

Musterlösung, Serie 2

$$1a) \textcircled{1} \begin{array}{c|c} 5/1000 & 1 \\ \hline 1 & 1 \end{array} \rightarrow \begin{array}{c|c} 5/1000 & 1 \\ \hline 200 & -199 \end{array} \Rightarrow L = \begin{pmatrix} 1 & 0 \\ 200 & 1 \end{pmatrix}, R = \begin{pmatrix} 5/1000 & 1 \\ 0 & -199 \end{pmatrix}$$

$$Ax=y, A=LR \rightarrow LRx=y, \underbrace{L}_{\mathbf{2}} Rx=y, Lz=y : \begin{array}{c|c} 1 & 0 \\ \hline 200 & 1 \end{array} \begin{array}{l} z_1 = 1/2 \\ z_2 = 1 - 200 \cdot z_1 = -99 \end{array}$$

$$Rx=2, \begin{array}{c|c} 5/1000 & 1 \\ \hline 0 & -199 \end{array} \begin{array}{l} x_2 = 99/199 \\ x_1 = 200 \left( \frac{1}{2} - \frac{99}{199} \right) = \frac{100}{199} \end{array} \quad \underline{\underline{x = \begin{pmatrix} 100/199 \\ 99/199 \end{pmatrix} \approx \begin{pmatrix} 0.5 \\ 0.5 \end{pmatrix}}}$$

$$1a) \textcircled{2} \begin{array}{c|c} 0.5e-2 & 0.1e1 \\ \hline 0.1e1 & 0.1e1 \end{array} \rightarrow \begin{array}{c|c} 0.5e-2 & 0.1e1 \\ \hline 0.2e3 & 0.2e3 \end{array} \quad \begin{array}{l} 0.1e1 - \frac{0.1e1}{0.5e-2} = 0.1e1 - 0.2e3 \\ = -0.199e3 \approx -0.2e3 \end{array}$$

$$L = \begin{pmatrix} 0.1e1 & 0 \\ 0.2e3 & 0.1e1 \end{pmatrix}, R = \begin{pmatrix} 0.5e-2 & 0.1e1 \\ 0 & -0.2e3 \end{pmatrix}$$

$$Lz=y : \begin{array}{c|c} 0.1e1 & 0 \\ \hline 0.2e3 & 0.1e1 \end{array} \begin{array}{l} 0.5e0 \\ 0.1e1 \end{array} \quad \begin{array}{l} z_1 = 0.5e0 \\ z_2 = 0.1e1 - 0.2e3 \times 0.5e0 = 0.1e1 - 0.1e3 \end{array}$$

$$Rx=2 : \begin{array}{c|c} 0.5e-2 & 0.1e1 \\ \hline 0 & -0.2e3 \end{array} \begin{array}{l} 0.5e0 \\ -0.99e2 \end{array} \quad \begin{array}{l} x_2 = \frac{1}{-0.2e3} (-0.99e2) = 0.495e0 \approx 0.5e0 \\ x_1 = \frac{1}{0.5e-2} (0.5e0 - 0.1e1 \times 0.5e0) = 0 \end{array}$$

Auslöschung!

$$\Rightarrow \underline{\underline{x = \begin{pmatrix} 0 \\ 0.5e0 \end{pmatrix}}}$$

$$1a) \textcircled{3} \begin{array}{c|c} 0.1e1 & 0.1e1 \\ \hline 0.5e-2 & 0.1e1 \end{array} \rightarrow \begin{array}{c|c} 0.1e1 & 0.1e1 \\ \hline 0.5e-2 & 0.1e1 \end{array} \quad \begin{array}{l} 0.1e1 - \frac{0.5e-2}{0.1e1} = 0.1e1 - 0.5e-2 \\ = 0.995e0 \approx 0.1e1 \end{array}$$

$$L = \begin{pmatrix} 0.1e1 & 0 \\ 0.5e-2 & 0.1e1 \end{pmatrix}, R = \begin{pmatrix} 0.1e1 & 0.1e1 \\ 0 & 0.1e1 \end{pmatrix}$$

$$Lz=\tilde{y} : \begin{array}{c|c} 0.1e1 & 0 \\ \hline 0.5e-2 & 0.1e1 \end{array} \begin{array}{l} 0.1e1 \\ 0.5e0 \end{array} \quad \begin{array}{l} z_1 = 0.1e1 \\ z_2 = 0.5e0 - 0.5e-2 \times 0.1e1 = 0.495e0 \approx 0.5e0 \end{array}$$

$$Rx=2 : \begin{array}{c|c} 0.1e1 & 0.1e1 \\ \hline 0 & 0.1e1 \end{array} \begin{array}{l} 0.1e1 \\ 0.5e0 \end{array} \quad \begin{array}{l} x_2 = 0.5e0 \\ x_1 = 0.1e1 - 0.1e1 \times 0.5e0 = 0.5e0 \end{array}$$

$$\Rightarrow \underline{\underline{x = \begin{pmatrix} 0.5e0 \\ 0.5e0 \end{pmatrix}}} \rightarrow \text{Keine Auslöschung hier!}$$