

7.2. $A = \begin{pmatrix} 0.8 & 2.2 & 3.6 \\ 2.0 & 3.0 & 4.0 \\ 1.2 & 2.0 & 5.8 \end{pmatrix}, b = \begin{pmatrix} 2.4 \\ 1.0 \\ 4.0 \end{pmatrix}, P = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$

a) $\begin{array}{ccc|ccc|ccc} 0.8 & 2.2 & 3.6 & 0 & 0 & 0 & 1 & 0 & 0 \\ 2.0 & 3.0 & 4.0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 1.2 & 2.0 & 5.8 & 0 & 0 & 0 & 0 & 0 & 1 \end{array} \Rightarrow \begin{array}{ccc|ccc|ccc} 2.0 & 3.0 & 4.0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0.8 & 2.2 & 3.6 & 0 & 0 & 0 & 1 & 0 & 0 \\ 1.2 & 2.0 & 5.8 & 0 & 0 & 0 & 0 & 0 & 1 \end{array}$

$k_1 = \frac{2}{5} \Rightarrow \begin{array}{ccc|ccc|ccc} 2.0 & 3.0 & 4.0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 1.0 & 2.0 & \frac{2}{5} & 0 & 0 & 1 & 0 & 0 \\ 0 & 0.2 & 3.4 & \frac{3}{5} & 0 & 0 & 0 & 0 & 1 \end{array} \xrightarrow{k_2 = \frac{3}{5}} \begin{array}{ccc|ccc|ccc} 2.0 & 3.0 & 4.0 & 1 & 0 & 0 & 0 & 1 & 0 \\ 0 & 1.0 & 2.0 & \frac{2}{5} & 1 & 0 & 0 & 1 & 0 \\ 0 & 0 & 3.0 & \frac{3}{5} & \frac{1}{5} & 1 & 0 & 0 & 1 \end{array}$
 R L P

b) $P \cdot Ax = Pb$

$\Rightarrow Pb: \begin{array}{ccc|c} 0 & 1 & 0 & 2.4 \\ 1 & 0 & 0 & 1.0 \\ 0 & 0 & 1 & 4.0 \end{array} \Rightarrow \begin{array}{c} 1.0 \\ 2.4 \\ 4.0 \end{array}$

$L y = c: \begin{array}{ccc|c} 1 & 0 & 0 & 1.0 \\ \frac{2}{5} & 1 & 0 & 2.4 \\ \frac{3}{5} & \frac{1}{5} & 1 & 4.0 \end{array} \Rightarrow \begin{array}{l} y_1 = 1.0 \quad (1) \\ \frac{2}{5} y_1 + y_2 = 2.4 \quad (2) \\ \frac{3}{5} y_1 + \frac{1}{5} y_2 + y_3 = 4.0 \quad (3) \end{array}$

(1) in (2): $\frac{2}{5} + y_2 = 2.4$
 $y_2 = 2.0$

(1) und (2) in (3): $\frac{3}{5} + \frac{2}{5} + y_3 = 4.0$
 $y_3 = 3.0$

$R x = y: \begin{array}{ccc|c} 2.0 & 3.0 & 4.0 & 1.0 \\ 0 & 1.0 & 2.0 & 2.0 \\ 0 & 0 & 3.0 & 3.0 \end{array} \Rightarrow \begin{array}{l} 2x_1 + 3x_2 + 4x_3 = 1 \quad (1) \\ x_2 + 2x_3 = 2 \quad (2) \\ 3x_3 = 3 \quad (3) \end{array}$

(3) in (2): $x_2 + 2 = 2$
 $x_2 = 0$

(3) und (2) in (1): $2x_1 + 4 = 1$
 $2x_1 = -3$
 $x_1 = -\frac{3}{2}$

c) Die Zerlegungen ergeben dieselben Matrizen wie von Hand berechnet.