P16 a) $a \times b = \begin{pmatrix} 7 \\ -68 \\ 37 \end{pmatrix}$ $a \times d = \begin{pmatrix} -22 \\ 8 \\ 38 \end{pmatrix}$

b) $(a+b) \times c = \begin{pmatrix} 9 \\ 8 \\ 13 \end{pmatrix} \times \begin{pmatrix} 18 \\ 16 \\ 26 \end{pmatrix} = \vec{0}$

c) $\langle a+b, a \times b \rangle = \langle a, a \times b \rangle + \langle b, a \times b \rangle = 0$

P17

$\vec{AB} = \begin{pmatrix} -1 \\ 0 \\ 1 \end{pmatrix}$ $\vec{AC} = \begin{pmatrix} -1 \\ -1 \\ 0 \end{pmatrix}$ $\vec{BC} = \begin{pmatrix} 0 \\ -1 \\ -1 \end{pmatrix}$

Längen $\sqrt{2}$ → gleichseitig

a) $\cos\alpha = \dfrac{\vec{AB} * \vec{AC}}{|\vec{AB}|\,|\vec{AC}|} = \dfrac{1}{2} \Rightarrow \alpha = 60°$

b) $A = \dfrac{\sqrt{3}}{4} a^2 = \dfrac{\sqrt{3}}{4} \cdot 2 = \dfrac{\sqrt{3}}{2}$ $A = \dfrac{1}{2} |\vec{AB} \times \vec{AC}| = \dfrac{\sqrt{3}}{2}$

$A = \dfrac{1}{2} |\vec{AB}| \cdot |\vec{AC}| \sin\alpha = \dfrac{\sqrt{3}}{2}$

c) $\vec{AB} \times \vec{AC} = \begin{pmatrix} 1 \\ -1 \\ 1 \end{pmatrix}$ $u = \dfrac{1}{\sqrt{3}} \begin{pmatrix} 1 \\ -1 \\ 1 \end{pmatrix}$

$E: (x_1 - x_2 + x_3 - 1) : \sqrt{3} = 0$

$b_1 = \dfrac{1}{\sqrt{3}} \begin{pmatrix} 1 \\ -1 \\ 1 \end{pmatrix}$ $b_3 = \dfrac{1}{\sqrt{2}} \begin{pmatrix} 1 \\ 0 \\ -1 \end{pmatrix}$ $b_1 \times b_2 = b_3$

$b_3 \times b_1 = b_2 = \dfrac{1}{\sqrt{6}} \begin{pmatrix} -1 \\ -2 \\ -1 \end{pmatrix}$

P18

x_1 g Äpfel $0{,}003 x_1 + 0{,}011 x_2 + 0{,}01 x_3 = 9$

x_2 g Bananen $0{,}006 x_1 + 0{,}002 x_2 + 0{,}002 x_3 = 5$

x_3 g Orangen $0{,}15 x_1 + 0{,}22 x_2 + 0{,}12 x_3 = 197$

zu 17c) $(x_1 - x_2 + x_3)/\sqrt{3} = c$

$(1 - 1 + 1)/\sqrt{3} = c$

$(x_1 - x_2 + x_3)/\sqrt{3} = 1/\sqrt{3}$

$\boxed{(x_1 - x_2 + x_3 - 1)/\sqrt{3} = 0}$