S. 134/3

A(3|0|2) ; B(5|1|4) ; C(5|-2|3)

$E: \vec{x} = \begin{pmatrix}3\\0\\2\end{pmatrix} + \lambda\begin{pmatrix}2\\1\\2\end{pmatrix} + \mu\begin{pmatrix}2\\-2\\1\end{pmatrix}$; $\vec{n} = \begin{pmatrix}2\\1\\2\end{pmatrix} \times \begin{pmatrix}2\\-2\\1\end{pmatrix} = \begin{pmatrix}5\\2\\-6\end{pmatrix}$

$\Rightarrow E \quad \begin{pmatrix}5\\2\\-6\end{pmatrix} \circ \left[\begin{pmatrix}x_1\\x_2\\x_3\end{pmatrix} - \begin{pmatrix}3\\0\\2\end{pmatrix}\right] = 0$

$E: \; 5x_1 + 2x_2 - 6x_3 - 3 = 0$

a) P(1|-5|1) ; Q(4|-3|3)

$g_{PQ}: \vec{x} = \begin{pmatrix}1\\-5\\1\end{pmatrix} + \sigma \cdot \begin{pmatrix}3\\2\\2\end{pmatrix}$ $\quad x_1 = 1 + 3\sigma$, $x_2 = -5 + 2\sigma$, $x_3 = 1 + 2\sigma$

einsetzen in E:

$5\cdot(1+3\sigma) + 2(-5+2\sigma) - 6(1+2\sigma) - 3 = 0$

$5 + 15\sigma - 10 + 4\sigma - 6 - 12\sigma - 3 = 0$

$7\sigma = 14$

$\sigma = 2$

$\Rightarrow$ g schneidet E!

Durchstoßpunkt: $\vec{OS} = \begin{pmatrix}1\\-5\\1\end{pmatrix} + 2\cdot\begin{pmatrix}3\\2\\2\end{pmatrix} = \begin{pmatrix}7\\-1\\5\end{pmatrix}$

($\sigma = 2$ in g_{PQ})

b) P(2|4|1) ; Q(4|5|3)

$g_{PQ}: \vec{x} = \begin{pmatrix}2\\4\\1\end{pmatrix} + \tau\cdot\begin{pmatrix}2\\1\\2\end{pmatrix}$

in E: $5\cdot(2+2\tau) + 2\cdot(4+\tau) - 6\cdot(1+2\tau) - 3 = 0$

$10 + 10\tau + 8 + 2\tau - 6 - 12\tau - 3 = 0$

$9 = 0$ ↯

$\Rightarrow$ kein gemeinsamer Punkt von g_{PQ} und E

$\Rightarrow g_{PQ} \parallel E$