Lösung - 2. SA - 03.03.15 - Vektorgeometrie

1.) $0 \cdot r = 0 \neq 1 \Rightarrow g \nparallel h_c$ für alle c ✓

I $3 = 2 + m$ I $\boxed{m=1}$ in II ✓

II $2 - 4k = -12 + 6m$ II: $-4k = -14 + 6 \Rightarrow -4k = -8 \Rightarrow \boxed{k=2}$ ✓

III $-3 + 3k = 9 + 2mc$ ✓ Probe in III: $-3 + 6 = 9 + 2c \Rightarrow 2c = -6$ $\boxed{c=-3}$ ✓

$\vec{s} = \begin{pmatrix} 3 \\ 2 \\ -3 \end{pmatrix} + 2 \cdot \begin{pmatrix} 0 \\ -4 \\ 3 \end{pmatrix} = \begin{pmatrix} 3 \\ -6 \\ 3 \end{pmatrix}$. Für $c=-3$ schneidet g h_3 in $S(3|-6|3)$ ✓

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2.) $E: \vec{x} = \begin{pmatrix} 3 \\ 2 \\ -3 \end{pmatrix} + \lambda \begin{pmatrix} 0 \\ -4 \\ 3 \end{pmatrix} + \mu \begin{pmatrix} 1 \\ 6 \\ -6 \end{pmatrix}$ ✓✓

$\left(\begin{array}{cc|c} 0 & 1 & x_1 - 3 \\ -4 & 6 & x_2 - 2 \\ 3 & -6 & x_3 + 3 \end{array}\right) \begin{array}{c} \\ \cdot 3 \\ \cdot 4 \end{array}$ ✓ $\Rightarrow \left(\begin{array}{cc|c} 0 & 1 & x_1 - 3 \\ -4 & 6 & x_2 - 2 \\ 0 & -6 & 3x_2 - 6 + 4x_3 + 12 \end{array}\right) \cdot 6$ ✓

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$\left(\begin{array}{cc|c} \dots & & \\ 0 & 0 & 6x_1 - 18 + 3x_2 - 6 + 4x_3 + 12 \end{array}\right) \Rightarrow E: 6x_1 + 3x_2 + 4x_3 - 12 = 0$ ✓

4.1) $6x_1 + 3x_2 + 4x_3 = 12 \Rightarrow E: \frac{x_1}{2} + \frac{x_2}{4} + \frac{x_3}{3} = 1$ ✓ (AAF) $\Rightarrow$

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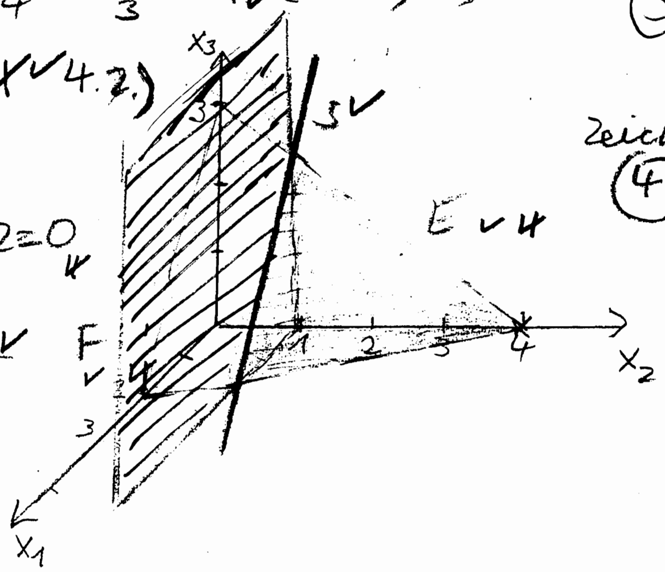
$\Rightarrow S_1(2|0|0)$; $S_2(0|4|0)$; $S_3(0|0|3)$ ✓✓ 4.2)

F: $S(0|1|0)$ ✓



Zeichn. 4

3.) $F \parallel_{\text{echt}}$ x_1x_3-Ebene ✓

$x_2 = 1$ ✓ $x_1 = r$ ✓ in $E: 6r + 3 + 4x_3 - 12 = 0$ ✓

$4x_3 = -6r + 9 \rightarrow x_3 = -1{,}5r + 2{,}25$ ✓

$\Rightarrow s: \vec{x} = \begin{pmatrix} 0 \\ 1 \\ 2{,}25 \end{pmatrix} + r \begin{pmatrix} 1 \\ 0 \\ -1{,}5 \end{pmatrix}$ ✓

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5.) $j \parallel_{\text{echt}} s$; $A \notin E$; $A \notin F \Rightarrow j: \vec{x} = \begin{pmatrix} 3 \\ 2 \\ 0 \end{pmatrix} + \beta \begin{pmatrix} 2 \\ 0 \\ -3 \end{pmatrix}$

✓✓ ✓✓

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Σ 25

1) mit Gauß-Schema

$$\begin{array}{cc|c} 0 & -1 & -1 \\ -4 & -6 & -14 \\ 3 & -2c & 12 \end{array} \quad \begin{array}{l} \\ \cdot 3 \\ \cdot 4 \end{array} \Big]+$$

$$\begin{array}{cc|c} 0 & -1 & -1 \\ 0 & -8c-18 & 6 \end{array} \quad \cdot(-8c-18) \Big]+$$

$$\begin{array}{cc|c} 0 & 0 & 8c+24 \end{array}$$

$8c+24=0 \Rightarrow c=-3$

eindeutige Lösung $\Rightarrow$ Schnittpunkt

$m=1 \qquad \vec{s} = \begin{pmatrix} 2 \\ -12 \\ 9 \end{pmatrix} + \begin{pmatrix} 1 \\ 6 \\ -6 \end{pmatrix} \qquad S(3/-6/3)$

$c \neq -3 \Rightarrow$ ↯ windschief da nicht parallel

3) 2 gemeinsame Punkte $\Rightarrow$ Gerade

$x_2 = 1$ setze $x_3 = 0 \Rightarrow 6x_1 + 3 - 12 = 0 \Rightarrow x_1 = 1{,}5 \quad A(1{,}5/1/0)$

$x_1 = 0 \Rightarrow 3 + 4x_3 - 12 = 0 \Rightarrow x_3 = 2{,}25 \quad B(0/1/2{,}25)$

$\Rightarrow \vec{x}_s = \begin{pmatrix} 1{,}5 \\ 1 \\ 0 \end{pmatrix} + r \begin{pmatrix} -1{,}5 \\ 0 \\ 2{,}25 \end{pmatrix}$

<u>oder:</u> $E_{Par.}$ in F:

$x_2 - 1 = 0$

$(2 + \lambda(-4) + \mu \cdot 6) - 1 = 0 \qquad 1 - 4\lambda + 6\mu = 0 \qquad \lambda = 1{,}5\mu + 0{,}25$

in E: $\vec{x}_s = \begin{pmatrix} 3 \\ 2 \\ -3 \end{pmatrix} + (1{,}5\mu + 0{,}25)\begin{pmatrix} 0 \\ -4 \\ 3 \end{pmatrix} + \mu \begin{pmatrix} 1 \\ 6 \\ -6 \end{pmatrix} = \begin{pmatrix} 3 \\ 1 \\ -2{,}25 \end{pmatrix} + \mu \begin{pmatrix} 1 \\ 0 \\ -1{,}5 \end{pmatrix}$