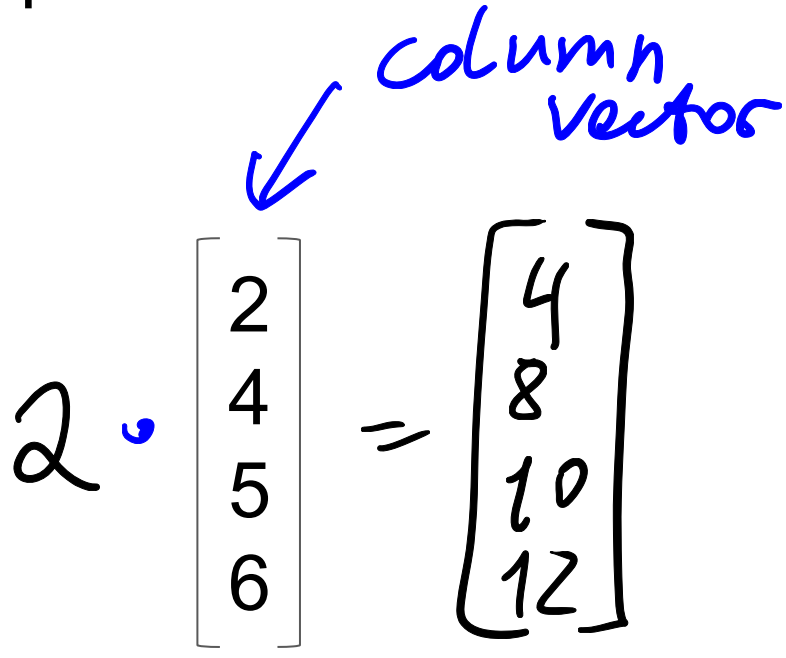
Session #1.8: Plan

- Vector operations
- Multiplication
- Matrix inverse

Vector operations



Vector operations

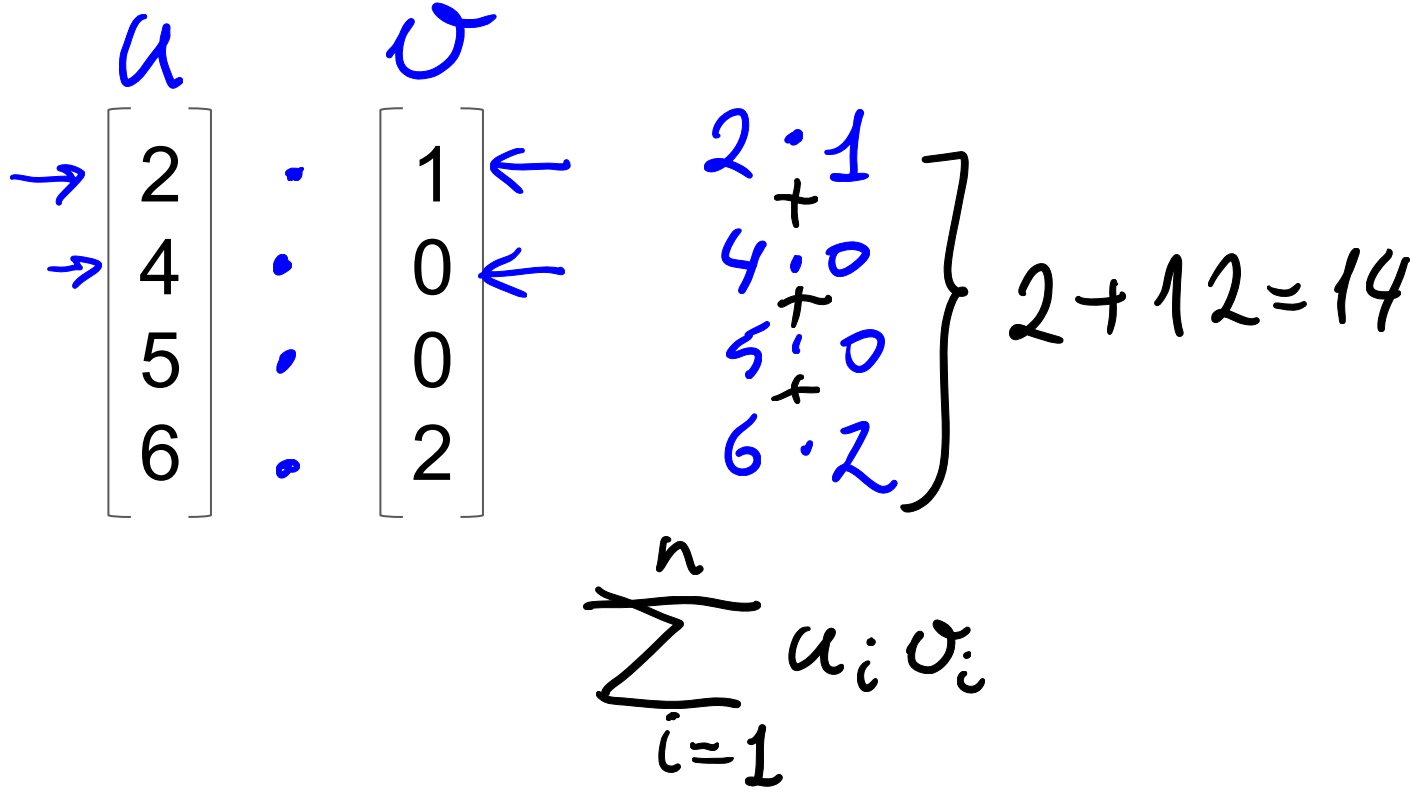
$$u + v$$

$$\begin{bmatrix} 2 \\ 4 \\ 5 \\ 6 \end{bmatrix} + \begin{bmatrix} 1 \\ 0 \\ 0 \\ 2 \end{bmatrix} = \begin{bmatrix} 3 \\ 4 \\ 5 \\ 7 \end{bmatrix}$$

Multiplication

- Vector-vector multiplication
- Matrix-vector multiplication
- Matrix-matrix multiplication

Vector-vector multiplication (dot product)



Vector-vector multiplication (dot product)

column

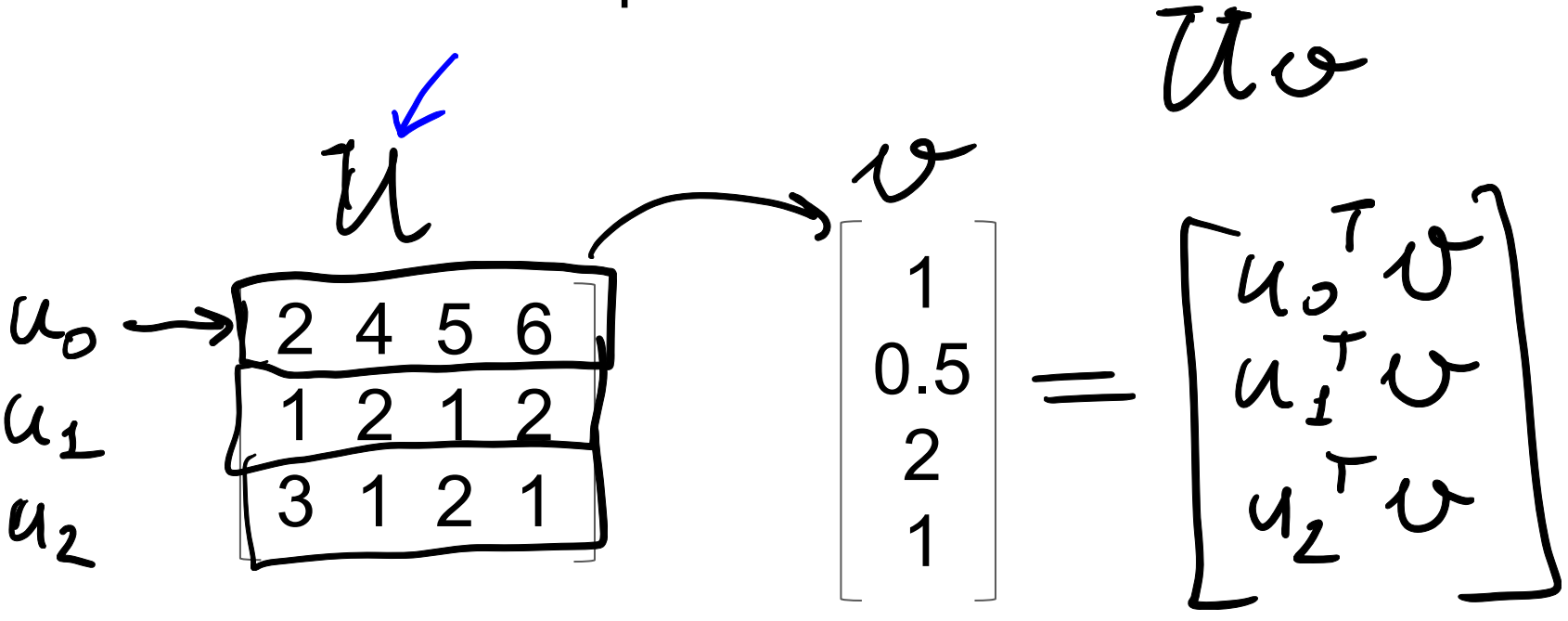
u

$$v^T \begin{bmatrix} 2 & 4 & 5 & 6 \end{bmatrix} \qquad \begin{bmatrix} 1 \\ 0 \\ 0 \\ 2 \end{bmatrix}$$

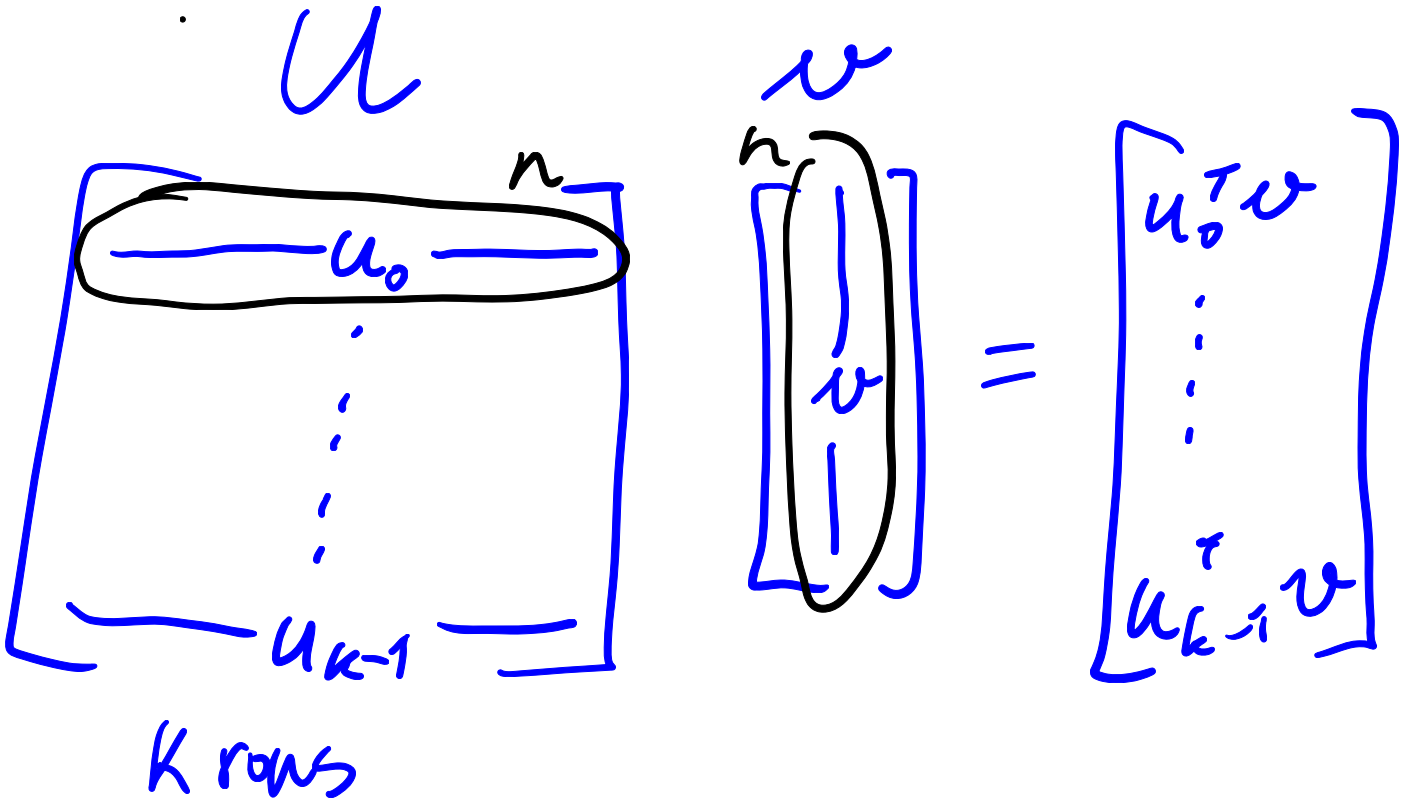
row vector

$$v^T u = \sum_{i=1}^{n} u_i v_i$$

Matrix-vector multiplication

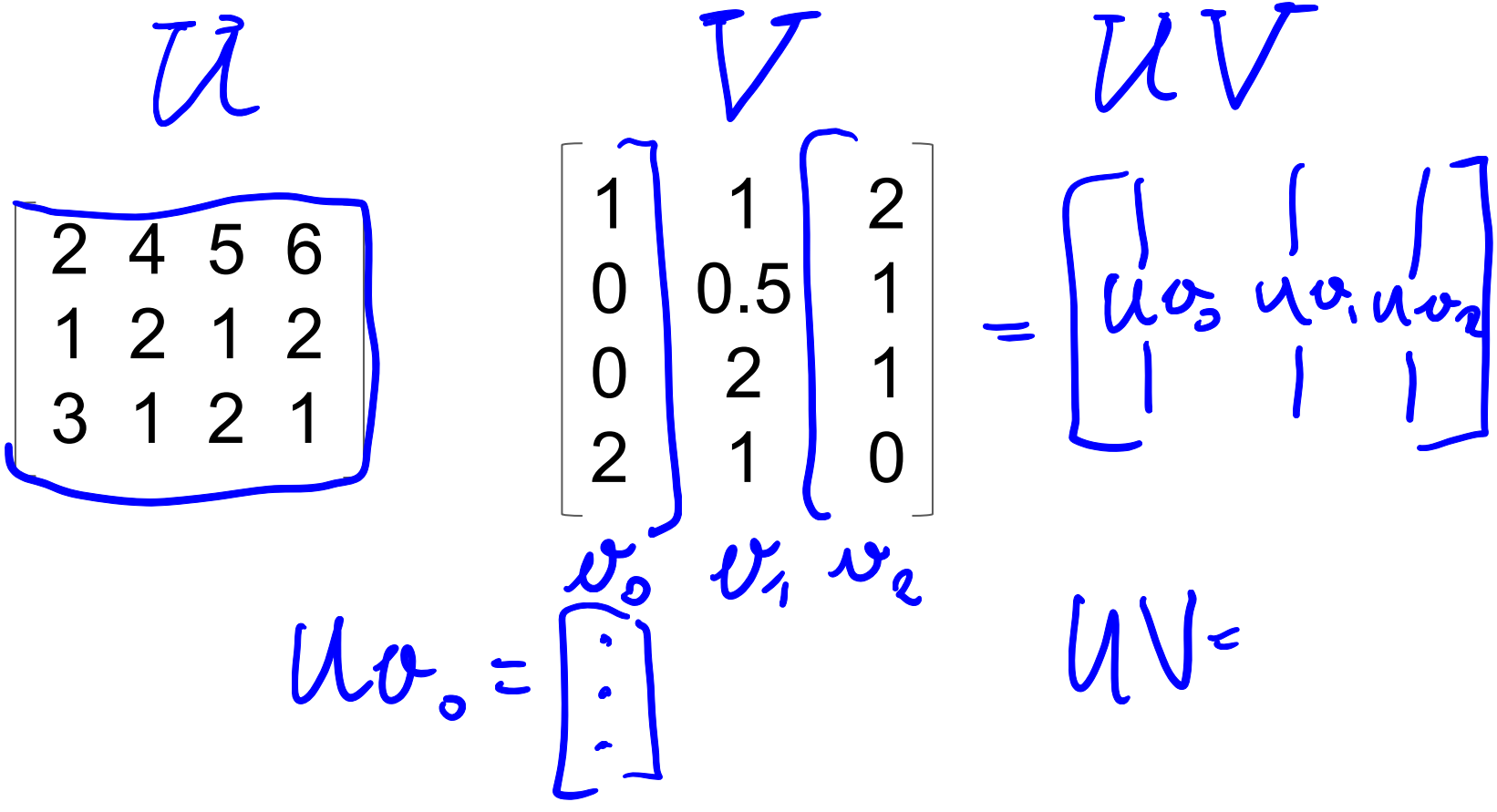


Matrix-vector multiplication



Rows of matrix * vector

Matrix-matrix multiplication



Identity matrix

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$U \cdot I = U$

$I \, U = U$

$1 \cdot x = x$

$x \cdot 1 = x$

Matrix inverse