$$y'' + y = 0$$

$$\lambda^2 = -1$$

$$\lambda_{1,2} = \pm j = 0 \pm 1 \cdot j$$

$$y(x) = C_1 \cos x + C_2 \sin x$$

$$C_1, C_2 \in \mathbb{R}$$

$y(0) = 0$

$y(\pi/2) = 1$

$0 = c_1 \cdot 1 + c_2 \cdot 0$

$1 = c_1 \cdot 0 + c_2 \cdot 1$

$c_1 = 0, \; c_2 = 1$

$y = \sin x$

$$y(0) = y(\pi) = 0$$

$$0 = c_1 \cdot 1 + c_2 \cdot 0$$

$$0 = c_1(-1) + c_2 \cdot 0$$

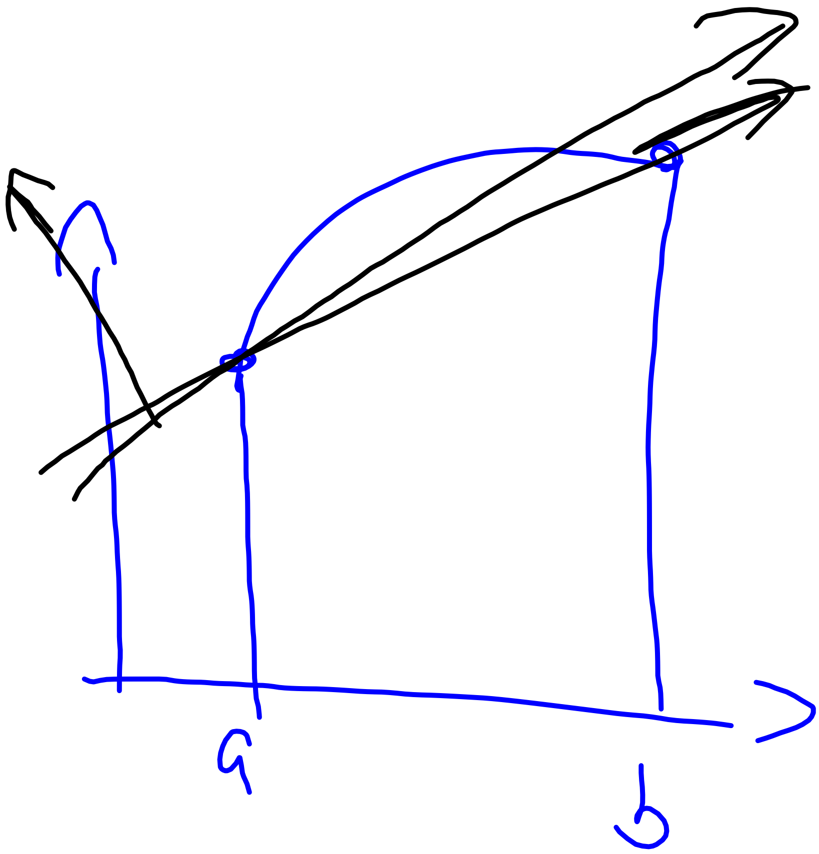
$$c_1 = 0, \quad c_2 \in \mathbb{R}$$

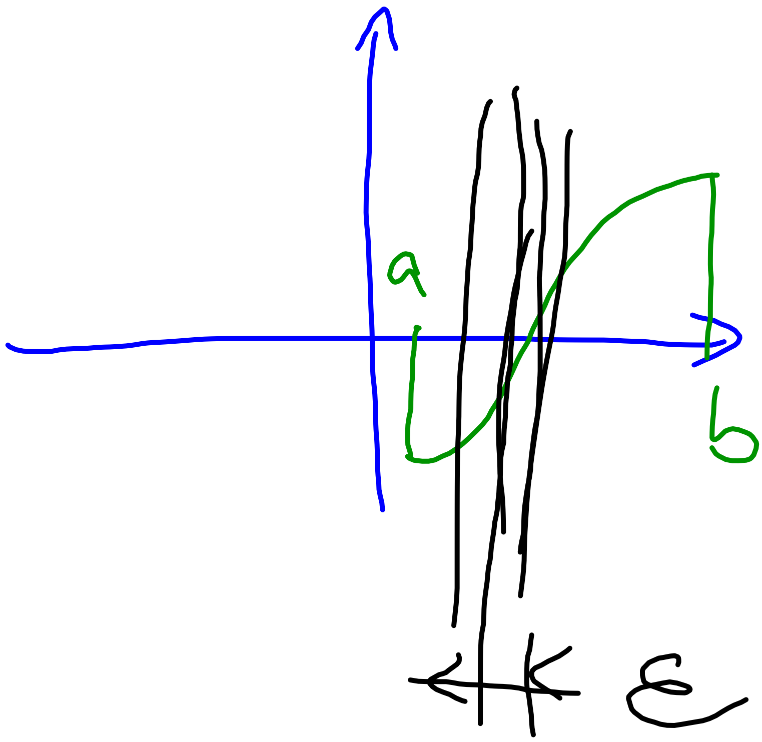
$$y(0) = 0, \quad y(\pi) = 1$$

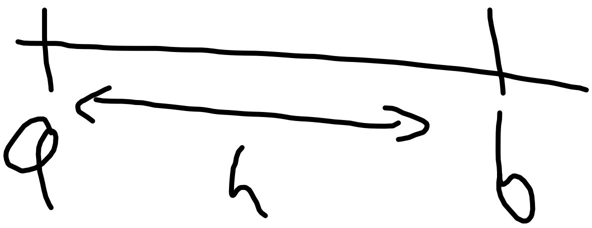
$$0 = c_1 + c_2 \cdot 0$$

$$1 = c_1(-1) + c_2 \cdot 0$$

$$\lightning$$


a
b





$$\frac{h}{2^n} < \varepsilon$$

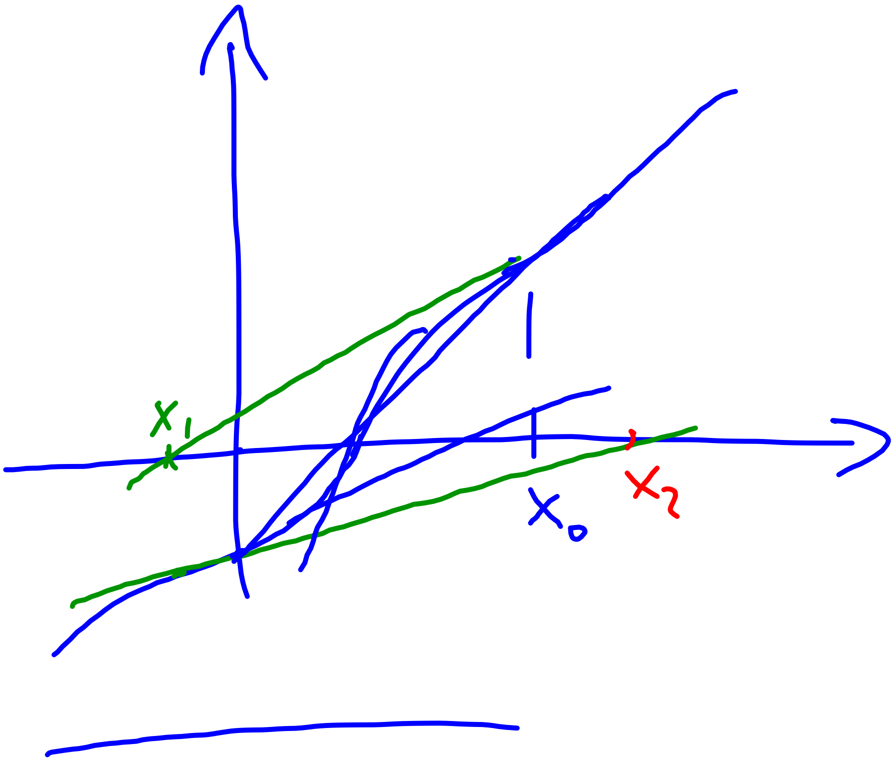
Newton-Tangen

$$x_{k+1} = x_k - \frac{f(x_k)}{f'(x_k)}$$

x_0

$$\left| \frac{f(x_k) \cdot f''(x_k)}{\left(f'(x_k)\right)^2} \right| < 1$$

$x_{k+1} \to x_*$



$$x^* = g(x^*)$$

AWP:

$$\underbrace{u(x;s)}$$

$$u(b)=\beta$$

$$\boxed{u(b;s)=\beta}$$

Gl. bzgl. s

$$\boxed{u(b;s)-\beta=0}$$

$A\bar{w} = \bar{u}$

A quadr. $E\bar{v} = \bar{v}$

Ges.: $\bar{v} \neq 0$

$A\bar{v} = \lambda\bar{v}$

Eigenvektor von A zu

Eigenwert λ

$$A\bar{v} - \lambda\bar{v} = \bar{0}$$

$$(A - \lambda E)\bar{v} = \bar{0}$$

hom. lineare

immer lösbar

$\bar{v} = \bar{0}$ ist die triv. Lsg.

$\rightsquigarrow$ $\underbrace{\det(A - \lambda E)}_{\text{char. Polyn.}} = 0$

<u>charakt. Gl.</u>

$\lambda_1, \lambda_2 \ldots \lambda_n$ EWe sind NS von CP

λ_1 :

$$(A - \lambda_1 E)\bar{v}_1 = \bar{0}$$

$$\Downarrow$$

$$\bar{v}_1$$

λ_2 : $(A - \lambda_2 E)\bar{v}_2 = 0$

$$\Downarrow$$

$$\bar{v}_2$$

$$\bar{y}(x) = c_1 e^{\lambda_1 x}\bar{v}_1 + c_2 e^{\lambda_2 x}\bar{v}_2 + \dots + c_n e^{\lambda_n x}\bar{v}_n$$

$$\begin{vmatrix} (0-\lambda) & 1 \\ 110 & (1-\lambda) \end{vmatrix} =$$

$$= -\lambda(1-\lambda) - 110 = 0$$

$$\lambda^2 - \lambda - 110 = 0$$

$$\lambda_1 = -10, \quad \lambda_2 = 11$$

$$\begin{pmatrix} 10 & 1 \\ 110 & 11 \end{pmatrix} \begin{pmatrix} v_1^1 \\ v_2^1 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$$

$$10 v_1^1 + 1 v_2^1 = 0$$

$$v_1^1 = \mu \; ; \; v_2^1 = -10\mu$$

$$\bar{v}^{(1)} = \begin{pmatrix} \mu \\ -10\mu \end{pmatrix} = \begin{pmatrix} 1 \\ -10 \end{pmatrix} \mu, \; \mu \neq 0$$

$$y_1(0) = 1$$

$$y_1(10) = 1$$

$$y_1 = c_1 e^{-10x} + c_2 e^{11x}$$

$$\begin{cases} 1 = c_1 e^{0} + c_2 e^{0} \\ 1 = c_1 e^{-100} + c_2 e^{110} \end{cases}$$

$$\underline{c_1 = 1 - c_2}$$

$$1 = (1 - c_2) e^{-100} + c_2 e^{110};$$

$$1 = e^{-100} + c_2 \left(e^{110} - e^{-100} \right);$$

$$C_2 = \frac{1 - e^{-100}}{e^{110} - e^{-100}}$$

$$C_1 = 1 - C_2 = 1 - \frac{1-e^{-100}}{e^{110} - e^{-100}} =$$

$$= \frac{e^{110} - \cancel{e^{-100}} - 1 + \cancel{e^{-100}}}{e^{110} - e^{-100}} =$$

$$= \frac{e^{110} - 1}{e^{110} - e^{-100}};$$