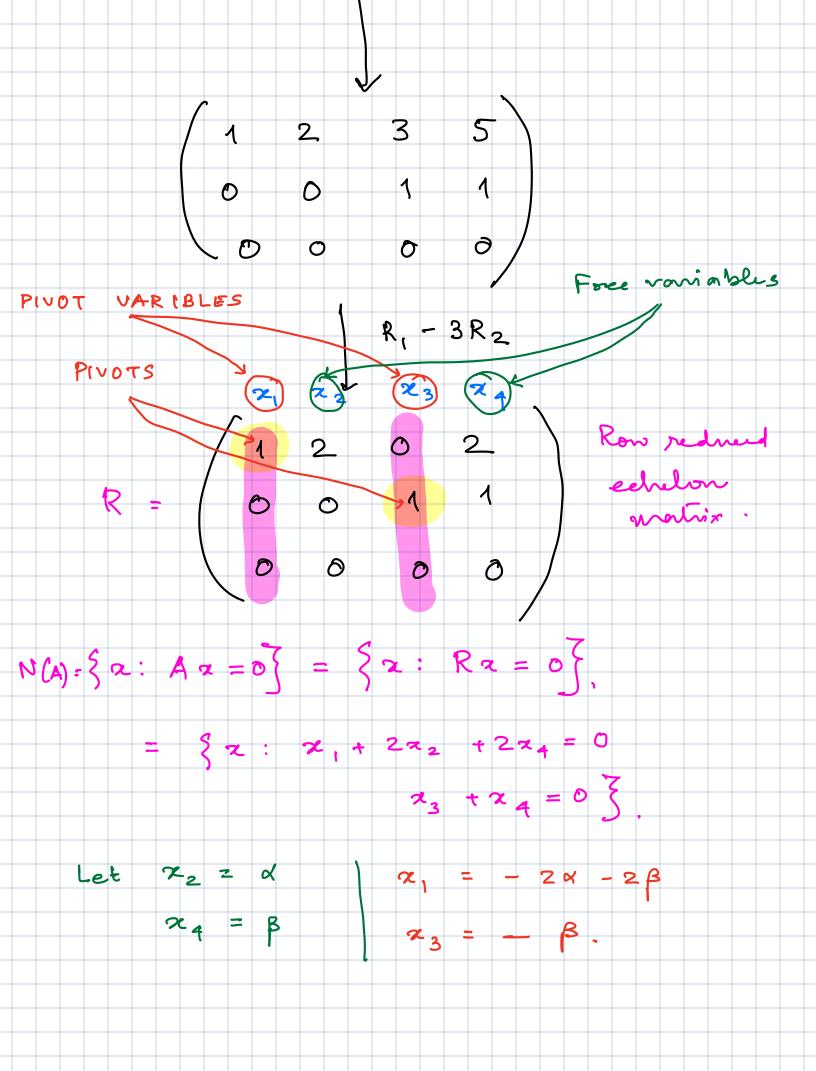
Lecture Feb 20, 2025 Solve $2, +2x_2 + 3x_3 + 5x_4 = b$, $1x_5 + ax_1$ $2x_1 + 4x_2 + 8x_3 + 12x_4 = b^2$ $3x_1 + 6x_2 + 7x_3 + 13x_4 = b^3$ for some appropriate (b1, b2, b3 € IR), such that the system is solvable (non-singular). A = b $A = \begin{pmatrix} 1 & 2 & 3 & 5 \\ 2 & 4 & 8 & 12 \\ 3 & 6 & 7 & 13 \end{pmatrix}$ Idia: STEP I: Solve Az=0. Describe N(A). din N(A)? STEP II: Find b, b2, b3 ER such lint systèm is solvable. STEPIII: Choose one poulicular meh 6 and get a particular solution to STEP IV: \$2: A2 = b }
= {20 + 2: 2 = N(A)}.

STEP I: , Echelon - , sono-reduced echelon A 2 3 5 A ५ 8 12 2 3 6 7 13 R_2-2R_1 $/R_3-3R_1$ 1 2 0 PIVOT 1st 2000 0 R3 + R2 2 Echelon 2 2 ٥ 0 PivoT ට 0 Ð PIVOT $k_2 = 3$ 1/2 R2



So N(A) $= \left\{ \left(-2\alpha - 2\beta, \alpha, -\beta, \beta\right) : \alpha, \beta \in \mathbb{R} \right\}.$ you can unite as columns as we identified - 2 x - 2 p Soly. when $\alpha = 1$, $\beta = 0$ $\alpha_1 = -2$, $\alpha_3 = 0$. Soly when d=0, B=1 & $x_1 = -2$, $x_3 = -1$. 1 sitting at different fosition makes them linearly in defundant. - We get here 2 LI - vectors corresponding to 2 foce variables

So din N (A) = no. of free variables. Cas din " subspace & din R"= n as IR^ - can't have a subset containing more than or ells.) Here dim N(A) = 2. This is what we said in yesterday's class: if the number of pirot is or, then the number of free variables is n-r & dim N(A) = n-r. Coming back to the soln. We have completed STEP I Nono to find a banlicular b: $R_3 + R_2$ $0 0 2 2 1 b_2 - 2b_1$ $0 0 0 0 0 b_3 + b_2 - 5b_1$

