

Linear Algebra and its applications

Assignment

1. Find the equation of the parabola $y=A+B\infty+C\infty^2$ that passes through three points (1,1), (2,-1) and (3,1) using Gaussian Elimination

 $\gamma = A + B \infty + C \infty^2$

at
$$(1,1)$$
, $1 = A + B + C \leftarrow \textcircled{1}$

Aoc = b

1	1	ĺ	A		٦ ,	1
1	2	4	В	11	-1	
١	3	9	C		1	

 $R_2 \longrightarrow R_2 - R_1 \mid R_3 \longrightarrow R_3 - R_1$

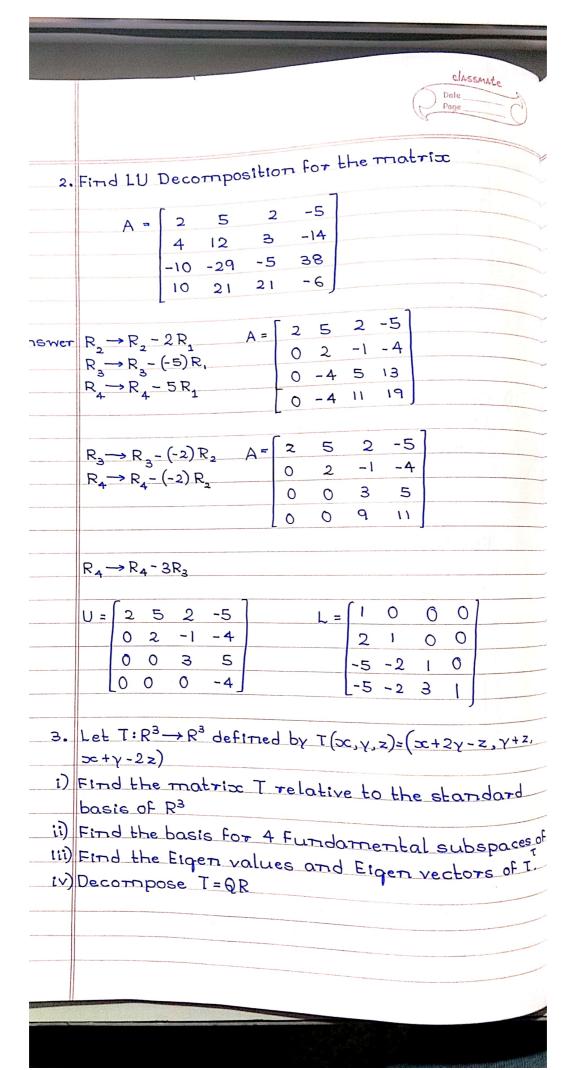
١	1	١	A]	١
0	1	3	В	7	-2
0	2	8	С		0

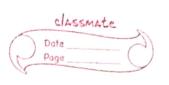
 $R_3 \rightarrow R_3 - 2R_2$

1	1	1		A		1
0	l	3	_	В	=	-2
0	0	2]	_	cJ		4

$$2C = 4$$
 $B+3C=-2$ $A+B+C=1$ $C=2$ $B=-8$ $A=7$

$$y = 7 + (-8) \infty + 2\infty^2$$





$$\int T(1,0,0) = (1,0,1), T(0,1,0) = (2,1,1), T(0,0,1) = (-1,1,-2)$$

$$T = \begin{bmatrix} 1 & 2 & -1 \\ 0 & 1 & 1 \end{bmatrix} \Rightarrow \begin{bmatrix} R_3 \rightarrow R_3 - R, & [1 & 2 & -1] \\ 0 & 1 & 1 \end{bmatrix} \Rightarrow \begin{bmatrix} 0 & 1 & 1 \\ 0 & -1 & -1 \end{bmatrix}$$

Linear independent
$$C(A) = \{(1,2,-1), (0,1,1)\}$$

$$\dim(C(A)) = 2$$

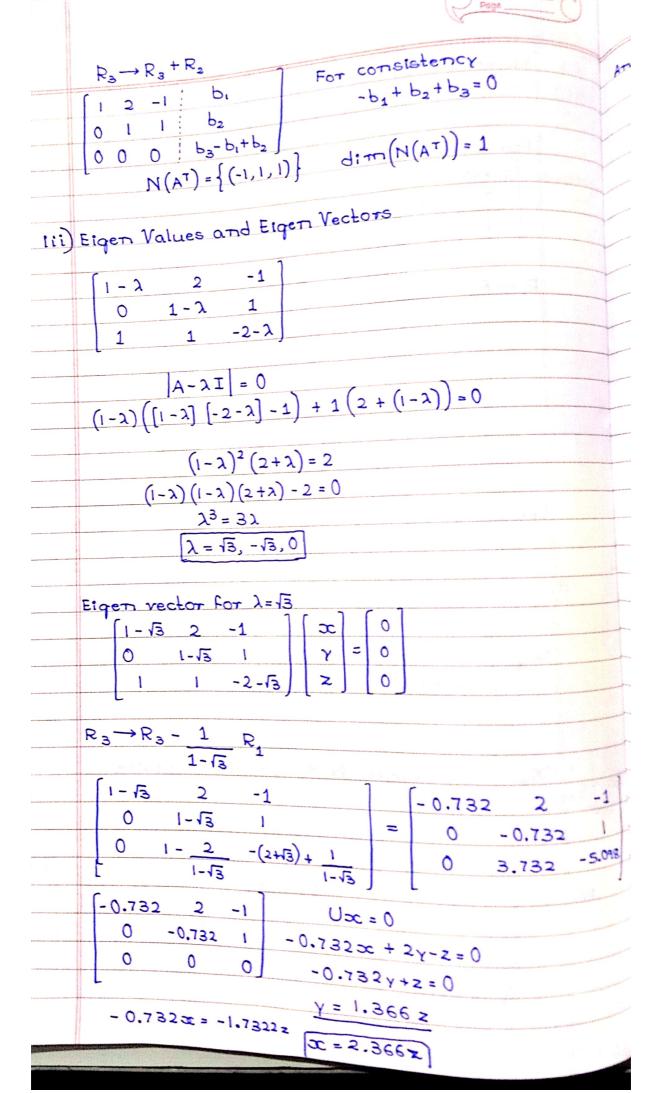
$$\dim(C(A^T)) = 2$$

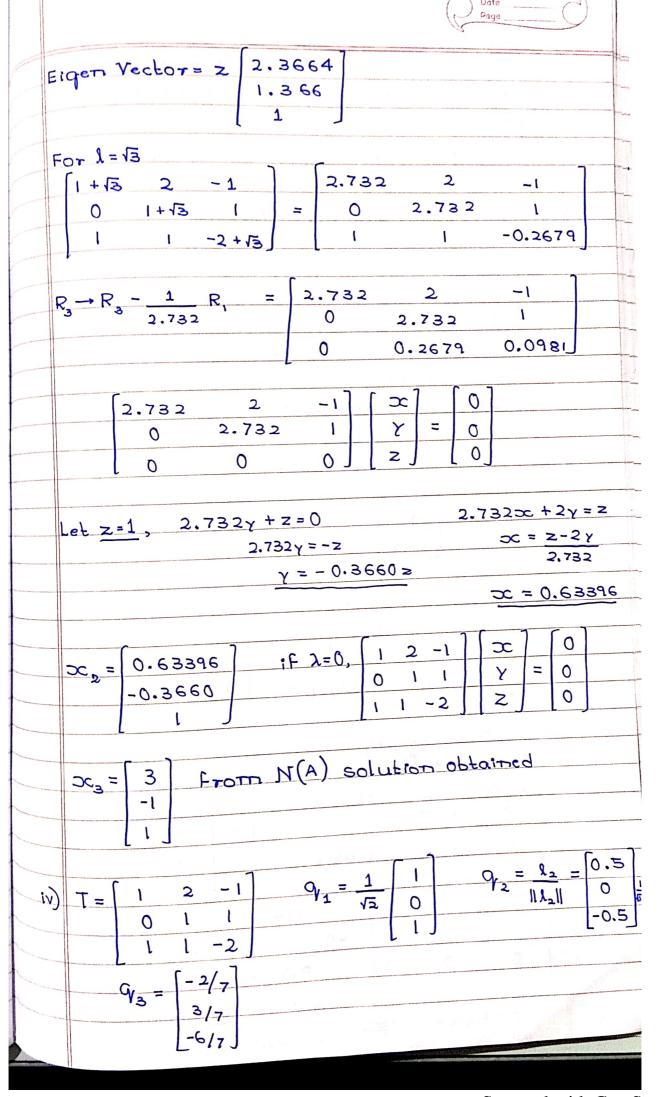
$$T = \begin{bmatrix} 1 & 2 & -1 \\ 0 & 1 & 1 \\ 0 & 0 & 0 \end{bmatrix} \Rightarrow \begin{bmatrix} R_1 \to R_1 - 2R_2 & \begin{bmatrix} 1 & 0 & -3 \\ 0 & 1 & 1 \\ 0 & 0 & 0 \end{bmatrix}$$

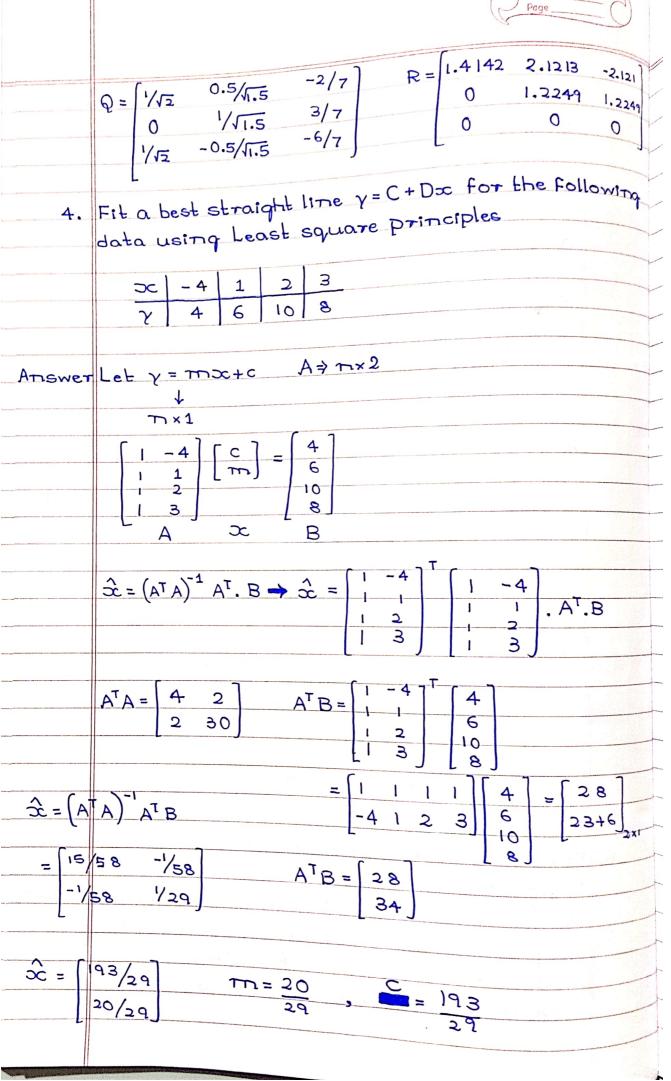
$$\begin{bmatrix} 1 & 0 & -3 \end{bmatrix} \begin{bmatrix} \infty \\ 0 \end{bmatrix} \begin{bmatrix} \infty \\ 0 \end{bmatrix} \begin{bmatrix} 0 \\ 0 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix} \begin{bmatrix} 0 \\ 0$$

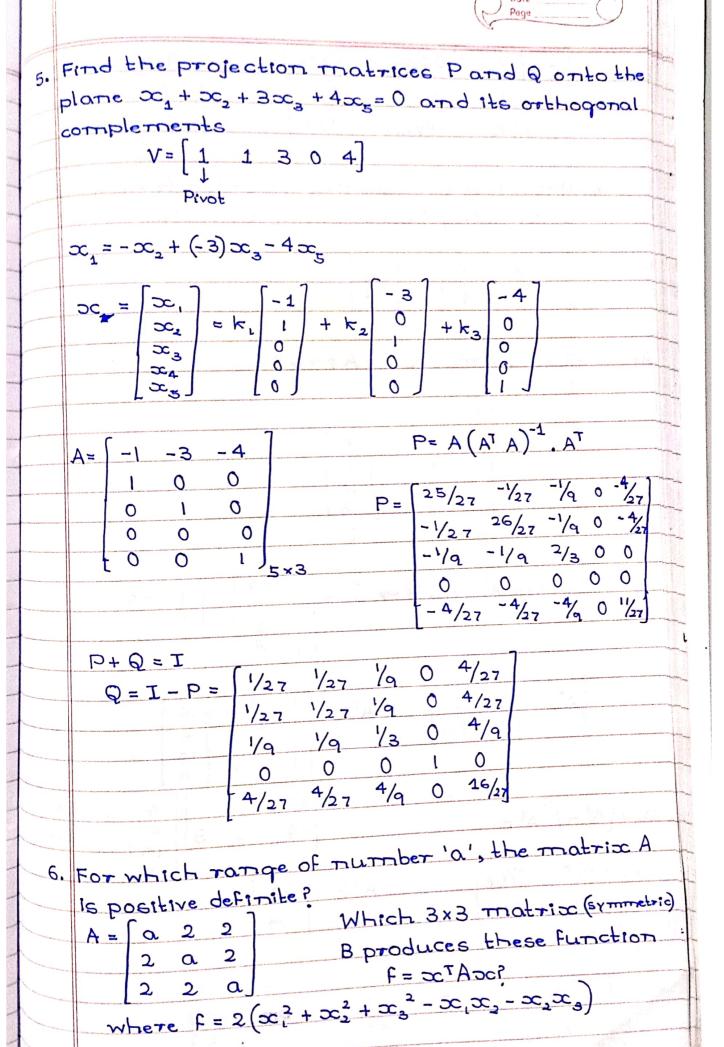
$$N(A) = z \begin{cases} 3 \\ -1 \end{cases}$$
 $N(A) = \{(3,-1,1)\}$ $dim(N(A)) = 1$

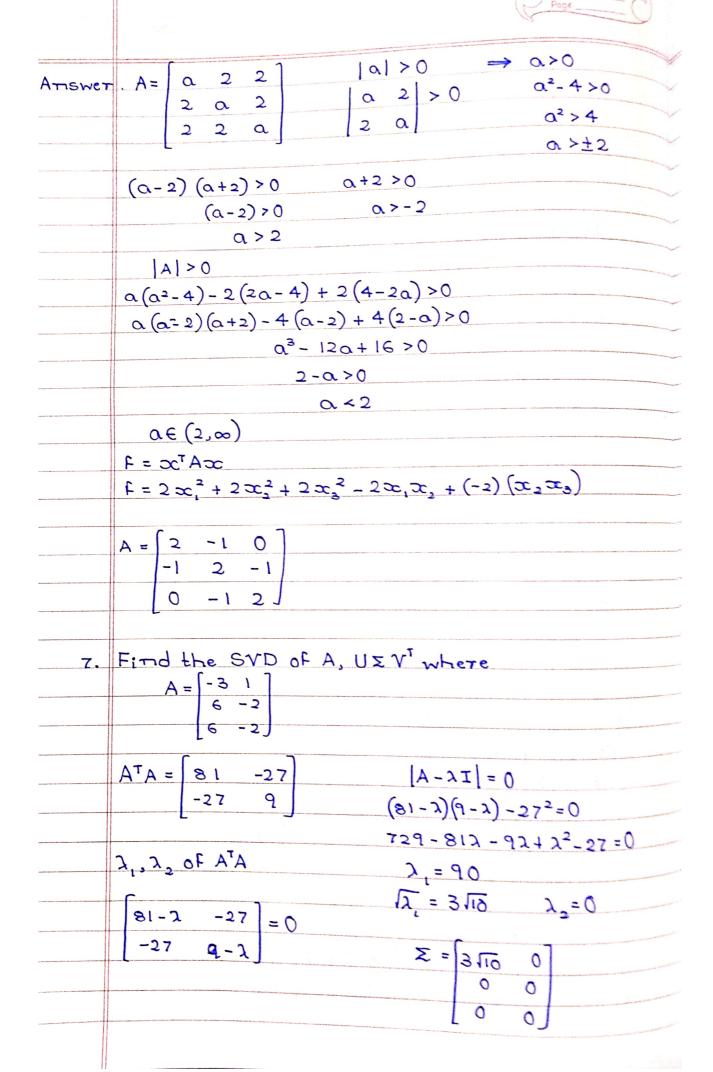
$$T = \begin{bmatrix} 1 & 2 & -1 & b_1 \\ 0 & 1 & 1 & b_2 \\ 1 & 1 & 2 & b_3 \end{bmatrix} \Rightarrow \begin{bmatrix} 1 & 2 & -1 & b_1 \\ 0 & 1 & 1 & b_2 \\ 0 & -1 & -1 & b_3 - b_1 \end{bmatrix}$$

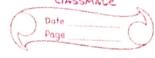












$$\lambda_{1} \text{ vector } x_{1} = \begin{bmatrix} -9 & -27 \\ -27 & -81 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

$$+9x + 27y = 0$$

$$27x + 81y = 0$$

$$y = \begin{bmatrix} -279 \\ 1 \end{bmatrix} = \begin{bmatrix} -3 \\ 1 \end{bmatrix}$$

$$\text{if } A=0, x_{2} = \begin{bmatrix} 1 \\ 3 \end{bmatrix}$$

For
$$V$$
, $\lambda_1 = 90$ and $\lambda_2 = 0$, $V_1 = \frac{\infty_1}{\|\infty_1\|} = \frac{1}{\sqrt{10}} \begin{bmatrix} 3 \\ 1 \end{bmatrix}$

$$V_2 = \frac{\infty_2}{\|\infty_2\|} = \begin{bmatrix} \sqrt{\sqrt{10}} \\ 3/\sqrt{10} \end{bmatrix} \qquad V = \begin{bmatrix} -3/\sqrt{10} & \sqrt{\sqrt{10}} \\ \sqrt{\sqrt{10}} & 3/\sqrt{10} \end{bmatrix} = \sqrt{\frac{1}{2}}$$

Finding U. Eigen Values
$$\Rightarrow$$
 90,0,0
 $U_1 = A.v. = 1 A.v = \begin{bmatrix} -0.266 \\ 0.533 \end{bmatrix}$
0.533

$$\sigma_{2} = 0$$
, $(AA^{T} - 0.I) = 0$
 $AA^{T} = \infty$

$$\begin{bmatrix} 10 & -20 & -20 \\ -20 & 40 & 40 \end{bmatrix} \begin{bmatrix} \infty \\ \gamma \\ z \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$$

$$\begin{bmatrix} -20 & 40 & 40 \end{bmatrix} \begin{bmatrix} 2 & 2 & 2 \\ 2 & 3 & 4 \end{bmatrix}$$

Finding Null Space

$$R_2 \rightarrow R_2 + 2R$$
, $\begin{bmatrix} 10 & -20 & -20 \\ 0 & 0 & 0 \end{bmatrix} \begin{bmatrix} x \\ y & = 0 \\ z & 0 \end{bmatrix}$

$$10\infty - 20\gamma - 20z = 0$$

$$\infty - 2\gamma - 2z = 0$$

$$\infty = 2\gamma + 2z$$

$$\infty = \gamma \begin{bmatrix} 2 \\ 1 \\ 0 \end{bmatrix} + z \begin{bmatrix} 2 \\ 0 \\ 1 \end{bmatrix}$$



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		7	-0.266	0.8944	Q	e de la constante de la consta
	For $\lambda=0$, $\mu=\frac{1}{2}$	Andrew Control of the Property of the State of	And the state of t		P	a la minima
-	15	or and the same party and a second party and a second second	0.533	0	С	
l		J	0.555	The second secon		and the last

U is orthogonal to [Uz L Uz] -0.2660 + 0.5336 =0

$$\alpha = 0.4$$
, $b = 0.8$, $c = 1$

$$V_3 = \frac{1}{\sqrt{1.8}} \begin{cases} 0.4 \\ 0.8 \\ 1 \end{cases}$$

1							_	
A =	[1/3	2/15	0.4/1.8		0	-3\110	1/40	
	-2/3	1/15	8.1\8.0	0	0	1/10	3/10 -	
	-2/3	0	1/11.8	0	0			
u			Σ		$\sqrt{\tau}$			