

S. 122/4

①

$$\begin{aligned} \underline{e)} \quad & 2r - s + at = 0 \\ & 3r + 3s + 3t = 0 \\ & 5r + 6s + 2t = 0 \end{aligned}$$

$$\begin{array}{cccc|l} 2 & -1 & a & 0 & \downarrow \cdot 3 \\ 3 & 3 & 3 & 0 & \downarrow \cdot 2 \\ 5 & 6 & 2 & 0 & \downarrow \cdot 5 \\ & & & & \downarrow \cdot 2 \end{array}$$

$$\begin{array}{cccc|l} 2 & -1 & a & 0 & \\ 0 & -9 & 3a-6 & 0 & \downarrow \cdot 17 \\ 0 & -17 & 5a-4 & 0 & \downarrow \cdot 9 \end{array}$$

$$\begin{array}{cccc|l} 2 & -1 & a & 0 & \\ 0 & -9 & 3a-6 & 0 & \\ 0 & 0 & * & 0 & \end{array}$$

$$* \quad \underbrace{(17(3a-6) - 9(5a-4))}_{=0 \text{ für lin. abh.}} t = 0$$

$$\rightarrow 0 = 51a - 102 - 45a + 36 = 0$$

$$6a = 66$$

$$\underline{\underline{a = 11}}$$

$$\underline{f)} \quad \begin{array}{cccc|l} 1 & 2 & 1 & 0 & \downarrow \cdot a \\ a & 8 & 1 & 0 & \downarrow \cdot a^2 \\ a^2 & 18 & 1 & 0 & \downarrow - \end{array}$$

$$\begin{array}{cccc|l} 1 & 2 & 1 & 0 & \\ 0 & 2a-8 & a-1 & 0 & \downarrow \cdot 2a^2-18 \\ 0 & 2a^2-18 & a^2-1 & 0 & \downarrow \cdot 2a-8 \end{array}$$

$$\begin{array}{cccc|l} 1 & 2 & 1 & 0 & \\ 0 & 2a-8 & a-1 & 0 & \\ 0 & 0 & * & 0 & \end{array}$$

$$* \quad \underbrace{((2a^2-18)(a-1) - (2a-8)(a^2-1))}_{=0 \text{ für lin. abh.}} t = 0$$

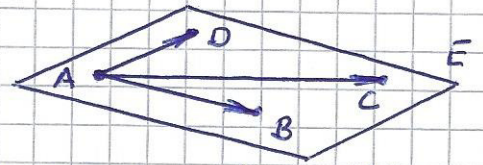
$$\rightarrow \cancel{2a^3} - 2a^2 - 18a + 18 - \cancel{2a^3} + 2a + 8a^2 - 8 = 0$$

$$6a^2 - 16a + 10 = 0$$

$$\text{GTR} \left\{ \begin{array}{l} a_1 = 1 \\ a_2 = \frac{5}{3} \end{array} \right.$$

$$a) \quad r \cdot \overline{AB} + s \cdot \overline{AC} + t \cdot \overline{AD} = \vec{0}$$

hat ∞ viele Lösungen,
einschließlich der trivialen, wenn A, B, C, D auf E liegen.



Prüfen:

$$r \cdot \begin{pmatrix} 1 \\ 9 \\ 7 \end{pmatrix} + s \cdot \begin{pmatrix} 2 \\ 1 \\ 3 \end{pmatrix} + t \cdot \begin{pmatrix} -4 \\ 15 \\ 5 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$$

$$\begin{array}{l} \text{I} \\ \text{II} \\ \text{III} \end{array} \quad \begin{array}{l} r \\ 9r \\ 7r \end{array} + \begin{array}{l} + 2s \\ + s \\ + 3s \end{array} - \begin{array}{l} 4t \\ + 15t \\ + 5t \end{array} = \begin{array}{l} 0 \\ 0 \\ 0 \end{array}$$

$$\begin{array}{l} A_2 \\ \\ \\ \end{array} \quad \begin{array}{cccc|c} 1 & 2 & -4 & 0 & 0 \\ 9 & 1 & 15 & 0 & 0 \\ 7 & 3 & 5 & 0 & 0 \end{array} \quad \begin{array}{l} \downarrow \cdot (-9) \\ \downarrow + \\ \\ \downarrow \cdot (-7) \\ \downarrow + \end{array}$$

$$\begin{array}{cccc|c} 1 & 2 & -4 & 0 & 0 \\ 0 & -17 & 51 & 0 & 0 \\ 0 & -11 & 33 & 0 & 0 \end{array} \quad \begin{array}{l} : 17 \\ : 11 \end{array}$$

$$\begin{array}{l} A_2 \\ \\ \\ \end{array} \quad \begin{array}{cccc|c} 1 & 2 & -4 & 0 & 0 \\ 0 & -1 & 3 & 0 & 0 \\ 0 & -1 & 3 & 0 & 0 \end{array} \quad \begin{array}{l} \downarrow - \\ \\ \end{array}$$

$$\begin{array}{cccc|c} 1 & 2 & -4 & 0 & 0 \\ 0 & -1 & 3 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{array}$$

$$\Rightarrow 0 \cdot t = 0 \quad \Rightarrow t = R \quad \Rightarrow \text{lin. abh.} \\ \Rightarrow \underline{\underline{A, B, C, D \in E}}$$

b) Prüfen:

$$r \cdot \begin{pmatrix} 4 \\ 3 \\ 2 \end{pmatrix} + s \cdot \begin{pmatrix} -12 \\ 3 \\ 4 \end{pmatrix} + t \cdot \begin{pmatrix} -1 \\ 4 \\ 6 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$$

mit CP: $L = \{(0|0|0)\}$ \Rightarrow nur triviale Los.

\Rightarrow lin. unabh.

$\Rightarrow \underline{\underline{A, B, C, D \text{ nicht alle } \in E}}$