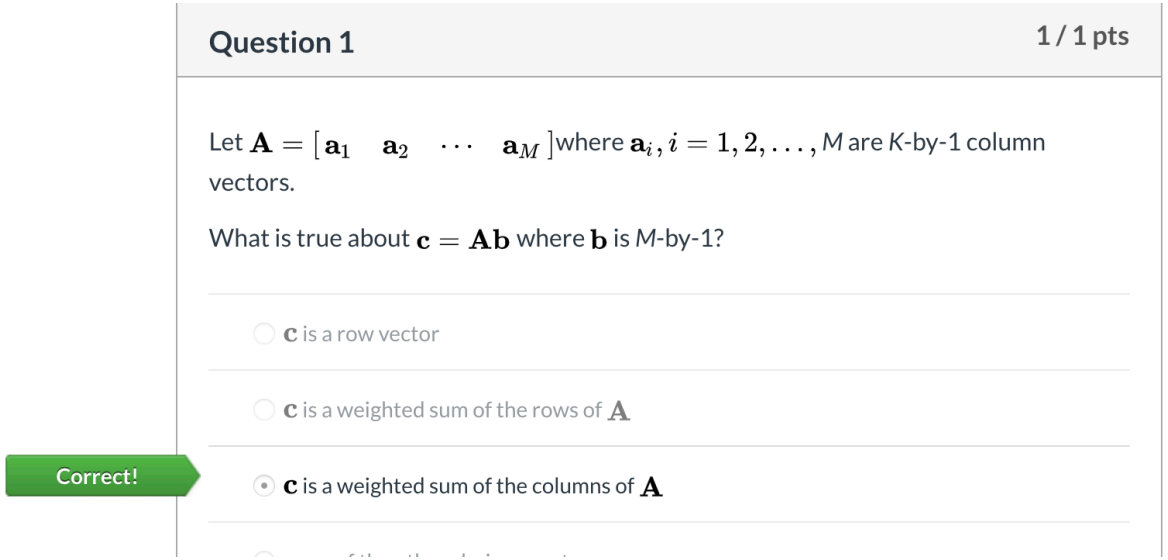
CS/ECE/ME 532 Activity 3

- Unit 1 Quiz Tuesday
  - 25 minutes, at start of class
  - Open notes
  - No interaction with anyone besides instructors
  - Additional practice problems (end of Week 2 module)
- In-class activity
  - Check your group – new students added
  - Time estimates at top of Activity
  - Ask for help, don't spend a lot of time



inner product

$$\boldsymbol{x}^T\boldsymbol{y}$$

outer product

$$\boldsymbol{x}\boldsymbol{y}^T$$

orthogonal if

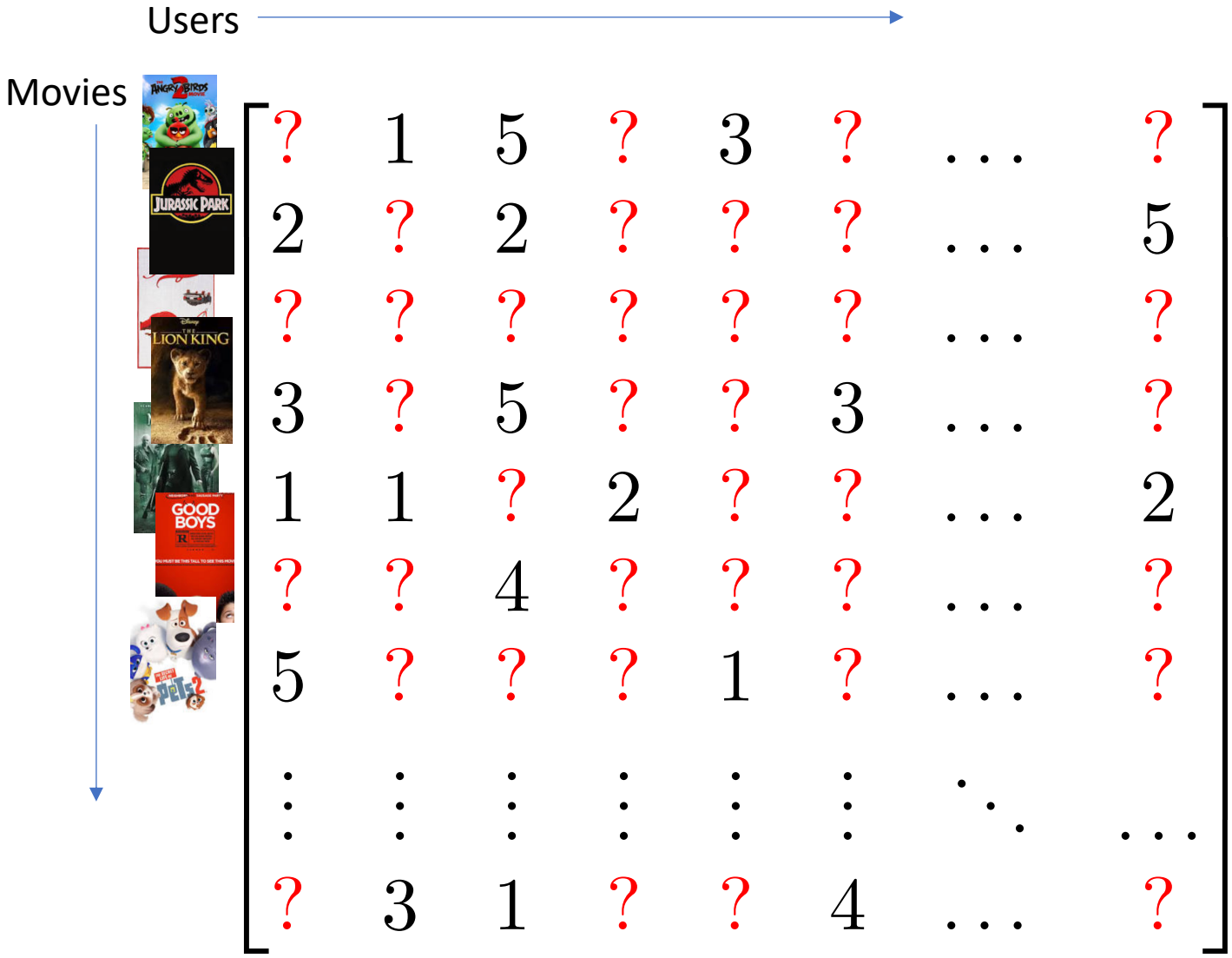
$$\boldsymbol{x}^T\boldsymbol{y} = 0$$

Matrix Completion

- Users rate movies with 1-5 stars

- How can we predict if a user will like a movie they haven't rated?

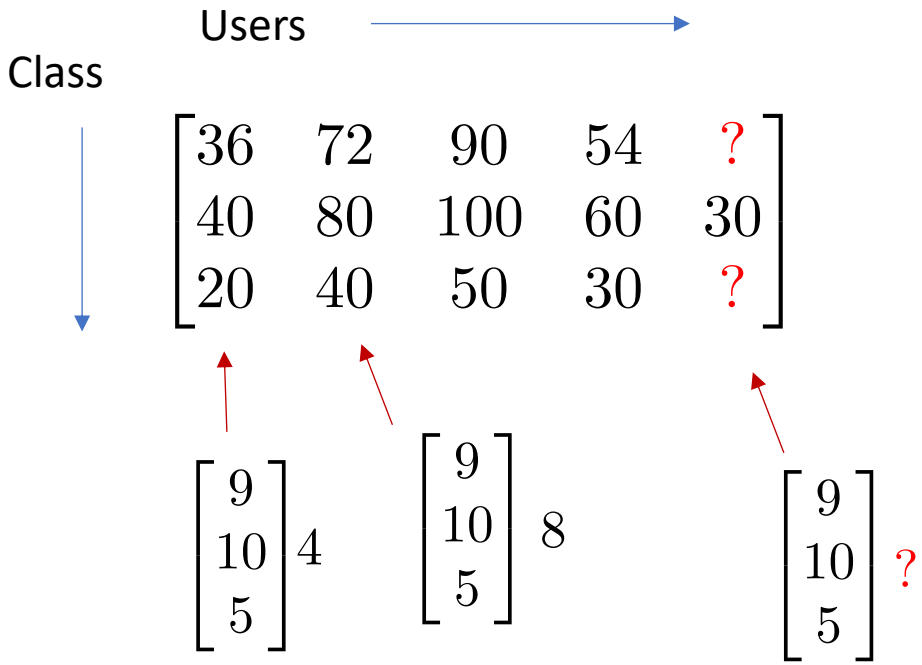
- Assumption: users have similar 'tastes'



Matrix Completion – Toy Example

- Students rate classes from 0-100
- How can we predict if a student will like a class they haven't rated?
- Assumption

$$\boldsymbol{X} = \boldsymbol{t}\boldsymbol{w}^T$$



Multiplying block matrices

$$\boldsymbol{AB} =$$

$$\begin{bmatrix} \boldsymbol{A}_{1,1} & \boldsymbol{A}_{1,2} \\ \boldsymbol{A}_{2,1} & \boldsymbol{A}_{2,2} \end{bmatrix} \begin{bmatrix} \boldsymbol{B}_{1,1} & \boldsymbol{B}_{1,2} \\ \boldsymbol{B}_{2,1} & \boldsymbol{B}_{2,2} \end{bmatrix} = \begin{bmatrix} \boldsymbol{A}_{1,1}\boldsymbol{B}_{1,1} + \boldsymbol{A}_{1,2}\boldsymbol{B}_{2,1} & \text{blah} \\ \text{blah} & \text{blah} \end{bmatrix}$$

$$\begin{bmatrix} | & & | \\ \mathbf{a}_1 & \cdots & \mathbf{a}_n \\ | & & | \end{bmatrix} \begin{bmatrix} - & \mathbf{b}_1^T & - \\ & \vdots & \\ - & \mathbf{b}_n^T & - \end{bmatrix} = \mathbf{a}_1\mathbf{b}_1^T + \cdots + \mathbf{a}_1\mathbf{b}_1^T$$