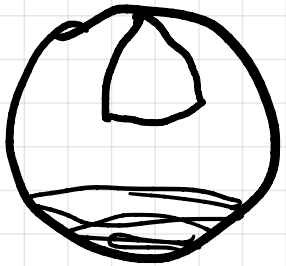
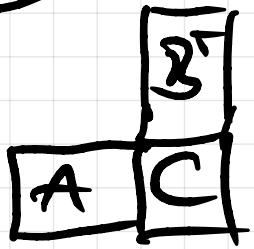
Visual and Scientific Computing

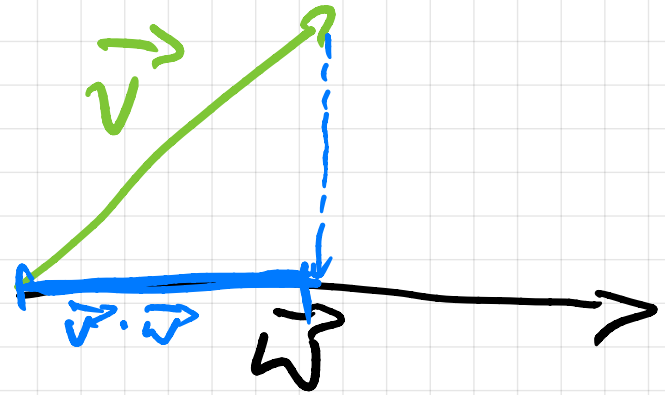
WS 2019/20

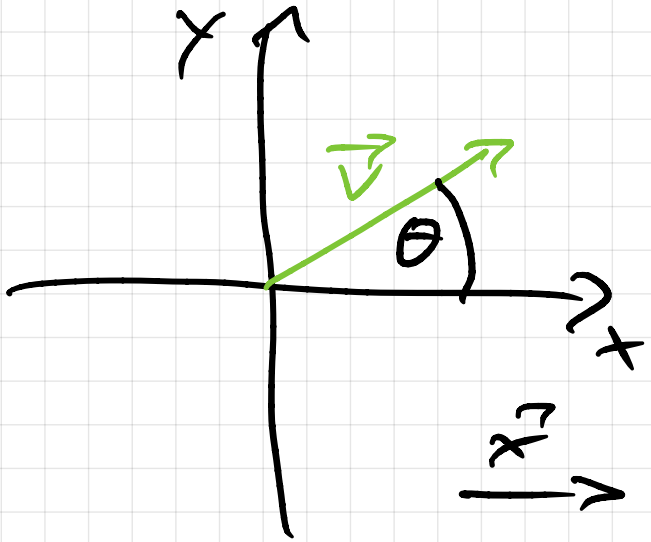


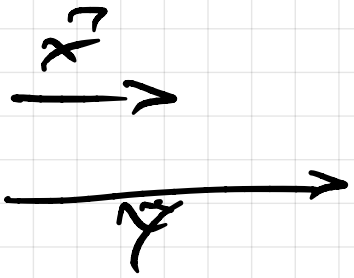
$$A = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 2 & 3 \end{bmatrix}$$

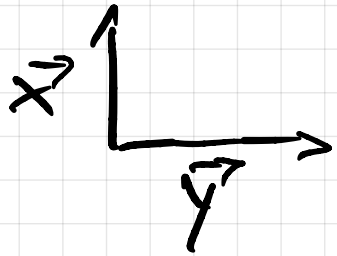
$$B = \begin{bmatrix} 1 & 2 & 3 \\ 1 & & 2 & 3 \end{bmatrix}$$



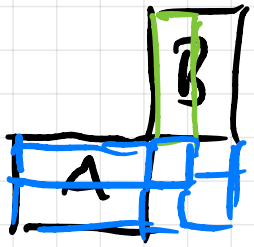


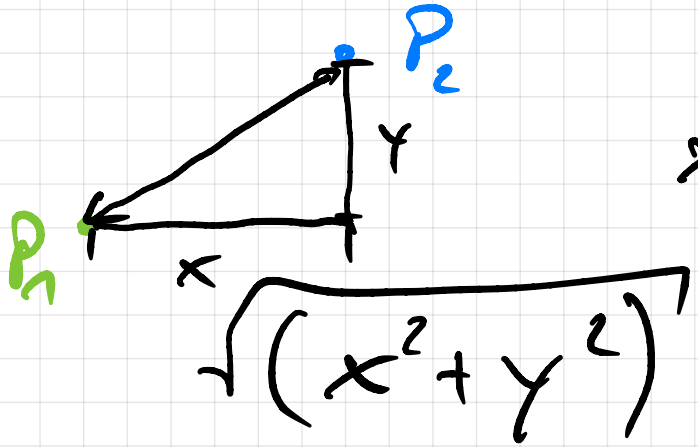






$$x \cdot y = 0$$





$x+y \Rightarrow L_1$-Norm

$$\underline{I} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

- Rot, Sca, Shear$_{x/y}$, Mirror

Lil. Trans.

- Trans

Sch Cbsp.:

$$6a + 12b = 30$$
$$3a + 3b = 9$$

$$A = \begin{bmatrix} 6 & 12 \\ 3 & 3 \end{bmatrix} \qquad Ax = b$$

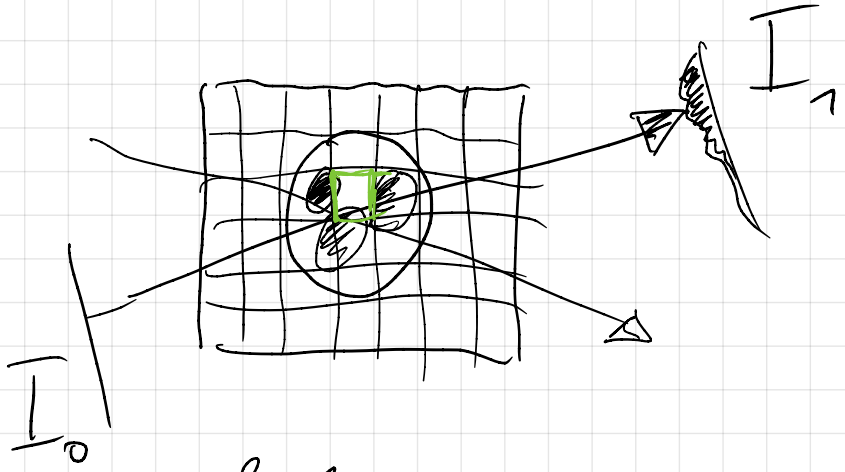
$$b = \begin{bmatrix} 30 \\ 9 \end{bmatrix}$$

$$f(x) = x^2 \qquad f'(x) = 2x$$

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

Problem → math. Formulierung → Lösung

Lin GS

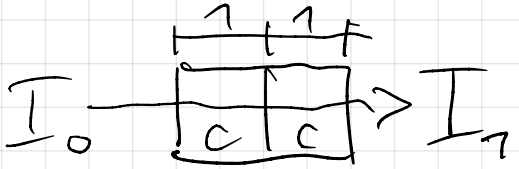


$c \in]0,1]$

$I_1 = I_0 \cdot c$

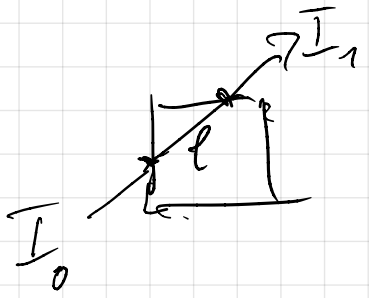
Weg des Strahls durch Element

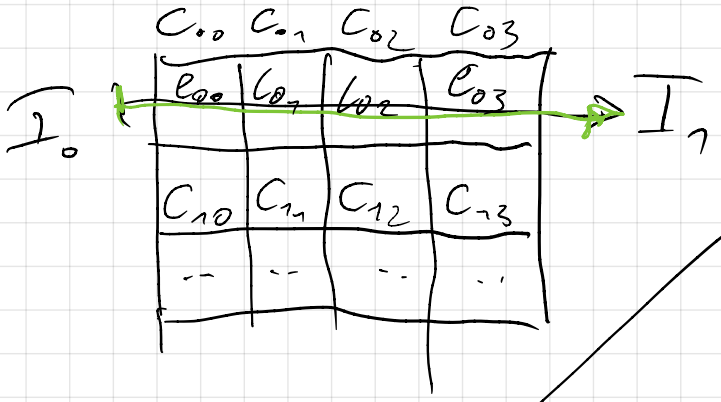
$I_1 = I_0 \cdot c^l$



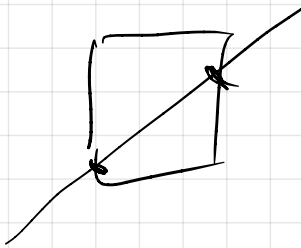
$I_1 = I_0 \cdot c^2$

$I_1 = I_0 \cdot c^{\frac{1}{2}}$





$$I_1 = I_0 \cdot c_{00}^{l_{00}} \cdot c_{01}^{l_{01}} \cdot c_{02}^{l_{02}} \cdot c_{03}^{l_{03}} \cdot \dots$$



$$Ax = b$$

$$\begin{matrix} Ax & & & & \vec{b} \\ a_{00}x_1 & + a_{01}x_2 & + \dots & = & b_0 \\ - & - & & = & b_1 \end{matrix}$$

$I_0 = 1$

$$\log I_1 = \log I_0 + l_{00} \cdot \log c_{00} + l_{01} \cdot \log c_{01} + l_{02} \log c_{02} + \dots$$

$\log I_1$: b — $\log I_0$: 0

$x_{ij} = \log c_{ij}$ → Unbekannt

$l_{00} \dots l_{nm}$ → A

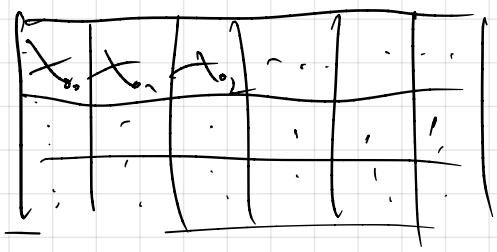
$$L\vec{x} = \vec{b}$$

0 ↗ Strahlbilder

$$b_0 = l_{00}^{0} \cdot x_{00} + l_{01}^{0} \cdot x_{01} + l_{02}^{0} \cdot x_{02} \dots$$

$$b_1 = l_{00}^{1} \cdot x_{00} + l_{01}^{1} x_{01} + l_{02}^{1} x_{02} \dots$$

$$L\vec{x} = \vec{b}$$



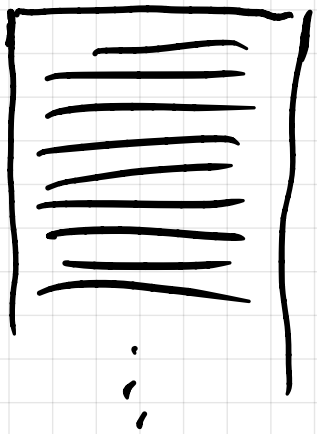
$$\vec{x} = [x_{00}, x_{01}, \dots x_{0m}, x_{10}, x_{11} \dots x_{nm}]$$

$$[L]|x| = [b]$$

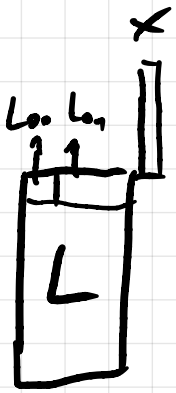
Raster $\neq$ Matrix
unbekannt

sondern Vektor $\vec{x}$

L_{00} $L_{n \times m}$



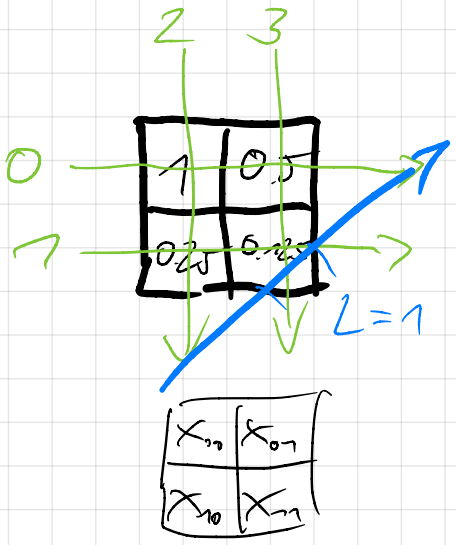
überbestimmtes LGS



$l_{00} x_{00} + l_{01} x_{01} \dots$

$= \begin{bmatrix} \\ \\ \\ \end{bmatrix}$ b

Bsp:



$I_0 = 1 \quad L = 1$

$1 \cdot 0.5 = \frac{1}{2}$

$\frac{1}{4} \cdot \frac{1}{8} = \frac{1}{32}$

$1 \cdot \frac{1}{4} = \frac{1}{4}$

$\frac{1}{2} \cdot \frac{1}{8} = \frac{1}{16}$

$I_1 \rightarrow \vec{b}$

$\frac{1}{8}$

Log zur Basis 2

$$\begin{bmatrix} b_0 \\ b_1 \\ b_2 \\ b_3 \end{bmatrix} = \begin{matrix} -1 \\ -5 \\ -2 \\ -4 \end{matrix}$$

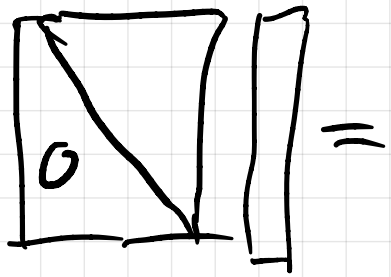
$b_4 = -3$

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

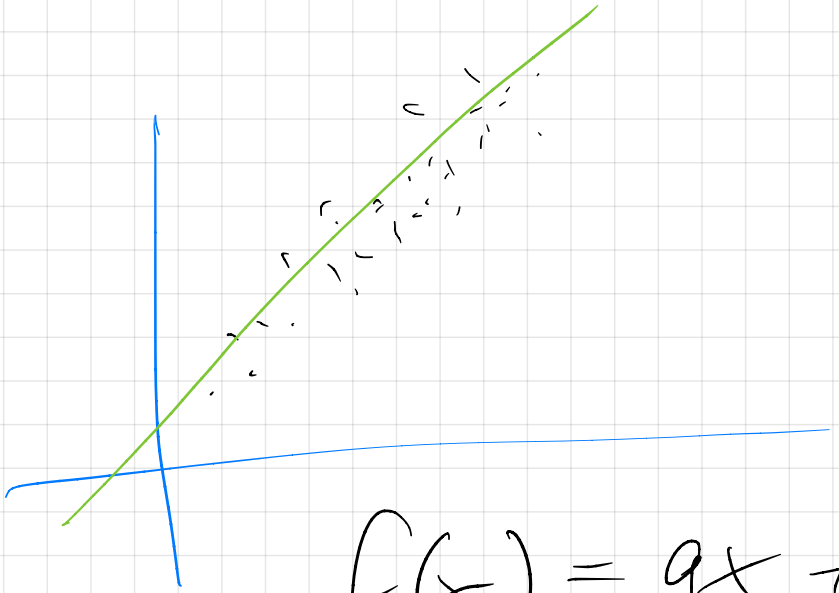
0 0 0 1

$$\begin{bmatrix} l^0_{00} & l^0_{01} & l^0_{10} & l^0_{11} \\ l^1_{00} & l^1_{01} & l^1_{10} & l^1_{11} \\ l^2_{00} & l^2_{01} & l^2_{10} & l^2_{11} \\ l^3 & l^3 & l^3 & l^3 \end{bmatrix} \begin{bmatrix} x_{00} \\ x_{01} \\ x_{10} \\ x_{11} \end{bmatrix} = \begin{bmatrix} b^0 \\ b^1 \\ b^2 \\ b^3 \end{bmatrix}$$

$$Ax = b$$



$=$



$$f(x) = ax + b$$