

Aufgabe 1)

a)

$$\left(\begin{array}{ccc|c} 20 & 30 & 10 & 5200 \\ 10 & 17 & 6 & 3000 \\ 20 & 3 & 2 & 0760 \end{array} \right)$$

$$\left(\begin{array}{ccc|c} 20 & 30 & 10 & 5200 \\ 0 & 1 & 2 & 800 \\ 0 & 0 & 10 & -2400 \end{array} \right)$$

$$\left(\begin{array}{ccc|c} 20 & 30 & 10 & 5200 \\ 0 & 4 & 0 & 1040 \\ 0 & 0 & 1 & -240 \end{array} \right)$$

$$\left(\begin{array}{ccc|c} 20 & 30 & 0 & 2600 \\ 0 & 1 & 0 & 260 \\ 0 & 0 & 1 & -240 \end{array} \right)$$

$$\left(\begin{array}{ccc|c} 20 & 0 & 0 & -200 \\ 0 & 1 & 0 & 260 \\ 0 & 0 & 1 & -240 \end{array} \right)$$

$$\left(\begin{array}{cccc|c} 1 & 0 & 0 & 0 & -1 \\ 0 & 1 & 0 & 0 & 260 \\ 0 & 0 & 1 & 0 & -240 \end{array} \right)$$

10/20
2/20

b)

$$\begin{pmatrix} 20 & 30 & 10 \\ 10 & 17 & 6 \\ 2 & 3 & 2 \end{pmatrix} \Rightarrow \begin{pmatrix} 20 & 30 & 10 \\ 0 & 2 & 1 \\ 0 & 0 & 1 \end{pmatrix} \Rightarrow \begin{pmatrix} 2 & 3 & 1 \\ 0 & 2 & 1 \\ 0 & 0 & 1 \end{pmatrix} R$$

$$L \begin{pmatrix} 0 & 0 & 0 \\ 1/2 & 0 & 0 \\ 1/10 & 0 & 0 \end{pmatrix}$$

$$L \cdot Z = b$$

$$b = \begin{pmatrix} 5,720 \\ 3,3 \\ 0,836 \end{pmatrix}$$

$$\begin{array}{ccc|c} 1 & 0 & 0 & z_1 & 5,720 \\ 1/2 & 1 & 0 & z_{11} & 3,3 \\ 1/10 & 0 & 1 & z_{111} & 0,836 \end{array}$$

$$z_1 = 5,72$$

$$z_2 = 3,3 - 2,86 = 0,44$$

$$z_3 = 0,836 - (5,72) \cdot 1/10 = 0,264$$

$$\begin{pmatrix} 2 & 3 & 1 \\ 0 & 2 & 1 \\ 0 & 0 & 1 \end{pmatrix} \cdot \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{pmatrix} 5,72 \\ 0,44 \\ 0,264 \end{pmatrix}$$

$$x_3 = 0,264$$

$$x_2 = (0,44 - 0,264)/2 = 0,088$$

$$x_1 = \underline{\underline{(5,72 - 0,264 - 3,088)}}$$

$$= 2,596$$

2,596

0,088

0,264

Aufgabe 2)

$$\xrightarrow{\leftrightarrow} \left(\begin{array}{ccc|ccc} 0,8 & 2,2 & 3,6 & 1 & 0 & 0 \\ 2,0 & 3,0 & 4,0 & 0 & 1 & 0 \\ 1,2 & 2,0 & 5,8 & 0 & 0 & 1 \end{array} \right)$$

$$\left(\begin{array}{ccc|ccc} 2,0 & 3,0 & 4,0 & 0 & 1 & 0 \\ 0,8 & 2,2 & 3,6 & 1 & 0 & 0 \\ 1,2 & 2,0 & 5,8 & 0 & 0 & 1 \end{array} \right) \leftarrow P_2$$

$$P_{1/2} \left(\begin{array}{ccc} 2,0 & 3,0 & 4,0 \\ 0,8 & 2,2 & 3,6 \\ 1,2 & 2,0 & 5,8 \end{array} \right)$$

$$P_{2/1} \left(\begin{array}{ccc} 2 & 3,0 & 4,0 \\ 0 & 1 & 2,0 \\ 0 & 0,2 & 3,4 \end{array} \right)$$

$$P_1 \left(\begin{array}{ccc} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{array} \right)$$

$$L = \left(\begin{array}{ccc} 1 & 0 & 0 \\ 0,8/2 & 1 & 0 \\ 1,2/2 & 0 & 1 \end{array} \right)$$

$$L = \left(\begin{array}{ccc} 1 & 0 & 0 \\ 0,4 & 1 & 0 \\ 0,6 & 0,2 & 1 \end{array} \right)$$

$$R \Rightarrow \left(\begin{array}{ccc|c} 2 & 3,0 & 4,0 & 2 \\ 0 & 1 & 2,0 & 3 \\ 0 & 0 & 3 & 0 \end{array} \right)$$

$$P = P_2 \circ P_1 = \left(\begin{array}{ccc} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{array} \right) \circ \left(\begin{array}{ccc} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{array} \right) = \begin{matrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{matrix}$$

$$Ly = Pb$$

$$\left(\begin{array}{ccc} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{array} \right) \cdot \begin{matrix} 2,4 \\ 1,0 \\ 4,0 \end{matrix} = \begin{matrix} 1,0 \\ 2,4 \\ 4,0 \end{matrix}$$

$$\left(\begin{array}{ccc} 1 & 0 & 0 \\ 0,4 & 1 & 0 \\ 0,6 & 0,2 & 1 \end{array} \right) \cdot \begin{pmatrix} y_1 \\ y_2 \\ y_3 \end{pmatrix} = \begin{pmatrix} 2,4 \\ 1 \\ 4 \end{pmatrix} = \begin{array}{l} y_1 = 1 \\ y_2 = 2,4 - 0,4 = 2 \end{array}$$

$$y_3 = 4 - 0,6 - 0,4 = 3$$

$$\left(\begin{array}{ccc|c} 2 & 3 & 4 & x_1 \\ 0 & 1 & 2 & x_2 \\ 0 & 0 & 3 & x_3 \end{array} \right) = \begin{matrix} 1 \\ 2 \\ 3 \end{matrix} = \begin{array}{l} x_1 = (1-4-0)/2 = -1,5 \\ x_2 = 0 \\ x_3 = 1 \end{array}$$

(C)

Aufgabe 3)

0	2	9	13
150	104	172	152

$$d = 150$$

$$ax^3 + bx^2 + cx + d = 0$$

$$\begin{pmatrix} 8 & 4 & 2 & \cancel{-46} \\ 729 & 81 & 9 & \cancel{22} \\ 2197 & 169 & 13 & \cancel{21} \end{pmatrix} \cdot \begin{pmatrix} a \\ b \\ c \end{pmatrix} = \begin{pmatrix} -46 \\ 22 \\ 2 \end{pmatrix}$$

$$a = -0,383 \quad b = 7,842 \quad c = -37,155$$

$$f(x) = -0,383 \cdot x^3 + 7,842 \cdot x^2 + 37,155 \cdot x + 150 \leq$$

b)

$$2004 = 7 \quad 2003 = 6$$

Einsetzen

$$f(7) \Rightarrow \underline{\underline{142,804}}$$

$$f(6) \Rightarrow \underline{\underline{126,654}}$$