Welone lo Math 54! (Sections 215/218)
CSI: Leurs Pan , morth.berkeley. edu/ryllpan Envail: yllpan@berkely edu
Offre Hons: $M \quad 10-11, W \quad 12-13$ Earno 1070
HW is due on grodescope an Tuesdoy 3pm

- If not enolled on grodesope, send we an email
- Please don'l email HW bo me
- $1^{\text {He }}$ HiN dre $3^{\text {on }}$ Angnol
- NO LATE SUBMissions

Quizzes will be on Thursdays

- Quizees 15 milis
- Lowest 2 scores dopped
- Your cannot tare qur from anommer cijl
- NO MAKE-UP QuIzZES
- Acl quizzes in pizrson

Linear Systems of Equations
EQuation

MATHis
REPRESENTATION
left hond rigtthond
$\left(\begin{array}{cc:c}2 & 3 & 4 \\ 4 & 1 & -2\end{array}\right)$
1
1
1
1 $\left(\begin{array}{cc:c}4 & 6 & 8 \\ 4 & 1 & -2\end{array}\right)$
divide $\div 5$

$$
\begin{array}{r}
y=2 \\
4 x+y=-2
\end{array}
$$



$$
4 x=-4
$$


divicle vedrow

$$
\text { by } \div 4 \quad x=-1
$$

swap rows

- Every linear equation car be unites using a motorists representation
- Con perform the usual now operations vise on the matrix
- Linear Algelonar is enol the sludgy of these equations and their matrices

Row peratims

1) Swap rows
2) Mutliphy row by a scalar
3) Add / subbrat row furn another

There are called elementary row operations
$\rightarrow$ The goal is lo solve the linear equation using these operations

Def.

Echelon Form

$$
\left(\begin{array}{lll:l}
1 & 1 & 2 & 4 \\
0 & 2 & 1 & 1 \\
0 & 0 & 0 & 0 \\
\text { pivots }
\end{array}\right.
$$

- Zens rows at bottom
- Leading non-zeno entries in each row go from left bright
- Leading nan zero extremes in each row are called profs

Reduced Row Echelon

$$
\frac{\text { Form }}{\left(\begin{array}{cc:c}
1 & 0 & 5 \\
0 & 1 & 10 \\
0 & 0 & 0
\end{array}\right)}
$$

Echelon Form plus:

- Pirates are 1
- Anything above and below pints are zero

COAC: Use elementong now operations to reduce matrix bo reduced row echelon form

STRATECY SEEP 1: Putito echelon form
 eliminate

- Find prats and eliminate under pivot

$$
\begin{aligned}
& L \\
& R_{1} \rightarrow\left(\begin{array}{ccc:c}
1 & 2 & 1 & -1 \\
R_{2} \rightarrow\left(\begin{array}{lll}
\text { pint } \\
R_{3}
\end{array}-2\right. & 5 & 1 \\
3 & 5 & -2 & 5
\end{array}\right) .
\end{aligned}
$$

$$
\underbrace{R_{2}-2 R_{1}}_{2} \searrow\left(\begin{array}{ccc:c}
1 & 2 & 1 & -1 \\
R_{3}-3 R_{1} \gg & -2 & 3 & 3 \\
0 & -1 & -5 & -8 \\
\text { eliminate }
\end{array}\right)
$$

eliminate


This is in echelon form.

STEP 2: Cos form echelon bo reduce row echelon.

- Make pints 1
- Make entries above pints 0

$$
\sim R_{2} \times-\frac{1}{2} \rightarrow\left(\begin{array}{ccc:c}
1 & 2 & 0 & 0 \\
0 & 1 & 0 & -3 \\
0 & 0 & 1 & -1
\end{array}\right)
$$

$$
\sim\left(\begin{array}{ccc:c}
1 & 0 & 0 & 6 \\
0 & 1 & 0 & -3 \\
0 & 0 & 1 & -1
\end{array}\right)
$$

This now in reduced vow echelon four!

