Solving Liver Systems siven 1 2000

siven A =1 ERM mxn ER"

$$m = n, A = gune, Goldilocks
sume # of opentions as unknowns
$$m = n = 1$$

$$ax = b$$

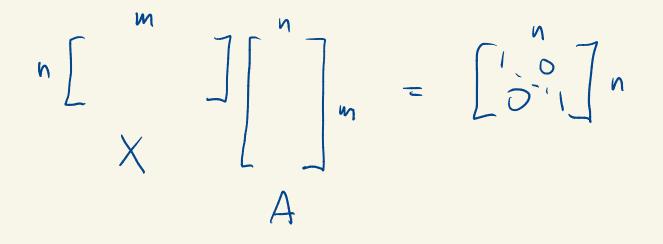
$$ab \in R$$

$$\begin{bmatrix} a = a^{-1} \\ a = a^{-1} \end{bmatrix}$$

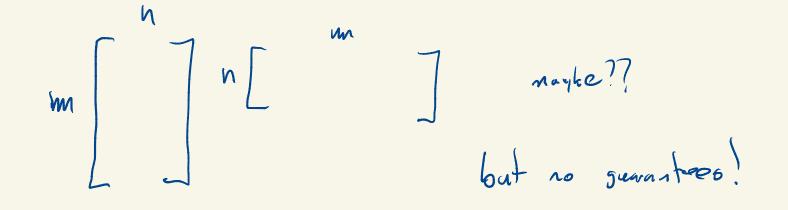
$$a^{-1}a + a^{-1}b$$

$$A^{-1}A = I$$

$$A^{-1}A^{-1}$$$$



Can X also be, for this full notrox, a vislot incose?



Hope: If you on fud a (left?, visht?) inveseX mushe the solution of Ax=6 13 Simply Xb. ax = 6? $x = a^{-1}6$?

$$A = \begin{bmatrix} 1 & 2 \\ 5 & 4 \\ 5 & 6 \end{bmatrix}$$
$$X = \frac{1}{2} \begin{bmatrix} 0 & -6 & 4 \\ 0 & 5 & -3 \end{bmatrix}$$

claun: X is a left morse of A

 $a = 5 \qquad a' = \frac{1}{5}$

$$\widetilde{X} = \frac{1}{2} \begin{bmatrix} -4 & 2 & 0 \\ 3 & -1 & 0 \end{bmatrix}$$

$$\frac{1}{2} \begin{bmatrix} -4 & 2 & 0 \\ 3 & -1 & 0 \end{bmatrix} \begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 56 \end{bmatrix} = \frac{1}{2} \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} = \mathbf{I}$$
notrix on how now then one left invese.
$$\mathbf{I} = \mathbf{I}$$

$$\mathbf{I} = \mathbf{I}$$

it has infinitely may:

$$\alpha X + \beta X$$

 $\omega X + \beta X$
 $\omega X +$

We will say X is an invesse of A if
XA = I and AX = I
in which case we will write
$$X = A^{-1}$$

is it which for the weight of the second sec

$$2 \times 2 \quad A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$$

$$\frac{1}{ad - bc} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$$

$$\frac{1}{ad - bc} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$$

$$\frac{1}{ad - bc} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$$

$$\frac{1}{cd - bc} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$$

$$\frac{1}{cd - bc} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix} \begin{bmatrix} a & b \\ c & d \end{bmatrix} = \begin{bmatrix} ad - bc & 0 \\ 0 & ad - bc \end{bmatrix}$$

$$\frac{1}{cd - bc} \begin{bmatrix} a & b \\ -c & a \end{bmatrix} = \begin{bmatrix} ad - bc & 0 \\ 0 & ad - bc \end{bmatrix}$$

$$\frac{1}{cd - bc} \begin{bmatrix} a & b \\ -c & a \end{bmatrix} = \begin{bmatrix} ad - bc & 0 \\ 0 & ad - bc \end{bmatrix}$$

ad-be is called the determinant at
$$A$$
, $(2,2)$
det (A)

Suppose A has an masse A1.
We want to solve
$$Ax = b$$

If a solution exists then

$$\begin{array}{ccc}
A^{-1}A & x &= A^{-1}b \\
\overline{x} & \overline{x} &= A^{-1}b \\
A^{-1} & \overline{x} &= A^{-1}b \\
A^{-1} & \overline{x} &= A^{-1}b \\
a & b \\
a & b \\
a & b \\
nverse \\
\end{array}$$

You sive me b. I form
$$A^{-1}b$$
. Is this a solution?
 $A(A^{-1}b) = (AA^{-1}b) = A^{-1}$ is a night
invose
 $= Ib = b / yep!$

() pshot: If A has a two sided invoses
then
$$A_{x} = b$$
 always has exactly one
solutions and it is given by $x = A^{-1}b$.

From the above: if A has a left invesse
$$X$$

then the only possible solution of $A_X = 6$
is $x = Xb$. However, it need not be
true that Xb is actually a solution.

 $X = \frac{1}{2} \begin{bmatrix} 0 & -6 & 4 \\ 0 & 5 & -3 \end{bmatrix}$ $A = \begin{bmatrix} 12 \\ 34 \\ 56 \end{bmatrix}$ $b = \begin{bmatrix} 2 \\ 2 \\ 4 \end{bmatrix}$ Ax= b Ax=b The solution, if it exists, is $\frac{1}{2}\begin{bmatrix} c & -6 & 0 \\ 0 & 5 & -3 \end{bmatrix} \begin{bmatrix} 2 \\ 2 \\ -2 \end{bmatrix} = \frac{1}{2}\begin{bmatrix} 4 \\ -2 \end{bmatrix} = \begin{bmatrix} 2 \\ -1 \end{bmatrix}$ XAX = Xb $I_X = X G$ x = X6 If there is an x with 1x=6 Then x=X6

(b) N_0 $b = \begin{bmatrix} 2\\ 2\\ 4\\ 4 \end{bmatrix}$ Did it work? $\begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{bmatrix} \begin{bmatrix} 2 \\ -i \end{bmatrix} = \begin{bmatrix} 0 \\ 2 \\ 4 \end{bmatrix}$

V is a router muerse

want 4x=6

A(Xb) = (AX)h = Ib = b