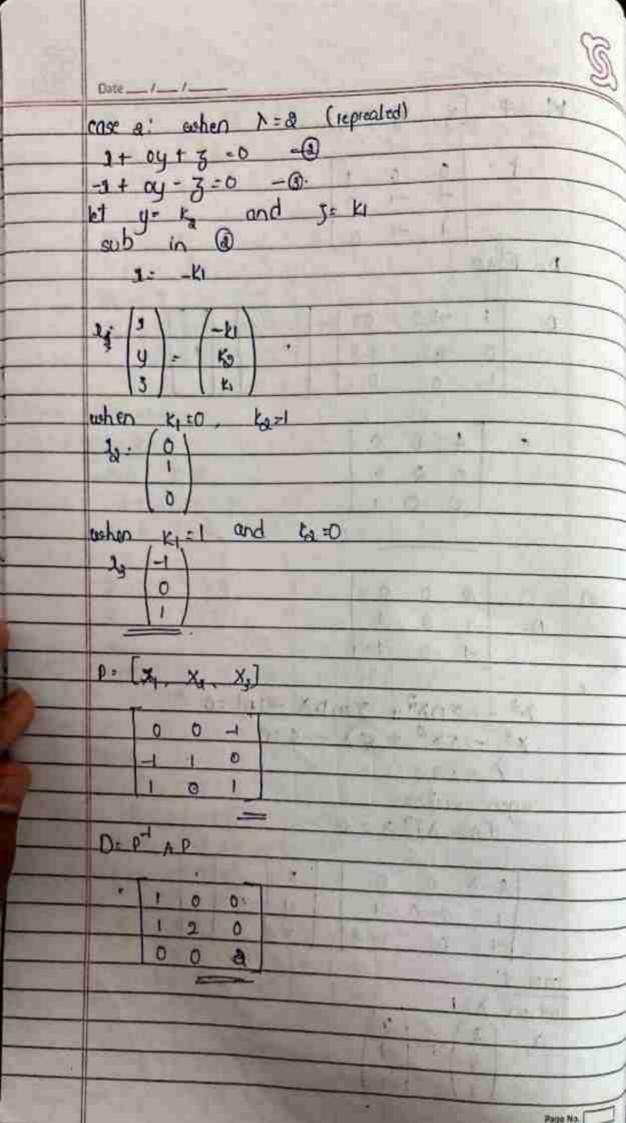


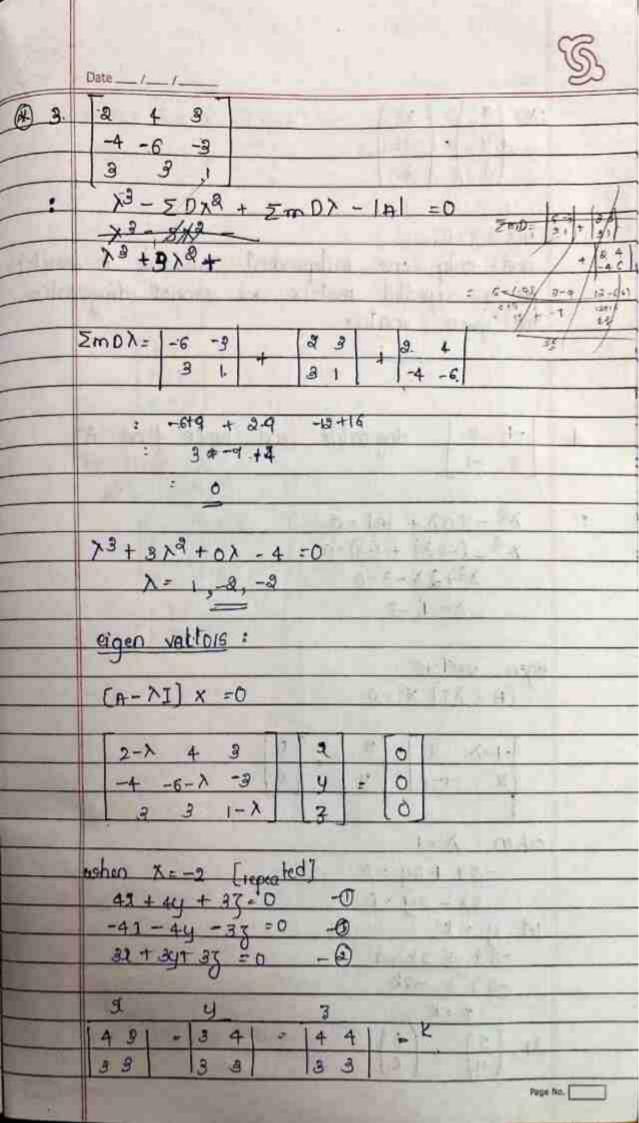
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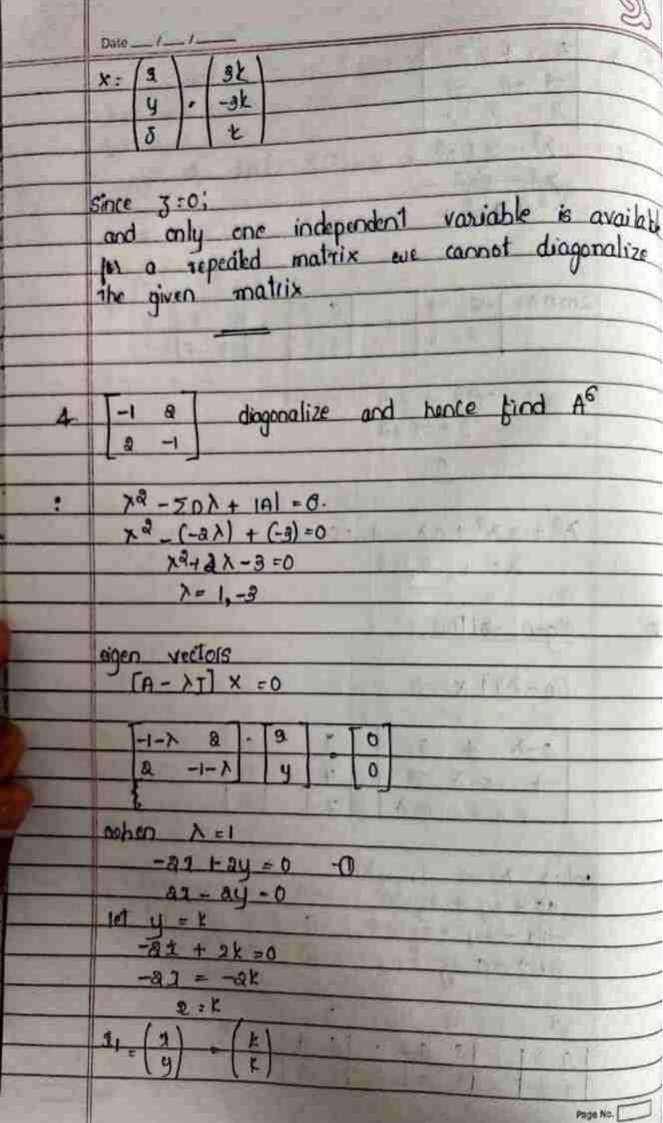
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4.	Given: A=	1 6	check	whether	U = 6 -5	is a
	eigen vector	-	Α			
1	AU = 1 6 5 a	6 .	-4 6 5	, AU:	טע	
	אט - אט	X=-d1	9 () = [6]	i U is	
	II.				J	Mark No.

	Date//
	Diagonalization q Matrix:
	let I be a square mallix of order n, h, h
016	consponding vectors from the matrix p is called as
Nogerian.	of reprinted malify and is represented by the corresponding eigen veilles the diagonalization of
	a makix is calculated as
	always be the eigen values in the diagonal)
	PD.= AP
-	Note!
	Powers of a squar mallix can be calculated using $\Lambda^2 = PD^2P^2$
	Problems:
1	Diogonalize the matrix if possible.
	A: 0 3 -1 3 3 13 13 14 10 10 10
	0 -1 3 = = = = = = = = = = = = = = = = = =
	73 - ZOX2 + ZmDX - IAI=0 = ===============================
	7=4,8,1
	10 und eigen vectors
	(H->1) x -0
	[1-2 0 0][2] [0]
	0 3-7 -1 9 2 0
	[0 -1 3-x][2][0]
	case 1: when x=4
	-37 + 04 + 03 -0 -(n)
-	01 - y - 3 = 0 (a)











when
$$\lambda = -a$$

when
$$\lambda = -3$$

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

$$D = p^{-1}AP$$

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

$$= \begin{bmatrix} 1 & -1 \\ -1 \end{bmatrix} \begin{bmatrix} 1^6 & 0 \\ 6 & (-3)^6 \end{bmatrix} \begin{bmatrix} 6.5 & 0.5 \\ -0.5 & 0.5 \end{bmatrix}$$

	Date//_
	For what value of t and 8 the system of equations has
(A)	no solution on
6	unique solution
(iii	infinite solution
	1 + Ay + 33 = 6
	1 + 84 + 53 = 9
	A3 + 54 + 93 = 0
	THE STATE OF THE S
:	1 2 9 6
	A= 1 8 5 8= 9
	8 5 a) [b]
	The state of
	A:9: 1 8 3 6
- 1	1, 3 5 9
	2 5 Q D
1	N - N - N - N - N - N - N - N - N - N -
	L ₃ → R ₃ - & B ₁
1	A:3 = 0 1 3 3
	0 1 0-6 6-12
	Ra - ARa - B
	1 2 3 6
	0 1 2 3
	0 0 0-8 6-15
(i)	If a #8 and h # 15 then we get unique solo
(ii)	if a=8 and b=15 then s(A:B)= s(A) = 8. < Th=3
	we get to Ligitate many and
(iii)	1 a=8 and b = 15 then s(A:A) - 3 s(A) = 3.
	ine get no solution.
	Page No