

Lösungen:

$$4) |\vec{a}| = \sqrt{9+4+16} = \sqrt{29}; |\vec{b}| = \sqrt{3}; |\vec{c}| = 3$$

$$|\vec{d}| = \sqrt{0,25+0,36+0,09} = \sqrt{0,7}; |\vec{e}| = 7$$

$$|\vec{f}| = \frac{1}{3} \sqrt{2+3+4} = 1; |\vec{g}| = \frac{1}{2} \sqrt{2} \cdot \sqrt{2} = 1$$

$$|\vec{h}| = \sqrt{11+12+13} = 6$$

$$5) \vec{a}_0 = \frac{1}{\sqrt{5}} \begin{pmatrix} 1 \\ 0 \\ 2 \end{pmatrix}; \vec{b}_0 = \frac{1}{\sqrt{14}} \begin{pmatrix} 3 \\ -2 \\ 1 \end{pmatrix}; \vec{c}_0 = \begin{pmatrix} 0 \\ -1 \\ 0 \end{pmatrix} = \vec{c}$$

$$\vec{d}_0 = \frac{1}{0,3} \begin{pmatrix} 0,2 \\ 0,2 \\ 0,1 \end{pmatrix}; \vec{e}_0 = \frac{1}{4} \cdot \frac{1}{\sqrt{26}} \begin{pmatrix} 3 \\ 1 \\ 4 \end{pmatrix} \cdot 4 = \frac{1}{\sqrt{26}} \begin{pmatrix} 3 \\ 1 \\ 4 \end{pmatrix}$$

$$\vec{f}_0 = 0,1 \cdot \frac{1}{5} \begin{pmatrix} 4 \\ 3 \\ 0 \end{pmatrix} \cdot 10 = \frac{1}{5} \begin{pmatrix} 4 \\ 3 \\ 0 \end{pmatrix}$$

$$\vec{g}_0 = \frac{1}{\sqrt{10}} \begin{pmatrix} \sqrt{2} \\ \sqrt{3} \\ \sqrt{5} \end{pmatrix}; \vec{h}_0 = \frac{1}{\sqrt{441}} \begin{pmatrix} \sqrt{146} \\ \sqrt{147} \\ \sqrt{148} \end{pmatrix} = \frac{1}{21} \begin{pmatrix} \sqrt{146} \\ \sqrt{147} \\ \sqrt{148} \end{pmatrix}$$

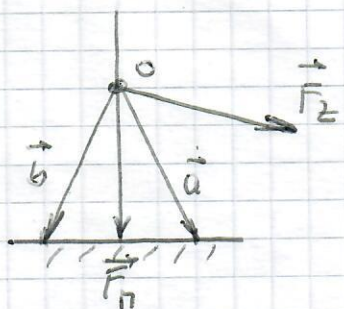
$$6) |\overline{AM}_{BC}| = 4,5; |\overline{BM}_{AC}| = 4,57; |\overline{CM}_{AB}| = 7,65$$

$$7) a) S = \sqrt{(x_1-4)^2 + (x_2-1)^2 + (x_3+1)^2} = |\vec{MX}|$$

$$b) 7 = |\vec{PA}| = \sqrt{(1-3)^2 + (-1-2)^2 + (5-x_3)^2} \quad \text{CP.}$$

$$\underline{x_3 = -1 \vee x_3 = 11}$$

8) Matr:



geg.:  $\vec{F}_2 = \begin{pmatrix} 20 \\ 10 \\ -15 \end{pmatrix}; \vec{a} = \begin{pmatrix} -1 \\ 1 \\ -1 \end{pmatrix}; \vec{b} = \begin{pmatrix} -1 \\ -1 \\ -1 \end{pmatrix}$

ges.:  $\vec{F}_n; \vec{F}_{s1}; \vec{F}_{s2}$

Lo.:  $\sum \vec{F}_i = \vec{0} \vee \vec{F}_{s1} + \vec{F}_{s2} + \vec{F}_n + \vec{F}_2 = \vec{0}$

$$\vec{F}_{s1} = r\vec{a}; \vec{F}_{s2} = s\vec{b}; \vec{F}_n = t \cdot \begin{pmatrix} 0 \\ 0 \\ -1 \end{pmatrix}$$

$$\rightarrow r\vec{a} + s\vec{b} + t \begin{pmatrix} 0 \\ 0 \\ -1 \end{pmatrix} + \vec{F}_2 = \vec{0}$$

$$r \begin{pmatrix} -1 \\ 1 \\ -1 \end{pmatrix} + s \begin{pmatrix} -1 \\ -1 \\ -1 \end{pmatrix} + t \begin{pmatrix} 0 \\ 0 \\ -1 \end{pmatrix} = \begin{pmatrix} -20 \\ -10 \\ 15 \end{pmatrix} \quad \text{LGS}$$

$$|\vec{F}_n| = \underline{35 \text{ N}}$$

$$\rightarrow r = 5; s = 15; t = -35 \text{ N} \quad |\vec{F}_{s1}| = 5\sqrt{3} \text{ N} / |\vec{F}_{s2}| = 15\sqrt{3}$$