

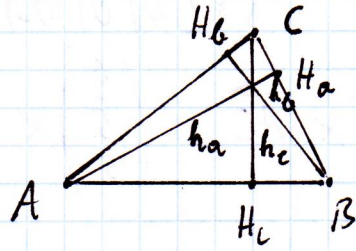
27. Hausübung

12.70 a) $A = (3 | -5 | -2)$, $B = (4 | 3 | 2)$, $C = (-6 | -11 | -8)$

$$\vec{a} = \vec{CB} = \begin{pmatrix} 10 \\ 14 \\ 10 \end{pmatrix} \parallel \begin{pmatrix} 5 \\ 7 \\ 5 \end{pmatrix}$$

$$\vec{b} = \vec{CA} = \begin{pmatrix} 9 \\ 6 \\ 6 \end{pmatrix} \parallel \begin{pmatrix} 3 \\ 2 \\ 2 \end{pmatrix}$$

$$\vec{c} = \vec{AB} = \begin{pmatrix} 1 \\ 8 \\ 4 \end{pmatrix}$$



$$E_a: 5x + 7y + 5z = -30 \quad \cap \quad a: X = \begin{pmatrix} 4 \\ 3 \\ 2 \end{pmatrix} + \lambda \cdot \begin{pmatrix} 5 \\ 7 \\ 5 \end{pmatrix} \rightarrow (1)$$

$$E_b: 3x + 2y + 2z = 22 \quad \cap \quad b: X = \begin{pmatrix} 3 \\ -5 \\ 2 \end{pmatrix} + t \cdot \begin{pmatrix} 3 \\ 2 \\ 2 \end{pmatrix} \rightarrow (2)$$

$$E_c: x + 8y + 4z = -126 \quad \cap \quad c: X = \begin{pmatrix} 4 \\ 3 \\ 2 \end{pmatrix} + u \cdot \begin{pmatrix} 1 \\ 8 \\ 4 \end{pmatrix} \rightarrow (3)$$

$$(1) \quad \left. \begin{array}{l} x = 4 + 5\lambda \\ y = 3 + 7\lambda \\ z = 2 + 5\lambda \end{array} \right\} \quad 20 + 25\lambda + 21 + 49\lambda + 10 + 25\lambda = -30 \Rightarrow 0 = -\frac{81}{33} = -\frac{9}{11}$$

$$H_a = \begin{pmatrix} 4 \\ 3 \\ 2 \end{pmatrix} + \begin{pmatrix} -\frac{45}{11} \\ -\frac{63}{11} \\ -\frac{45}{11} \end{pmatrix} = \begin{pmatrix} -\frac{1}{11} \\ -\frac{20}{11} \\ -\frac{23}{11} \end{pmatrix}$$

$$|\overrightarrow{H_a A}| = \left| \begin{pmatrix} \frac{34}{11} \\ -\frac{25}{11} \\ \frac{1}{11} \end{pmatrix} \right| \approx 3,84 \quad \underline{\underline{h_a \approx 3,84}}$$

$$(2) \quad \left. \begin{array}{l} x = 3 + 3t \\ y = -5 + 2t \\ z = 2 + 2t \end{array} \right\} \quad 9 + 9t - 10 + 4t + 4 + 4t = 22 \Rightarrow t = \frac{19}{17}$$

$$H_b = \begin{pmatrix} \frac{51}{17} \\ -\frac{85}{17} \\ \frac{24}{17} \end{pmatrix} + \begin{pmatrix} \frac{57}{17} \\ \frac{38}{17} \\ \frac{38}{17} \end{pmatrix} = \begin{pmatrix} \frac{108}{17} \\ -\frac{47}{17} \\ \frac{72}{17} \end{pmatrix}$$

$$|\overrightarrow{H_b B}| = \left| \begin{pmatrix} -\frac{40}{17} \\ \frac{98}{17} \\ -\frac{38}{17} \end{pmatrix} \right| \approx 6,62 \quad \underline{\underline{h_b \approx 6,62}}$$

$$(3) \quad \left. \begin{aligned} x &= 4 + u \\ y &= 3 + 8u \\ z &= 2 + 4u \end{aligned} \right\} \quad 4+u + 24+64u + 8+16u = -126 \Rightarrow u = -\frac{162}{81}$$
$$u = -\frac{18}{9} = -2$$

$$H_c = \begin{pmatrix} 4 \\ 3 \\ 2 \end{pmatrix} - \begin{pmatrix} 2 \\ 16 \\ 8 \end{pmatrix} = \begin{pmatrix} 2 \\ -13 \\ -6 \end{pmatrix}$$

$$|\overrightarrow{CH_c}| = \left| \begin{pmatrix} 2 \\ -13 \\ -6 \end{pmatrix} \right| = \sqrt{72} \approx 8,49 \quad \underline{\underline{h_c \approx 8,49}}$$