S. 132/3

$A(1|3|2)$; $B(3|9|5)$; $C(7|10|4)$

E in Parameterform: $E: \vec{x} = \begin{pmatrix}1\\3\\2\end{pmatrix} + r\cdot\begin{pmatrix}2\\6\\3\end{pmatrix} + s\begin{pmatrix}6\\-3\\2\end{pmatrix}$

$\vec{n} = \begin{pmatrix}2\\6\\3\end{pmatrix} \times \begin{pmatrix}6\\-3\\2\end{pmatrix} = \begin{pmatrix}21\\14\\-42\end{pmatrix} = 7\cdot\begin{pmatrix}3\\2\\-6\end{pmatrix} \longrightarrow \vec{n} = \begin{pmatrix}3\\2\\-6\end{pmatrix}$

$E: \begin{pmatrix}3\\2\\-6\end{pmatrix} \circ \left[\begin{pmatrix}x_1\\x_2\\x_3\end{pmatrix} - \begin{pmatrix}1\\3\\2\end{pmatrix}\right] = 0$

$|\vec{n}| = \sqrt{3^2+2^2+(-6)^2} = \sqrt{9+4+36} = 7$

$E: 3x_1 + 2x_2 - 6x_3 + 3 = 0$

$-3x_1 - 2x_2 + 6x_3 - 3 = 0 \quad \rightarrow \vec{n}_0 = \frac{1}{7}\begin{pmatrix}3\\2\\-6\end{pmatrix}$

$\Rightarrow$ HNF $\quad \frac{-3x_1 - 2x_2 + 6x_3 - 3}{7} = 0$

$\frac{1}{7}\begin{pmatrix}3\\2\\-6\end{pmatrix} \circ \left[\begin{pmatrix}x_1\\x_2\\x_3\end{pmatrix} - \begin{pmatrix}1\\3\\2\end{pmatrix}\right] = 0$

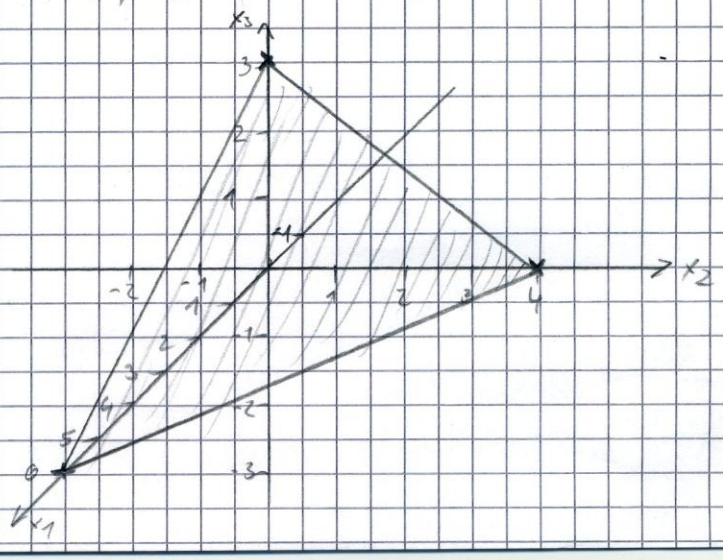
S. 132/4

$E: 2x_1 + 3x_2 + 4x_3 - 12 = 0$

a) x_1-Achse: $x_2 = 0$; $x_3 = 0$: $2x_1 - 12 = 0 \Rightarrow x_1 = 6$ $S_1(6|0|0)$

x_2-Achse: $x_1 = 0$; $x_3 = 0$: $3x_2 - 12 = 0 \Rightarrow x_2 = 4$ $S_2(0|4|0)$

x_3-Achse: $x_1 = 0$, $x_2 = 0$: $4x_3 - 12 = 0 \Rightarrow x_3 = 3$ $S_3(0|0|3)$



b) $E: \vec{x} = \begin{pmatrix} 6 \\ 0 \\ 0 \end{pmatrix} + \lambda \cdot \begin{pmatrix} -6 \\ 4 \\ 0 \end{pmatrix} + \mu \begin{pmatrix} -6 \\ 0 \\ 3 \end{pmatrix}$

Zusatz:

$E: 2x_1 + 3x_2 + 4x_3 - 12 = 0$

$\Rightarrow \vec{n} = \begin{pmatrix} 2 \\ 3 \\ 4 \end{pmatrix}, \quad |\vec{n}| = \sqrt{2^2 + 3^2 + 4^2} = \sqrt{29}$

HNF: $\frac{1}{\sqrt{29}} \begin{pmatrix} 2 \\ 3 \\ 4 \end{pmatrix} \circ \left[\begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} - \begin{pmatrix} 6 \\ 0 \\ 0 \end{pmatrix} \right] = 0$

$$\frac{2x_1 + 3x_2 + 4x_3 - 12}{\sqrt{29}} = 0$$