Nr. 3) $P(1|-2|-3)$

$d(P; x_2x_3\text{-Ebene}) = 1$ LE

$d(P; x_1x_3\text{-Ebene}) = |-2| = 2$ LE

$d(P; x_1x_2\text{-Ebene}) = |-3| = 3$ LE

Nr. 4)a) $S_1(3|0|0)$ $S_2(0|3|0)$ $S_3(0|0|4)$ $P(4|5|7)$

$$E_1: \vec{x} = \begin{pmatrix}3\\0\\0\end{pmatrix} + r\begin{pmatrix}0-3\\3-0\\0-0\end{pmatrix} + s\begin{pmatrix}0-3\\0-0\\4-0\end{pmatrix} = \begin{pmatrix}3\\0\\0\end{pmatrix} + r\begin{pmatrix}-3\\3\\0\end{pmatrix} + s\begin{pmatrix}-3\\0\\4\end{pmatrix}$$

$-3 \quad -3$
$3 \quad 0$
$0 \quad 4$
$-3 \quad -3$
$3 \quad 0$
$0 \quad 4$

$$\vec{n}_{E_1} = \begin{pmatrix}12\\12\\9\end{pmatrix}; \quad \vec{n}_{E_{10}} = \frac{1}{\sqrt{369}}\begin{pmatrix}12\\12\\9\end{pmatrix}; \quad \text{HNF von } E_1: \left[\vec{x} - \begin{pmatrix}3\\0\\0\end{pmatrix}\right] \cdot \frac{1}{\sqrt{369}}\begin{pmatrix}12\\12\\9\end{pmatrix} = 0$$

$$\text{HNF von } E_1: \frac{12x_1 + 12x_2 + 9x_3 - 36}{\sqrt{369}} = 0$$

$$d(E_1; P) = \frac{|12\cdot 4 + 12\cdot 5 + 9\cdot 7 - 36|}{\sqrt{369}} = \frac{135}{\sqrt{369}} \approx 7{,}03 \text{ LE}$$

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b) $Q(5|8|-9)$; $E_2: 2x_1 + 3x_2 - 4x_3 = 12$

$$g \perp E_2 \wedge Q \in g \Rightarrow g: \vec{x} = \begin{pmatrix}5\\8\\-9\end{pmatrix} + t\begin{pmatrix}2\\3\\-4\end{pmatrix}$$

$g \cap E_2 = \{F\} \Rightarrow 2\cdot(5+2t) + 3(8+3t) - 4(-9-4t) = 12$

$4t + 10 + 9t + 24 + 16t + 36 = 12$

$29t + 70 = 12$

$29t = -58$

$t = -2$

$$\vec{OF} = \begin{pmatrix}5\\8\\-9\end{pmatrix} + (-2)\cdot\begin{pmatrix}2\\3\\-4\end{pmatrix} = \begin{pmatrix}1\\2\\-1\end{pmatrix}; \quad F(1|2|-1)$$

0. Fell