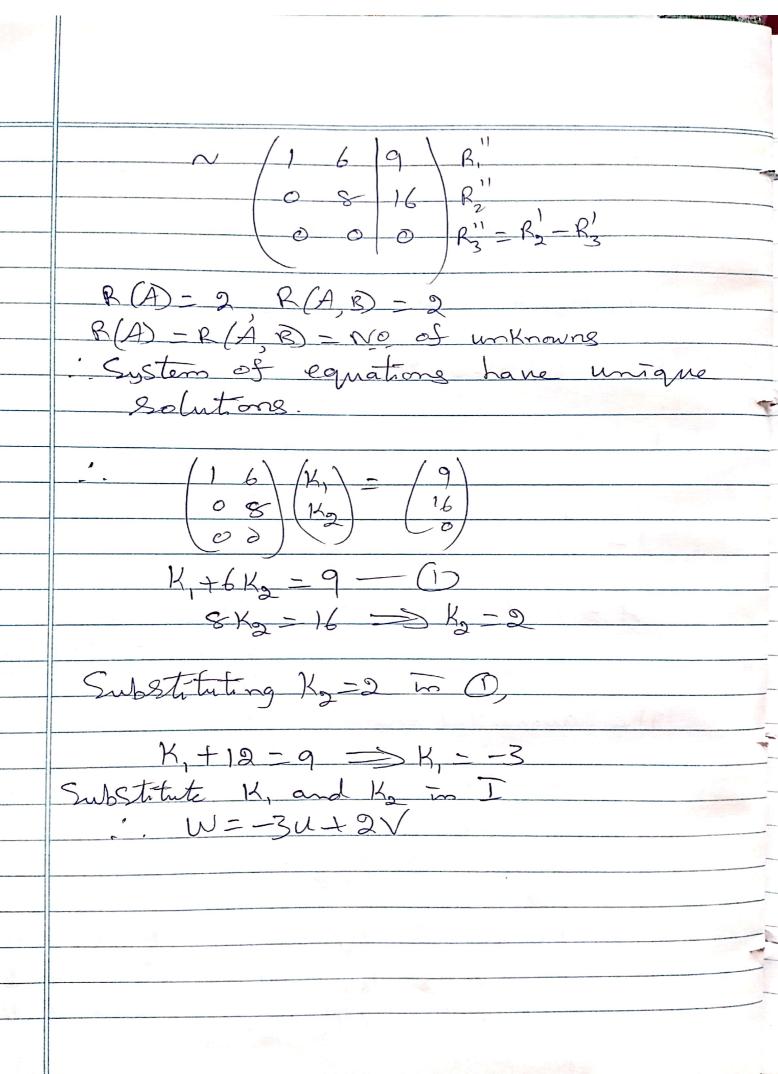
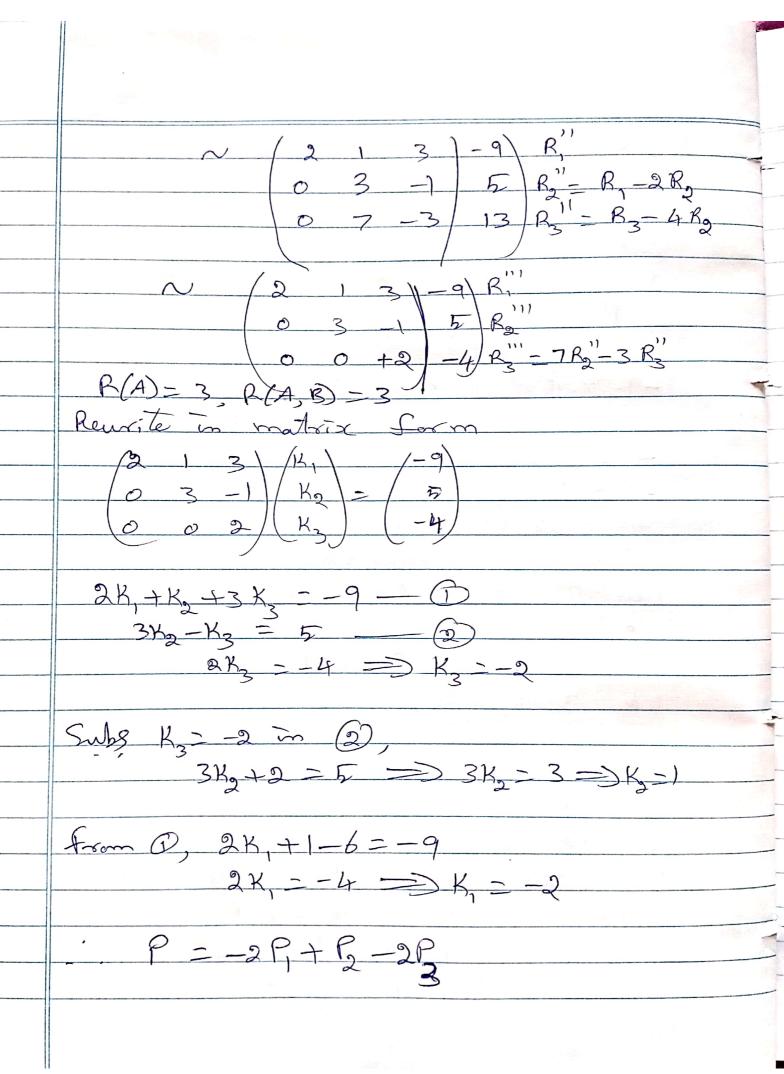
	Linear Combination
	Definition
	A vector w in a vector space V is Called a
	tinear Combination of the Vectors u, uz, un
	in Vif W can be expressed in the form
	W=K, H+K2U2+-+Knun where K, K2. Kn are Scalar
	Example
	Every Vector in R3 can be expressed as a linear
	Combination of the Standard Vectors
	i = (1,0,0), $i = (0,1,0)$ , $k = (0,0,1)$
	[(a,b,c) = a(1,0,0)+b(0,1,0)+c(0,0,1)
	ProHems
1.	Consider the Vectors u= (1,2-1) and
	12=(6,4,2) in R3. Show that w= (9,2,7) is a
	linear Combination of U and O.
	$C \mid A_{r}$
	Solution: IS w is a linear Combination of u and U
	then W= Ku+K D - I
	(9,2,7)=K, (1,2,-1)+K, (6,4,2)
	To check whether K. Kz exists
	· / d

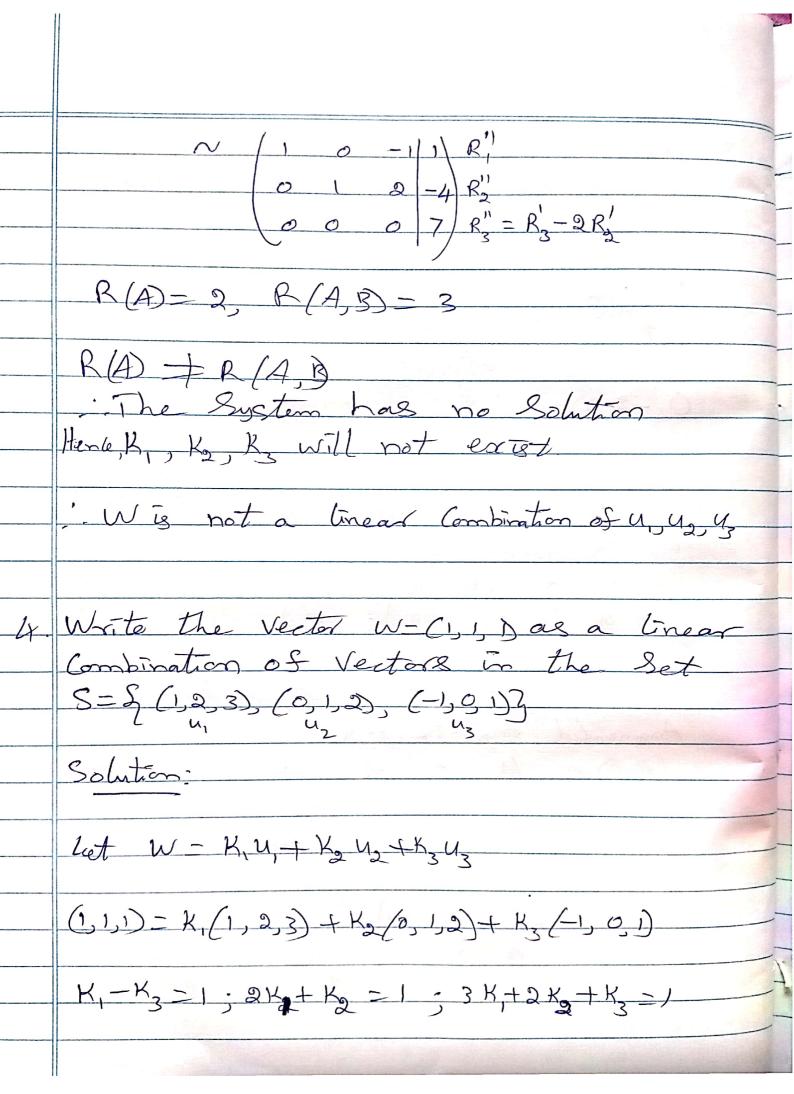
(9,2,7) = (K,,2K,,-K) -> (6K2, 4K2,2K2) = (K,+6K2, 2K,+4K2, -K,+2K2) - K,+6K2=9, 2K,+4K2=2, -K,+2K2=7 Solve the above three ears by Gauss Elimination augmented matrix is

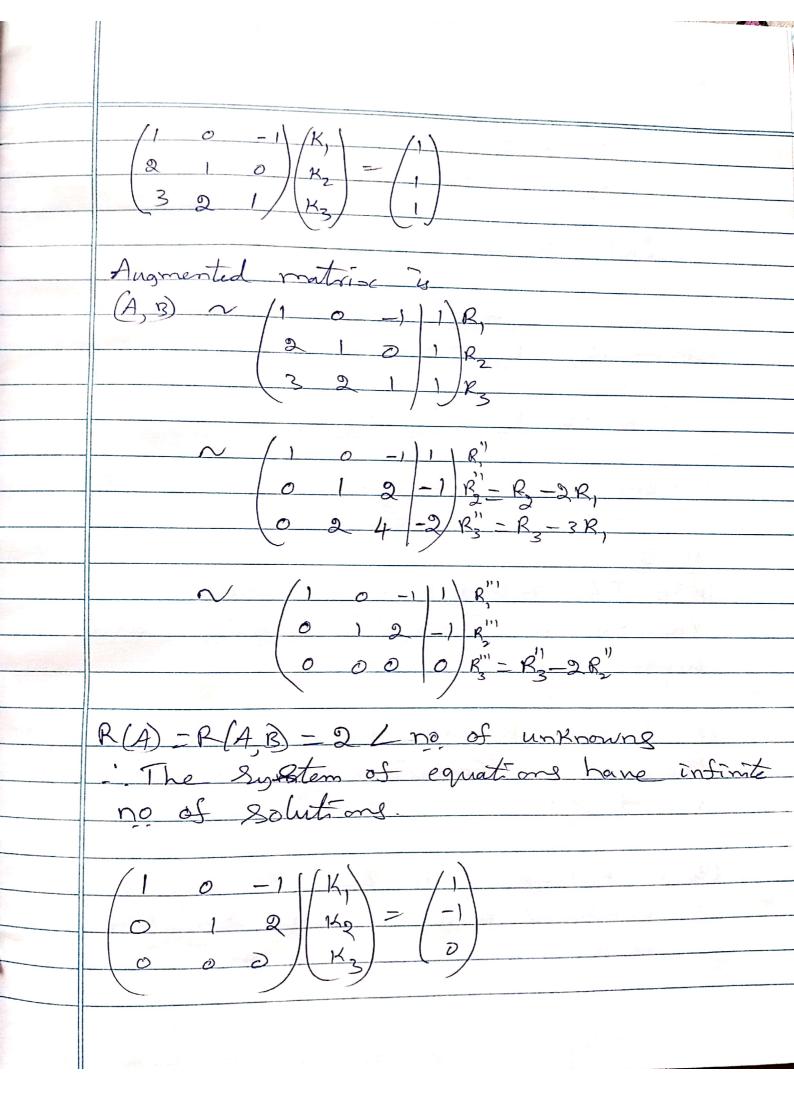


2. Express -9-7x-15x2 as a tinear combination of P1 = 2+x+4x2, Pa=1-x+3x3, P3 = 3+2x+5x3 Let P= -9-7x-15x2 If P is a linear Combination of P, P2, P3 then P = K, P, + K2 P2 + K2 P2 -9-7x-15x2= K, (2+x+4x2)+ K2(1-x+3x2)+ K3 (3-12x+5x2) -9 = 2K, +K2 + 3K3 -7 = K, -K2+2K3 -15 = 4K, +3Kg+5K3 Solve above 3 eques using Gauss Elimination method Rewritting in matrix form,  $\begin{pmatrix}
2 & 1 & 3 & K_1 & -9 \\
1 & -1 & 2 & K_2 & -7 \\
4 & 3 & 5 & K_3 & -15
\end{pmatrix}$ The augmented routrix is 



3) Check whether the Vectors w (1,-2,2) is a linear combination of vectors in the Set S= { (1,2,3), (0,1,2), (-1,0,1)} Solution Let W= K, U, +K, U, +K, U, (1, -2,2)=K,(1,2,3)+K,(91,2)+K3(-1,0,+1) K1-K3-1; 2X, +K2 = -2; 3K, +2K2+K3-2 Augmented routrix (A, B) is 





13, -13 = 1 - 0 13 + 213 = -1 - 2let K3 = 1 From (2), Ky = -3 -- K, -2, K2 =-3, K3=1 Hence W= 24,-34, +43 =0 Note: () IF R/A = R/A, B) = no of unknowns, then the system of eggs is Consistent and have unique Solution (2) If R(A)=R(A,B) L no of unknowns then the System is Consistent and have insinite no of Solutions (3) If R(A) = R(A,B), then the System is Intensistent and have no Solution,

	1
	Linear Defendence and Indefendence
_	
-	Definition: Linearly Dependent
	A Set of Vectors S-SU 12 127 in a
	A Set of Vectors S-SU, 12, 12, 12, in a vector space V is said to be linearly
	all fendent It there exists & Calara K K. K.
-	not all Zero Such that K, V, +K, Vg + - +K, V = 0
-	
-	Linearly Independent
	A set of vectors S-SU, 12, 12, in
	a vector space V is Said to be tinearly
	Indefendent if there exists scalars K, =0,
	Kg=0,, Kr=0 Such that K, O, + + K, Dr=0.
-	harry man of the control of the cont
	Note
-	In a system of homogeneous linear equations
-	In a system of nonogeneous areas from S
-	(1) the System is always consistent if R/A)=R(A, B)
	2) if R(A) = R(A, B) = no of unknowns, then the
	System will have trivial Solution
	(is all unknowns = 0)
	11) 1 - Ha Sultem has unique
	The Wall Soma
	and the system has
	number of non-zero solutions

Problems. 1. Determine whether the Vectors 4=6,-2,3) V2 = (5,6,-1), V3=(3,2,1) form a linearly defendent Set (08) a linearly Independent Set Let A = \( 1 -2 3 \)
\( \forall \)
\( \forall \)
\( \forall \)
\( 3 2 1 \) The System has an institute no of non-zero Solutions. ie K, K2 Kzexists. not all Zero . SV, va, v3) Sorm a linearly dependent Set. 2. Determine whether the Set of vectors  $S = \{0,2,3\}$ , (0,1,2), (-2,0)17 in  $R^3$  is tinearly independent (or) linearly dependent.

Solution. |A| = 1 2 3 0 12 = 1(1-0)-2(0+4)+3(0+2) -2 0 1 = 1-8+6=-1+0(The System has unique Solution (Te) trivial Solution K, - K2 - K3 - 0 . S is tinearly independent 3. Determine whether the Set of Vectors
in Po is linearly independent where the
Set is { 1+x+2x3, 2+5x-x3, x+x3} Solution  $\begin{array}{c|cccc}
A & = & 1 & 1 & 2 \\
\hline
2 & 5 & -1 \\
\hline
0 & 1 & 1
\end{array}$