

Nr. 3

$$A = \begin{pmatrix} 2 & -1 & 0 & 0 \\ -1 & 2 & -1 & 0 \\ 0 & -1 & 2 & -1 \\ 0 & 0 & -1 & 2 \end{pmatrix} \quad b = \frac{1}{25} \begin{pmatrix} -1 \\ -1 \\ -1 \\ -1 \end{pmatrix}$$

Erzeuge L

$$\begin{array}{ccc} 2 & & \\ -1 & 2 & \\ 0 & -1 & 2 \\ 0 & 0 & -1 & 2 \end{array} \Rightarrow \begin{array}{ccc|ccc} \sqrt{2} & & & & & \\ -\frac{1}{\sqrt{2}} & & & & & \\ 0 & -1 & 2 & & & \\ 0 & 0 & -1 & 2 & & \end{array} \Rightarrow \begin{array}{ccc|ccc} \sqrt{2} & & & & & \\ -\frac{1}{\sqrt{2}} & \frac{\sqrt{2}}{2} & & & & \\ 0 & -\frac{\sqrt{2}}{2} & & & & \\ 0 & 0 & -1 & 2 & & \end{array}$$

$$\Rightarrow \begin{array}{ccc|ccc} \sqrt{2} & & & & & \\ -\frac{1}{\sqrt{2}} & \frac{\sqrt{2}}{2} & \frac{\sqrt{2}}{2} & & & \\ 0 & -\frac{\sqrt{2}}{2} & \frac{\sqrt{2}}{2} & & & \\ 0 & 0 & -\frac{\sqrt{2}}{2} & \frac{\sqrt{2}}{2} & & \end{array} \Rightarrow \begin{array}{ccc|ccc} \sqrt{2} & & & & & \\ -\frac{1}{\sqrt{2}} & \frac{\sqrt{2}}{2} & \frac{\sqrt{2}}{2} & & & \\ 0 & -\frac{\sqrt{2}}{2} & \frac{\sqrt{2}}{2} & & & \\ 0 & 0 & -\frac{\sqrt{2}}{2} & \frac{\sqrt{2}}{2} & & \end{array} \Rightarrow L$$

$L y = b$

$$\left(\begin{array}{cccc|c} \sqrt{2} & 0 & 0 & 0 & -\frac{1}{25} \\ -\frac{1}{\sqrt{2}} & \frac{\sqrt{2}}{2} & 0 & 0 & -\frac{1}{25} \\ 0 & -\frac{\sqrt{2}}{2} & \frac{\sqrt{2}}{2} & 0 & -\frac{1}{25} \\ 0 & 0 & -\frac{\sqrt{2}}{2} & \frac{\sqrt{2}}{2} & -\frac{1}{25} \end{array} \right) \Leftrightarrow \left(\begin{array}{cccc|c} 1 & 0 & 0 & 0 & -\frac{1}{25\sqrt{2}} \\ 0 & 1 & 0 & 0 & -\frac{1}{25} \\ 0 & 0 & 1 & 0 & -\frac{1}{25} \\ 0 & 0 & 0 & 1 & -\frac{1}{25} \end{array} \right)$$

$L^T x = y$

$$\left(\begin{array}{cccc|c} \sqrt{2} & -\frac{1}{\sqrt{2}} & 0 & 0 & -\frac{1}{25\sqrt{2}} \\ 0 & \frac{\sqrt{2}}{2} & \frac{\sqrt{2}}{2} & 0 & -\frac{1}{25} \\ 0 & 0 & \frac{\sqrt{2}}{2} & -\frac{\sqrt{2}}{2} & -\frac{1}{25} \\ 0 & 0 & \frac{\sqrt{2}}{2} & \frac{\sqrt{2}}{2} & -\frac{1}{25} \end{array} \right) \Rightarrow \left(\begin{array}{cccc|c} 1 & 0 & 0 & 0 & -\frac{1}{25\sqrt{2}} \\ 0 & 1 & 0 & 0 & -\frac{1}{25} \\ 0 & 0 & 1 & 0 & -\frac{1}{25} \\ 0 & 0 & 0 & 1 & -\frac{1}{25} \end{array} \right)$$