S.124/11

$$P(1|3|-4) \quad ; \quad g: \vec{x} = \begin{pmatrix} 1 \\ 0 \\ 2 \end{pmatrix} + \lambda \cdot \begin{pmatrix} 1 \\ -2 \\ 3 \end{pmatrix}$$

$h \parallel g \Rightarrow$ gleicher Richtungsvektor! $\Rightarrow h: \vec{x} = \begin{pmatrix} 1 \\ 3 \\ -4 \end{pmatrix} + \lambda \begin{pmatrix} 1 \\ -2 \\ 3 \end{pmatrix}$

S.124/12

a) $\vec{AB} = \begin{pmatrix} 0-0 \\ 11-3 \\ 0-0 \end{pmatrix} = \begin{pmatrix} 0 \\ 8 \\ 0 \end{pmatrix}$; $\vec{BC} = \begin{pmatrix} -8-0 \\ 11-11 \\ 0-0 \end{pmatrix} = \begin{pmatrix} -8 \\ 0 \\ 0 \end{pmatrix}$

$$\vec{AB} \circ \vec{BC} = 0\cdot(-8) + 8\cdot 0 + 0\cdot 0 = 0 \Rightarrow \vec{AB} \perp \vec{BC}$$

$$\left.\begin{aligned} |\vec{AB}| &= \sqrt{0^2+8^2+0^2} = 8 \\ |\vec{BC}| &= \sqrt{(-8)^2+0^2+0^2} = 8 \end{aligned}\right\} \text{„="} \quad |\vec{AB}| = |\vec{BC}|$$

b) $\vec{D} = \vec{A} + \vec{BC} = \begin{pmatrix} 0 \\ 3 \\ 0 \end{pmatrix} + \begin{pmatrix} -8 \\ 0 \\ 0 \end{pmatrix} = \begin{pmatrix} -8 \\ 3 \\ 0 \end{pmatrix} \Rightarrow D(-8|3|0)$

$$\vec{M} = \vec{A} + \frac{1}{2}\vec{AC} = \begin{pmatrix} 0 \\ 3 \\ 0 \end{pmatrix} + \frac{1}{2}\begin{pmatrix} -8-0 \\ 11-3 \\ 0-0 \end{pmatrix} = \begin{pmatrix} 0 \\ 3 \\ 0 \end{pmatrix} + \begin{pmatrix} -4 \\ 4 \\ 0 \end{pmatrix} = \begin{pmatrix} -4 \\ 7 \\ 0 \end{pmatrix} \Rightarrow M(-4|7|0)$$

c) $\vec{M}_{AS} = \begin{pmatrix} 0 \\ 3 \\ 0 \end{pmatrix} + \frac{1}{2}\vec{AS} = \begin{pmatrix} 0 \\ 3 \\ 0 \end{pmatrix} + \frac{1}{2}\begin{pmatrix} -4 \\ 4 \\ 6 \end{pmatrix} = \begin{pmatrix} -2 \\ 5 \\ 3 \end{pmatrix}$

$\vec{M}_{SC} = \frac{1}{2}\begin{pmatrix} -12 \\ 18 \\ 6 \end{pmatrix} = \begin{pmatrix} -6 \\ 9 \\ 3 \end{pmatrix}$;

$\vec{M}_{SD} = \frac{1}{2}\begin{pmatrix} -12 \\ 10 \\ 6 \end{pmatrix} = \begin{pmatrix} -6 \\ 5 \\ 3 \end{pmatrix}$

$$g: \vec{x} = \vec{M}_{AS} + \lambda \cdot \vec{M_{AS}C} = \begin{pmatrix} -2 \\ 5 \\ 3 \end{pmatrix} + \lambda \begin{pmatrix} -8-(-2) \\ 11-5 \\ 0-3 \end{pmatrix} = \begin{pmatrix} -2 \\ 5 \\ 3 \end{pmatrix} + \lambda \begin{pmatrix} -6 \\ 6 \\ -3 \end{pmatrix}$$

$$h: \vec{x} = \vec{M}_{AS} + \mu \, \vec{M_{AS}M_{SC}} = \begin{pmatrix} -2 \\ 5 \\ 3 \end{pmatrix} + \mu \begin{pmatrix} -6-(-2) \\ 9-5 \\ 3-3 \end{pmatrix} = \begin{pmatrix} -2 \\ 5 \\ 3 \end{pmatrix} + \mu \begin{pmatrix} -4 \\ 4 \\ 0 \end{pmatrix}$$

$$i: \vec{x} = \vec{M}_{SD} + \sigma \, \vec{M_{SD}B} = \begin{pmatrix} -6 \\ 5 \\ 3 \end{pmatrix} + \sigma \begin{pmatrix} 0-(-6) \\ 11-5 \\ 0-3 \end{pmatrix} = \begin{pmatrix} -6 \\ 5 \\ 3 \end{pmatrix} + \sigma \begin{pmatrix} 6 \\ 6 \\ -3 \end{pmatrix}$$

$$j: \vec{x} = \vec{M}_{SD} + \tau \cdot \vec{M_{SD}M} = \begin{pmatrix} -6 \\ 5 \\ 3 \end{pmatrix} + \tau \begin{pmatrix} -4-(-6) \\ 7-5 \\ 0-3 \end{pmatrix} = \begin{pmatrix} -6 \\ 5 \\ 3 \end{pmatrix} + \tau \begin{pmatrix} 2 \\ 2 \\ -3 \end{pmatrix}$$

d) $V = \frac{1}{3} \cdot \left|(\vec{AB} \times \vec{AD}) \circ \vec{AS}\right| = \frac{1}{3} \cdot \left|\begin{pmatrix} 0 \\ 8 \\ 0 \end{pmatrix} \times \begin{pmatrix} -8 \\ 0 \\ 0 \end{pmatrix} \circ \begin{pmatrix} -4 \\ 4 \\ 6 \end{pmatrix}\right| = \frac{1}{3} \cdot \left|\begin{pmatrix} 0 \\ 0 \\ 64 \end{pmatrix} \circ \begin{pmatrix} -4 \\ 4 \\ 6 \end{pmatrix}\right| = \frac{1}{3} \cdot |384| = 128 \text{ VE}$

$$O = 8\cdot 8 + 4 \cdot \frac{1}{2} \cdot |\vec{AB} \times \vec{AS}| = 64 + 2 \cdot \left|\begin{pmatrix} 0 \\ 8 \\ 0 \end{pmatrix} \times \begin{pmatrix} -4 \\ 4 \\ 6 \end{pmatrix}\right| = 64 + 2 \cdot \left|\begin{pmatrix} 48 \\ 0 \\ 32 \end{pmatrix}\right|$$

$$= 64 + 2 \cdot \sqrt{48^2+0^2+32^2} = 64 + 2 \cdot 16\sqrt{13} = 64 + 32\sqrt{13} \approx 179{,}4 \text{ FE}$$