SO FAR:

§2.1

$$x - 2y = 1$$
$$3x + 2y = 11$$

$$\Downarrow$$

$$\begin{pmatrix} 1 & -2 \\ 3 & 2 \end{pmatrix} \cdot \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 1 \\ 11 \end{pmatrix}$$

$$\boxed{A\vec{x} = \vec{b}}$$

- HOW TO ENCODE A SYSTEM OF EQNS.
- ROW PICTURE VS.
- COLUMN PICTURE.

$$\begin{pmatrix} 1 \\ 3 \end{pmatrix} x + \begin{pmatrix} -2 \\ 2 \end{pmatrix} y = \begin{pmatrix} 1 \\ 11 \end{pmatrix}$$

Upcoming

§2.2 Elimination.

Idea: Turn equations like:

$$x - 2y = 1$$
$$8y = 8$$

$$\begin{pmatrix} 1 & -2 \\ 0 & 8 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 1 \\ 8 \end{pmatrix}$$

$$U\vec{x} = \vec{c}$$

Q: When does this fail?

§2.3 Elimination encoded by matrix multiplication.

(1) Elimin. matrices,

(2) Row exchange matrices.

Start:

$$Ax = b$$
$$E_1 A x = E_1 b$$
$$E_2 E_1 A x = E_2 E_1 b$$
$$\vdots$$

$$E_k \cdots E_1 A x = E_k \cdots E_1 b$$

gets $\quad U\vec{x} = \vec{c}$

Q: what is matrix mult?

§2.4 matrix op.

$$A + B \quad , \quad cA$$

$A \cdot B$ this is fun!

$\Rightarrow$ 3 diff ways.

§2.5 Inverses.

Identity matrix I.

$$I \cdot A = A$$

Q: $\exists$? A^{-1} $\Rightarrow$ $A^{-1} \cdot A = I$

↳ "such that"

Importance:

$$A x = b \quad (?)$$

$$A^{-1} A x = A^{-1} b$$

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

$$\boxed{x = A^{-1} b}$$

(1) How to Find A^{-1}?

(2) When does A^{-1} exist?

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

$$A A^{-1} \stackrel{?}{=} I$$