

$$A = [\vec{a}_1 | \vec{a}_2 | \vec{a}_3]$$

$$\vec{r}_1 = \vec{a}_1 \Rightarrow t_{12} = \frac{(\vec{r}_1, \vec{a}_2)}{(\vec{r}_1, \vec{r}_1)} = \frac{(1 \cdot 5 + 4 \cdot 5 + 0 \cdot 1)}{(1 + 16 + 0)} = \frac{25}{17}$$

$$\vec{r}_2 = \vec{a}_2 - t_{12} \cdot \vec{r}_1 = \begin{pmatrix} 5 \\ 5 \\ 1 \end{pmatrix} - \frac{25}{17} \cdot \begin{pmatrix} 1 \\ 4 \\ 0 \end{pmatrix} = \begin{pmatrix} \frac{59}{17} \\ -\frac{19}{17} \\ 1 \end{pmatrix} \Rightarrow$$

$$t_{13} = \frac{(\vec{r}_1, \vec{a}_3)}{(\vec{r}_1, \vec{r}_1)} = \frac{(1 \cdot 7 + 4 \cdot 7 + 0 \cdot 1)}{1 + 16 + 0} = \frac{36}{17}$$

$$t_{23} = \frac{(\vec{r}_2, \vec{a}_3)}{(\vec{r}_2, \vec{r}_2)} = \frac{\left(\frac{59}{17} \cdot 7 + \left(-\frac{19}{17}\right) \cdot 7 + 1 \cdot 1\right)}{\frac{3481}{289} + \frac{361}{289} + 1} = \frac{11}{9}$$

$$\vec{r}_3 = \vec{a}_3 - t_{13} \cdot \vec{r}_1 - t_{23} \cdot \vec{r}_2 = \begin{pmatrix} 7 \\ 7 \\ 1 \end{pmatrix} - \left(\frac{36}{17}\right) \cdot \begin{pmatrix} 1 \\ 4 \\ 0 \end{pmatrix} - \frac{11}{9} \cdot \begin{pmatrix} \frac{59}{17} \\ -\frac{19}{17} \\ 1 \end{pmatrix} =$$

$$= \begin{pmatrix} \frac{98}{153} \\ -\frac{16}{153} \\ -\frac{2}{9} \end{pmatrix}$$

$$\vec{b} = \begin{pmatrix} 3 \\ 3 \\ 1 \end{pmatrix}$$

$$x_3 = \frac{(\vec{r}_3, \vec{b})}{(\vec{r}_3, \vec{a}_3)} = \frac{\left(\frac{98}{153} \cdot 3 + 3 \cdot \left(-\frac{16}{153} \right) + 1 \cdot \left(-\frac{2}{9} \right) \right)}{\left(\frac{98}{153} \cdot 7 + \left(-\frac{16}{153} \right) \cdot 7 + \left(-\frac{2}{9} \right) \cdot 1 \right)} = \frac{53}{153}$$

$$\vec{b}^{(11)} = \begin{pmatrix} 3 \\ 3 \\ 1 \end{pmatrix} - 2 \begin{pmatrix} 7 \\ 7 \\ 1 \end{pmatrix} = \begin{pmatrix} -11 \\ -11 \\ -1 \end{pmatrix}$$

$$x_2 = \frac{(\vec{r}_2, \vec{b}^{(11)})}{(\vec{r}_2, \vec{a}_2)} = \frac{\frac{59}{17} \cdot (-11) + \left(-\frac{19}{17} \right) \cdot (-11) + 1 \cdot (-1)}{\frac{59}{17} \cdot 5 + \left(-\frac{19}{17} \right) \cdot 5 + 1 \cdot 1} = -\frac{457}{217}$$

$$x_1 = \frac{(\vec{r}_1, \vec{b}^{(11)})}{(\vec{r}_1, \vec{a}_1)}$$

$$\vec{b}^{(12)} = \begin{pmatrix} -11 \\ -11 \\ -1 \end{pmatrix} - 1 \begin{pmatrix} 5 \\ 5 \\ 1 \end{pmatrix} \cdot (-1) = \begin{pmatrix} -6 \\ -6 \\ 0 \end{pmatrix}$$

$$x_1 = \frac{1 \cdot 1 + 4 \cdot 4 + 0 \cdot 0}{1 \cdot 1 + 4 \cdot 4 + 0 \cdot 0} = \frac{17}{17} = 1$$

$$\text{Ordnung: } \begin{cases} x_1 = 1 \\ x_2 = -\frac{457}{217} \\ x_3 = \frac{53}{153} \end{cases}$$

x_1	x_2	x_3	Messg. Leichter			
0	0	0	d_1	d_2	d_3	d_{max}
1	2,3	2,6	1,3	2,3	2,6	2,6
1,17	2,08	3,09	1,0,77	4,38	0,49	7,38
-0,242	2,033	1,742	1,412	4,123	1,348	4,113
1,262	1,88	3,26	1,504	0,153	1,518	1,518
0,912	2,027	2,912	6,35	0,147	0,347	0,935

x_1	x_2	x_3	d_1	d_2	d_3	d_{max}
0	0	0	1	2,3	2,6	2,6
1,17	2,08	3,09	0,17	0,22	0,49	0,49
1,006	2,033	2,89	0,164	0,647	0,1	0,164
1,0159	2,0038	3,0087	0,0059	0,0292	0,0187	0,0292

Messg. Zeigene

$$x_0 = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$$

$$x_2 = \begin{pmatrix} 1,44 \\ 2,0072 \\ 2,9734 \end{pmatrix}$$

$$x_3 = \begin{pmatrix} 1 \\ 2,6 \\ 3,18 \end{pmatrix}$$

$$x_3 = \begin{pmatrix} 1,0075 \\ 2,0075 \\ 3,00752 \end{pmatrix}$$