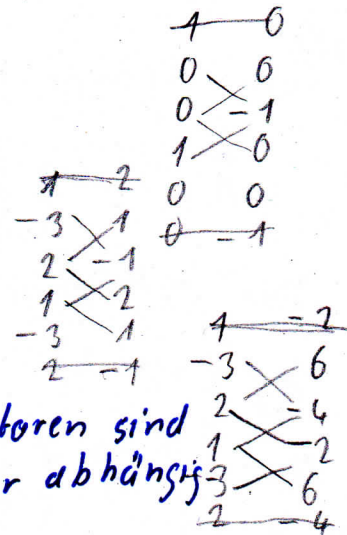


Nr. 1) a)  $\begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} \times \begin{pmatrix} 0 \\ 0 \\ -1 \end{pmatrix} = \begin{pmatrix} 0-0 \\ 0+1 \\ 0+0 \end{pmatrix} = \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix}$

b)  $\begin{pmatrix} 1 \\ -3 \\ 2 \end{pmatrix} \times \begin{pmatrix} 2 \\ 1 \\ -1 \end{pmatrix} = \begin{pmatrix} 3-2 \\ 4+1 \\ 1+6 \end{pmatrix} = \begin{pmatrix} 1 \\ 5 \\ 7 \end{pmatrix}$

c)  $\begin{pmatrix} 1 \\ -3 \\ 2 \end{pmatrix} \times \begin{pmatrix} -2 \\ 6 \\ -4 \end{pmatrix} = \begin{pmatrix} 12-12 \\ -4+4 \\ 6-6 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$

$\Rightarrow$  Vektoren sind linear abhängig



Nr. 2) a)  $\begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix} \times \begin{pmatrix} 2 \\ 1 \\ 3 \end{pmatrix} = \begin{pmatrix} 2 \\ 2 \\ -2 \end{pmatrix}$  ;  $\begin{pmatrix} 2 \\ 1 \\ 3 \end{pmatrix} \times \begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix} = \begin{pmatrix} -2 \\ -2 \\ +2 \end{pmatrix}$

b)  $\begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix} \times \begin{pmatrix} 0 \\ -2 \\ -2 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$

c)  $\begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix} \times \left[ \begin{pmatrix} 2 \\ 1 \\ 3 \end{pmatrix} \times \begin{pmatrix} -3 \\ 0 \\ 1 \end{pmatrix} \right] = \begin{pmatrix} 14 \\ 1 \\ -1 \end{pmatrix}$  ;  $\left[ \begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix} \times \begin{pmatrix} 2 \\ 1 \\ 3 \end{pmatrix} \right] \times \begin{pmatrix} -3 \\ 0 \\ 1 \end{pmatrix} = \begin{pmatrix} 2 \\ 4 \\ 6 \end{pmatrix}$

Nr. 3) a)  $\vec{n} = \begin{pmatrix} -1 \\ 2 \\ -3 \end{pmatrix} \times \begin{pmatrix} 5 \\ 0 \\ -2 \end{pmatrix} = \begin{pmatrix} 4-0 \\ -15-2 \\ 0-10 \end{pmatrix} = \begin{pmatrix} -4 \\ -17 \\ -10 \end{pmatrix}$

E:  $\left[ \vec{x} - \begin{pmatrix} 3 \\ 1 \\ 2 \end{pmatrix} \right] \cdot \begin{pmatrix} -4 \\ -17 \\ -10 \end{pmatrix} = 0 \Rightarrow -4x_1 - 17x_2 - 10x_3 = -12 - 17 - 20 = -49$   
 $4x_1 + 17x_2 + 10x_3 = 49$

b)  $\vec{n} = \begin{pmatrix} 1 \\ -1 \\ 1 \end{pmatrix} \times \begin{pmatrix} 3 \\ 2 \\ -4 \end{pmatrix} = \begin{pmatrix} 4-2 \\ 3+4 \\ 2+3 \end{pmatrix} = \begin{pmatrix} 2 \\ 7 \\ 5 \end{pmatrix}$

E:  $\left[ \vec{x} - \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix} \right] \cdot \begin{pmatrix} 2 \\ 7 \\ 5 \end{pmatrix} = 0 \Rightarrow 2x_1 + 7x_2 + 5x_3 = 0$

