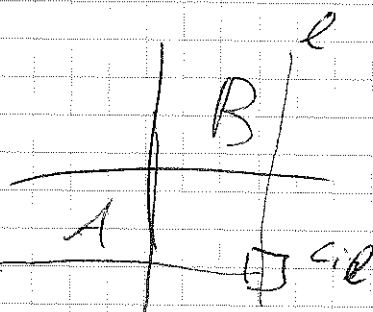


## Matrizenmultiplikation

$$A = \begin{pmatrix} 1 & 2 \\ 0 & 2 \\ -1 & 3 \end{pmatrix}$$

$$B = \begin{pmatrix} -1 & 9 \\ 0 & 9 \end{pmatrix}$$



$$A \cdot B = \begin{pmatrix} 1 & 2 \\ 0 & 2 \\ -1 & 3 \end{pmatrix} \cdot \begin{pmatrix} -1 & 9 \\ 0 & 9 \end{pmatrix} = \begin{array}{c|cc} & -1 & 9 \\ \hline 1 & 2 & -1 & 11 \\ 0 & 2 & 0 & 8 \\ -1 & 3 & 1 & 9 \end{array} = \begin{pmatrix} -1 & 11 \\ 0 & 8 \\ 1 & 9 \end{pmatrix}$$

$$A = (a_{ij}) \in K^{m \times n}, B = (b_{je}) \in K^{n \times q}$$

$$A \cdot B = (c_{ie}) \in K^{m \times q}$$

$$c_{ie} = a_{i1} \cdot b_{1e} + \dots + a_{in} \cdot b_{ne} = \sum_{j=1}^n a_{ij} b_{je}$$

Quadr. Matrix: Anzahl Zeilen = Anzahl Spalten

transponierte Matrix  $A^T$  ... Zeilen v. Spalten werden getauscht

$$A = \begin{pmatrix} 3 & 2 \\ 2 & 5 \\ 1 & 0 \end{pmatrix}$$

$$A^T = \begin{pmatrix} 3 & 2 & 1 \\ 2 & 5 & 0 \end{pmatrix}$$

Symmetrische Matrix:  $A = A^T$   $A \in K^{n \times n}$

## Diagonal matrix

$$\text{diag}(\lambda_1, \lambda_2, \dots, \lambda_n) = \begin{pmatrix} \lambda_1 & 0 & 0 & \dots & 0 \\ 0 & \lambda_2 & & & 0 \\ 0 & 0 & \lambda_3 & & \\ 0 & 0 & 0 & \ddots & \\ 0 & \dots & 0 & 0 & \lambda_n \end{pmatrix} \in K^{n \times n}$$

$$\text{diag}(1, 0, -2) = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & -2 \end{pmatrix} \in K^{3 \times 3}$$

## Einheitsmatrix

$$I_n = \text{diag}(1, 1, 1, \dots, 1) = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} = (\underline{e}_1, \underline{e}_2, \dots, \underline{e}_n)$$

## Addieren

$$A+B = \begin{pmatrix} 1 & 2 \\ 0 & 2 \\ 3 & -1 \end{pmatrix} + \begin{pmatrix} -5 & 2 \\ 0 & 3 \\ 1 & -1 \end{pmatrix} = \begin{pmatrix} -4 & 4 \\ 0 & 5 \\ 4 & -2 \end{pmatrix}$$

## Skalarmultipl. wh.

$$\lambda A = \begin{pmatrix} \lambda a_{11} & \dots \\ \dots & \dots \end{pmatrix}$$

## Multipl. wh.

$$A \cdot B = \begin{pmatrix} 2 & 1 \\ -3 & 0 \end{pmatrix} \cdot \begin{pmatrix} 3 & 0 & 1 \\ 2 & -2 & 0 \end{pmatrix} = \begin{array}{c|cc|cc} & 3 & 0 & 1 & & \\ \hline & 2 & -2 & 0 & & \\ \hline 21 & 2 \cdot 3 & 2 \cdot 0 & 2 \cdot 1 & & \\ & +2 \cdot 1 & -2 \cdot 2 & -2 \cdot 0 & & \\ \hline -30 & -3 \cdot 3 & -3 \cdot 0 & -3 \cdot 1 & & \\ & +2 \cdot 0 & -2 \cdot 0 & +2 \cdot 0 & & \end{array}$$