

A2

$$A = \begin{pmatrix} 1 & -1 & 1 & -1 \\ -1 & 5 & -5 & 5 \\ 1 & -5 & 14 & -14 \\ -1 & 5 & -14 & 30 \end{pmatrix}$$

A ist symmetrisch, da  $\forall a_{ij} = a_{ji}$   
 $i, j = 1 \dots 4$

1. Schritt:

$$\begin{array}{cccc} 1 & -1 & 1 & -1 \\ -1 & 5 & -5 & 5 \\ 1 & -5 & 14 & -14 \\ -1 & 5 & -14 & 30 \end{array}$$

$$l_{11} = \sqrt{1} = 1$$

$$\begin{array}{c|ccc} 1 & -1 & 1 & -1 \\ -1 & 5 & -5 & 5 \\ 1 & -5 & 14 & -14 \\ -1 & 5 & -14 & 30 \end{array}$$

$$\Rightarrow \begin{array}{c|ccc} 1 & & & \\ -1 & 5 - (-1) \cdot (-1) & & \\ 1 & -5 - 1 \cdot 1 & 14 - 1 \cdot 1 & \\ -1 & 5 - (-1) \cdot (-1) & -14 - 1 \cdot (-1) & 30 - (-1) \cdot (-1) \end{array}$$

$$\Rightarrow \begin{array}{c|ccc} 1 & & & \\ -1 & 4 & & \\ 1 & -4 & 13 & \\ -1 & 4 & -13 & 29 \end{array}$$

2. Schritt:  $l_{22} = \sqrt{4} = 2$

$$\begin{array}{c|cc} 1 & & \\ -1 & 2 & \\ 1 & -2 & 13 \\ -1 & 2 & -13 \end{array} \quad 29$$

$$\Rightarrow \begin{array}{c|cc} 1 & & \\ -1 & 2 & \\ 1 & -2 & 13 - (-2) \cdot (-2) \\ -1 & 2 & -13 - (-2) \cdot (-2) \end{array} \quad 29 - 2 \cdot 2$$

$$\Rightarrow \begin{array}{c|cc} 1 & & \\ -1 & 2 & \\ 1 & -2 & 9 \\ -1 & 2 & -9 \end{array} \quad 25$$

3. Schritt:  $l_{33} = \sqrt{9} = 3$

$$\begin{array}{c|cc} 1 & & \\ -1 & 2 & \\ 1 & -2 & 3 \\ -1 & 2 & -3 \end{array} \quad 25 - (-3) \cdot (-3)$$

4. Schritt:

$$\begin{array}{c|cc} 1 & & \\ -1 & 2 & \\ 1 & -2 & 3 \\ -1 & 2 & -3 \end{array} \quad 16 \quad l_{44} = \sqrt{16} = 4 \quad \Rightarrow \begin{array}{c|cc} 1 & & \\ -1 & 2 & \\ 1 & -2 & 3 \\ -1 & 2 & -3 \end{array} \quad 4$$

$$\Rightarrow L = \begin{pmatrix} 1 & 0 & 0 & 0 \\ -1 & 2 & 0 & 0 \\ 1 & -2 & 3 & 0 \\ -1 & 2 & -3 & 4 \end{pmatrix} \quad L^T = \begin{pmatrix} 1 & -1 & 1 & -1 \\ 0 & 2 & -2 & 2 \\ 0 & 0 & 3 & -3 \\ 0 & 0 & 0 & 4 \end{pmatrix} \quad A = L \cdot L^T = \begin{pmatrix} 1 & -1 & 1 & -1 \\ -1 & 5 & -5 & 5 \\ 1 & -5 & 14 & -14 \\ -1 & 5 & -14 & 30 \end{pmatrix}$$

A3

$$f(x) = \tan(x) \quad f'(x) = \frac{1}{\cos^2(x)}$$

$$\textcircled{1} x=0,1 \quad ; \quad \delta = 10^{-2} = 0,01$$

$$\max_{[x-\delta; x+\delta]} |f'(x)| = \frac{1}{\cos^2(x-\delta)} = \frac{1}{\cos^2(0,1+0,01)} = \frac{1}{\cos^2(0,11)} \leq 1,013$$

$$\chi_a < 1,013 \quad \chi_r < \frac{|0,1|}{|f(0,1)|} \cdot 1,013 = \frac{0,1}{\tan(0,1)} \cdot 1,013 = 1,0096 < 1,01$$

$$\textcircled{2} x=1,5 \quad , \quad \delta = 10^{-2} = 0,01 \quad 153,5189$$

$$\max_{[x-\delta; x+\delta]} |f'(x)| = \frac{1}{\cos^2(1,51)} \approx 270,882177 < 270,9$$

$$\chi_a < 155 \quad \chi_r < \frac{|1,5|}{|f(1,5)|} \cdot 270,9 \approx 29,82$$