LÖSUNG ZU 698):

a) $\overrightarrow{AB} = \begin{pmatrix} -1 \\ 2 \\ 0 \end{pmatrix} - \begin{pmatrix} -2 \\ 1 \\ 1 \end{pmatrix} = \begin{pmatrix} 1 \\ 1 \\ -1 \end{pmatrix}$

$\overrightarrow{AC} = \begin{pmatrix} 1 \\ -1 \\ 1 \end{pmatrix} - \begin{pmatrix} -2 \\ 1 \\ 1 \end{pmatrix} = \begin{pmatrix} 3 \\ -2 \\ 0 \end{pmatrix}$

$$\overrightarrow{AB} \times \overrightarrow{AC} = \begin{pmatrix} 1 \\ 1 \\ -1 \end{pmatrix} \times \begin{pmatrix} 3 \\ -2 \\ 0 \end{pmatrix} = \begin{pmatrix} 1 \cdot 0 - (-1) \cdot (-2) \\ -(1 \cdot 0 - (-1) \cdot 3) \\ 1 \cdot (-2) - 1 \cdot 3 \end{pmatrix} = \begin{pmatrix} -2 \\ -3 \\ -5 \end{pmatrix}$$

b) $\overrightarrow{AB} = \begin{pmatrix} 6 \\ 2 \\ -3 \end{pmatrix} - \begin{pmatrix} 4 \\ 7 \\ -3 \end{pmatrix} = \begin{pmatrix} 2 \\ -5 \\ 0 \end{pmatrix}$

$\overrightarrow{AC} = \begin{pmatrix} 0 \\ -2 \\ 4 \end{pmatrix} - \begin{pmatrix} 4 \\ 7 \\ -3 \end{pmatrix} = \begin{pmatrix} -4 \\ -9 \\ 7 \end{pmatrix}$

$$\overrightarrow{AB} \times \overrightarrow{AC} = \begin{pmatrix} 2 \\ -5 \\ 0 \end{pmatrix} \times \begin{pmatrix} -4 \\ -9 \\ 7 \end{pmatrix} = \begin{pmatrix} (-5) \cdot 7 - 0 \cdot (-9) \\ -(2 \cdot 7 - 0 \cdot (-4)) \\ 2 \cdot (-9) - (-5) \cdot (-4) \end{pmatrix} = \begin{pmatrix} -35 \\ -14 \\ -38 \end{pmatrix}$$

c) $\overrightarrow{AB} = \begin{pmatrix} -1 \\ 2 \\ 0 \end{pmatrix} - \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix} = \begin{pmatrix} -1 \\ 1 \\ 0 \end{pmatrix}$

$\overrightarrow{AC} = \begin{pmatrix} 16 \\ 0 \\ 0 \end{pmatrix} - \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix} = \begin{pmatrix} 16 \\ -1 \\ 0 \end{pmatrix}$

$$\overrightarrow{AB} \times \overrightarrow{AC} = \begin{pmatrix} -1 \\ 1 \\ 0 \end{pmatrix} \times \begin{pmatrix} 16 \\ -1 \\ 0 \end{pmatrix} = \begin{pmatrix} 1 \cdot 0 - 0 \cdot (-1) \\ -((-1) \cdot 0 - 0 \cdot 16) \\ (-1) \cdot (-1) - 1 \cdot 16 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ -15 \end{pmatrix}$$

d) $\overrightarrow{AB} = \begin{pmatrix} 1 \\ -3 \\ 2 \end{pmatrix} - \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix} = \begin{pmatrix} 0 \\ -4 \\ 1 \end{pmatrix}$

$\overrightarrow{AC} = \begin{pmatrix} 1 \\ 7 \\ 2 \end{pmatrix} - \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix} = \begin{pmatrix} 0 \\ 6 \\ 1 \end{pmatrix}$

$$\overrightarrow{AB} \times \overrightarrow{AC} = \begin{pmatrix} 0 \\ -4 \\ 1 \end{pmatrix} \times \begin{pmatrix} 0 \\ 6 \\ 1 \end{pmatrix} = \begin{pmatrix} (-4) \cdot 1 - 1 \cdot 6 \\ -(0 \cdot 1 - 1 \cdot 0) \\ 0 \cdot 6 - (-4) \cdot 0 \end{pmatrix} = \begin{pmatrix} -10 \\ 0 \\ 0 \end{pmatrix}$$