Ans 1)
$$A = \begin{bmatrix} 1 & 2 & 3 & 0 \\ 2 & 4 & 3 & 2 \\ 3 & 2 & 1 & 3 \\ 3 & 2 & 7 & 5 \end{bmatrix} \Rightarrow R_1$$

step 0 → R2 - 2R1, R3-3R1, R4-6R1
We get, Also R2 ↔ R3 [Swap]

Stek 2 -> R4 R2 R4-R2

Step 3 = R4 + R3

As we can see here there is 4 non-zero rows so rank of the Matrix A = 4

AR) The alimension of the alomain W is n = 2+2 Now Nulleity [T] = dim (Ker (T)) A synclaix matrix [a b will map to zero polynomial by satisfying the following conditions d-6:0 b-C =0 e-a = 0 This implies a = b = C 30 the matrix = [a a a] The stim of this space is 1 so nullity of T is 1. Now Rank (T) + Nulity (T) = alim (W) Rank (T) = 3 Rank is 3.

A3)
$$A = \begin{bmatrix} 2 & -1 \\ -1 & a \end{bmatrix}$$
 $A^{-1} = \frac{1}{aa^{1}-bc} \begin{bmatrix} a1 & -b \\ -c & a \end{bmatrix}$
 $A = R, b = -1$ $C = -1$ $c = 2$

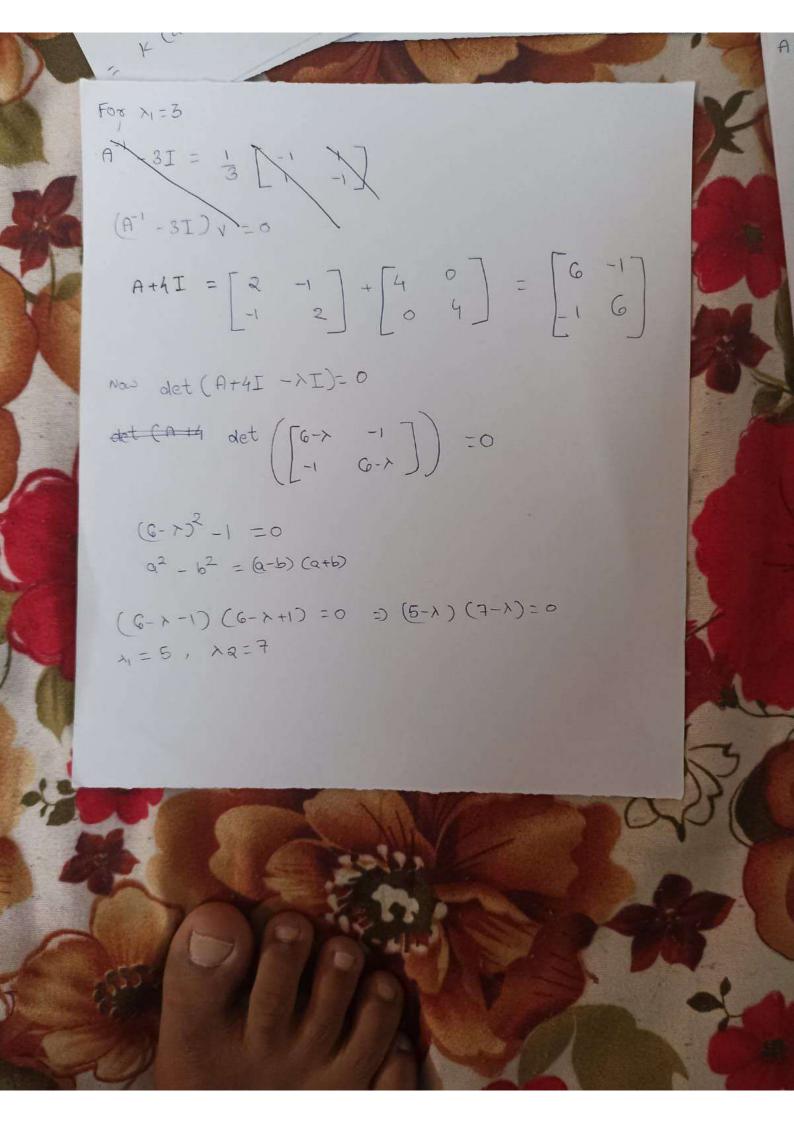
80

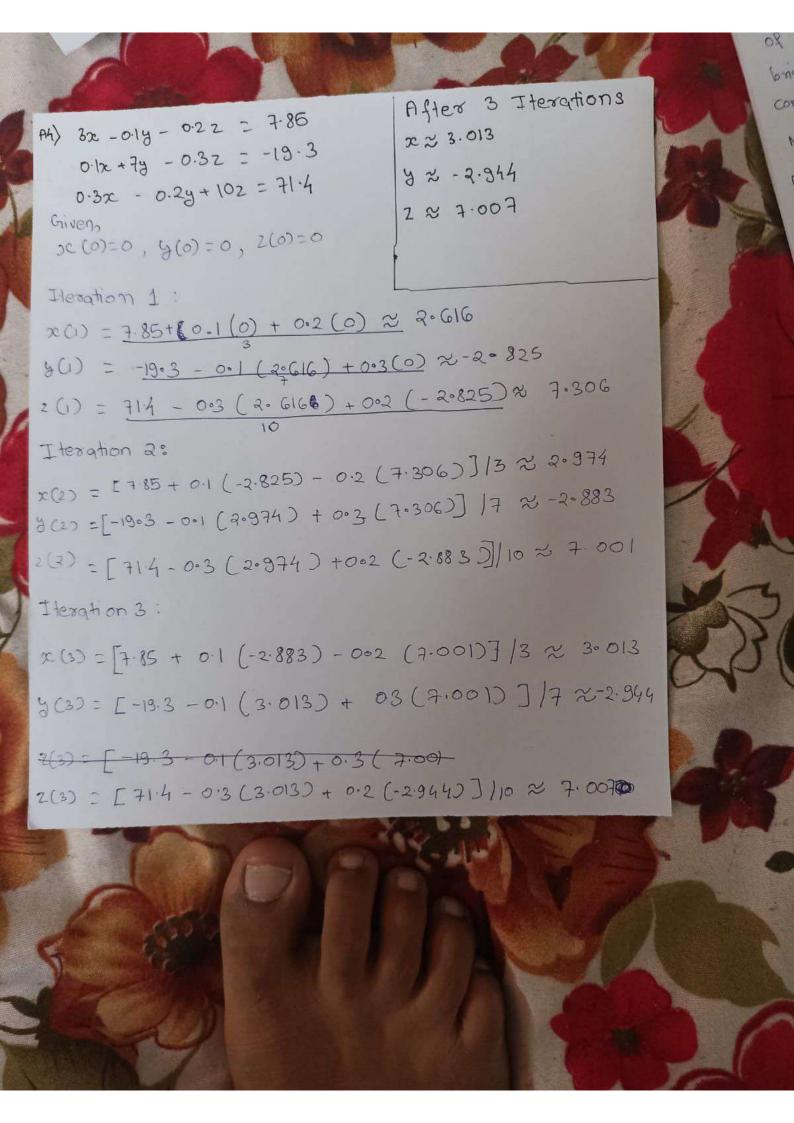
 $A^{-1} = \frac{1}{4-1R} \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$

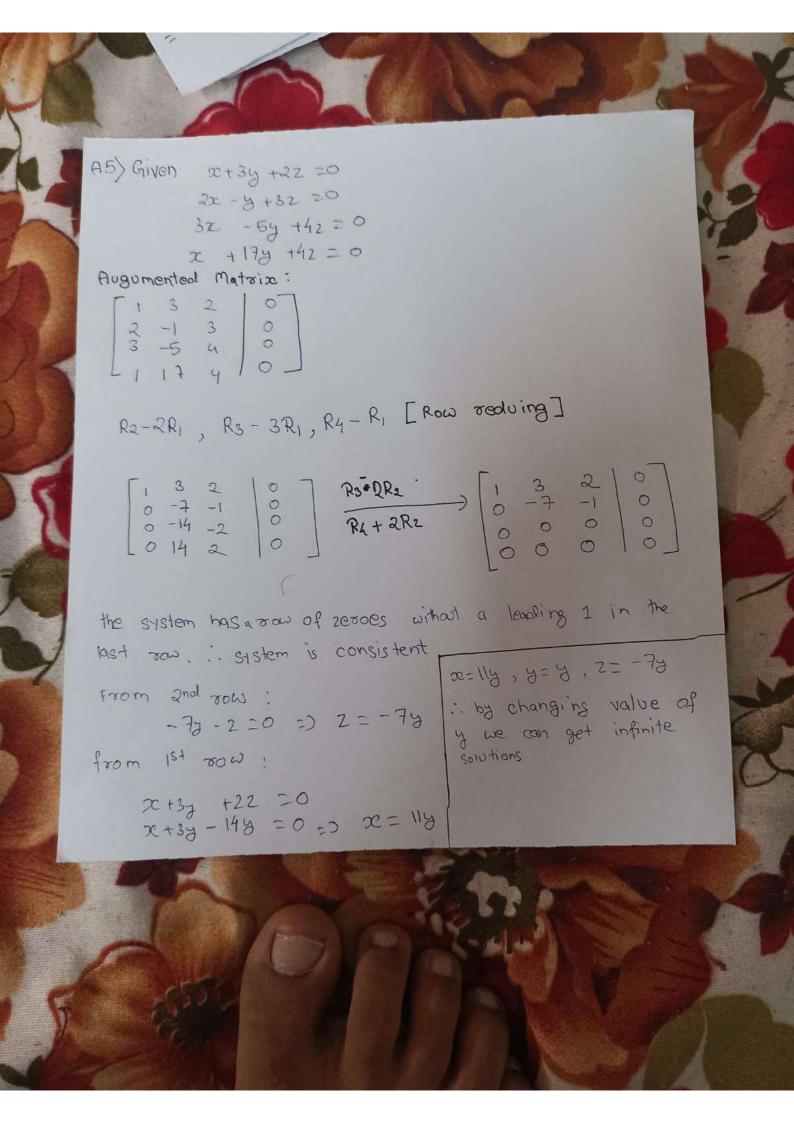
Now for eigen value and eigen vectors of A^{-1}
 $det(A^{-1} - \lambda I) = 0$
 $det(\frac{1}{3}\begin{bmatrix} 2-\lambda & 1 \\ 1 & 2-\lambda \end{bmatrix}) = 0$
 $det(\frac{1}{3}\begin{bmatrix} 2-\lambda & 1 \\ 1 & 2-\lambda \end{bmatrix}) = 0$
 $det(2-\lambda)^{2} - \frac{1}{2} = 0$
 $a^{2} - b^{2} = (a-b)(a+b)$

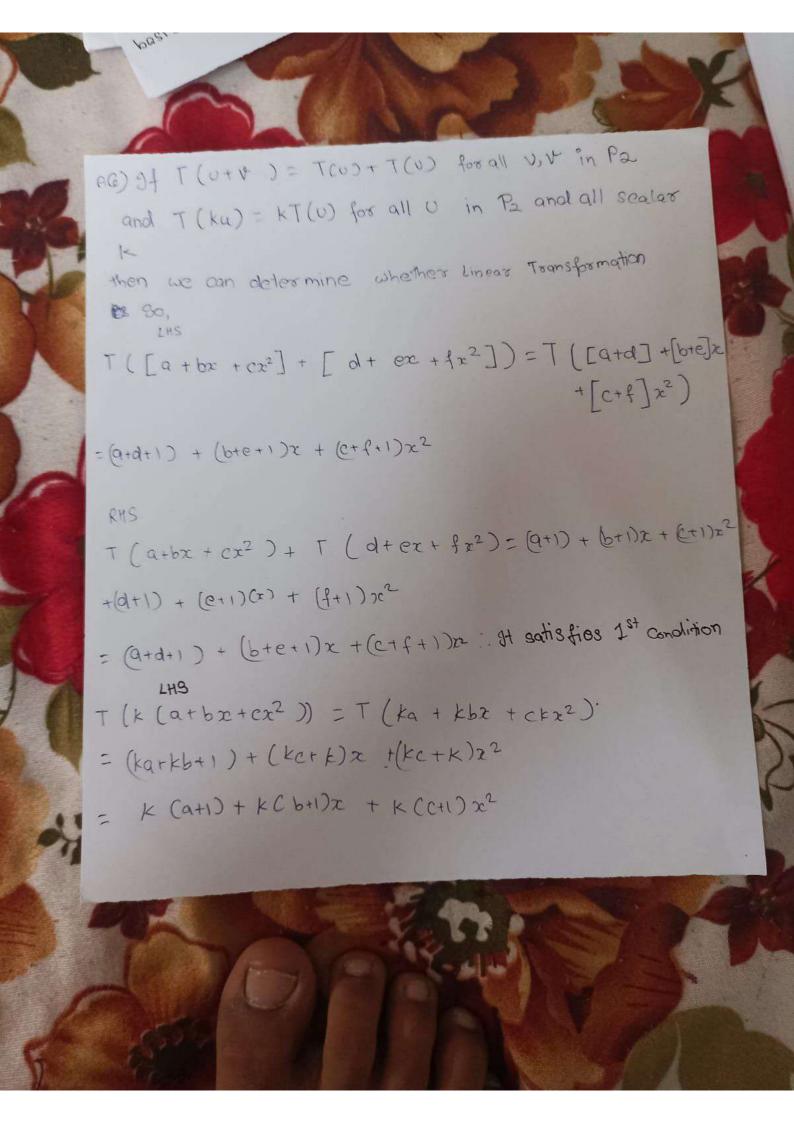
80 R $(2-\lambda - 1)(2-\lambda + 1) = 0 = (3-\lambda)(1-\lambda) = 0$

Gigen values are $\lambda = 3$ $\lambda = 1$









basis = 0+3(18))7 = 5 KT (a+bx+cx2) = K(a+1) + (b+1) = + (C+1) x2) = k(a+1) + k(b+1)x + k(c+1)x2 . It satisfies 2nd Condition : It is Indeed Linear Transformation

