

## 1 | Looking forward

- Will use canvas's discussion board in the future.
- Assume matrices have real numbers

## 2 | Solving with Matrices

- Elementary matrices (like  $\begin{bmatrix} 1 & -2 \\ 0 & 1 \end{bmatrix}$ )
- Steps walk through
  - Start with  $\begin{bmatrix} a & b \\ d & e \end{bmatrix}$  (the coefficient matrix).
  - You want to get somewhere such that  $\begin{bmatrix} 1x \\ 0y \end{bmatrix} = \begin{bmatrix} c \\ f \end{bmatrix}$
  - And ultimately  $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} ans_x \\ ans_y \end{bmatrix}$
  - srcD3SolveWithMatrices.png

## 3 | Matrix Inverse Formula

- I should technically know this already.

### 3.1 | Derivation

$$\begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} w & x \\ y & z \end{pmatrix} = \begin{pmatrix} aw + by & ax + bz \\ cw + dy & cx + dz \end{pmatrix}$$

( $\therefore$ )

- There's two 2 variable equations. srcIdentityMatrixFormula.png

## 4 | Matrix Operations

- If we have a set of objects that are almost groups in under both addition and multiplication, then it's called a field
  - 2x2 Matrices aren't quite close enough on the multiplication (too many no inverses) but we can work with other sizes. ### Vector Products
- Matrices of dimension  $n \times 1$
- What multiplications on vectors are "nice"?
  - Transpose the first (left) one and multiply normally, then squish 2x2 into 2x1
  - Cross product

- Element wise (is closed)
  - Take every element and multiply them all together, and then duplicate?
    - \* No, no identity
  - Any one to one mapping?
    - \* No, identity doesn't work if it's on the left.
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