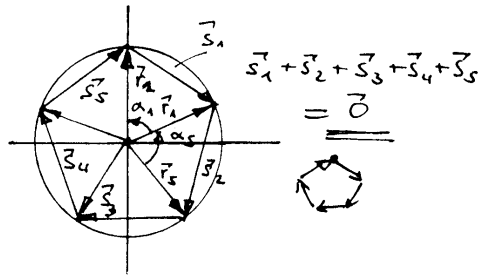


1



$$\alpha_1 + \alpha_2 + \alpha_3 + \alpha_4 + \alpha_5 = 360^\circ \quad (2\pi)$$

$$\alpha_k = \frac{360^\circ}{5}$$

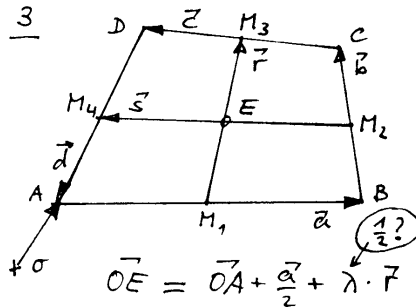
$$\vec{r}_1 + \vec{r}_2 + \vec{r}_3 + \vec{r}_4 + \vec{r}_5 = \vec{0}$$

2 $2\vec{u} + \frac{1}{2}(\vec{x} + 2\vec{u} - 3\vec{c}) = \frac{1}{3}(2\vec{x} - \vec{u} + \vec{c})$

$$\Rightarrow \frac{\vec{x}}{2} - \frac{2}{3}\vec{x} = -\frac{1}{3}\vec{u} + \frac{1}{3}\vec{c} - 2\vec{u} - \frac{1}{2}\vec{u} + \frac{3}{2}\vec{c}$$

$$\Rightarrow -\frac{1}{6}\vec{x} = -\frac{10}{3}\vec{u} + \frac{11}{6}\vec{c} \Rightarrow \underline{\underline{\vec{x} = +20\vec{u} - 11\vec{c}}}$$

3



$$\vec{a} = \vec{OB} - \vec{OA}, \vec{b} = \vec{OC} - \vec{OB},$$

$$\vec{c} = \vec{OD} - \vec{OC}, \vec{d} = \vec{OA} - \vec{OD}$$

$$\vec{a} + \vec{b} + \vec{c} + \vec{d} = \vec{0} \Rightarrow \vec{d} = -\vec{a} - \vec{b} - \vec{c}$$

$$\vec{r} = \frac{\vec{a}}{2} + \frac{\vec{b}}{2} + \frac{\vec{c}}{2}, \quad -\vec{s} = \frac{\vec{d}}{2} + \frac{\vec{a}}{2} + \frac{\vec{b}}{2}$$

$$\vec{OE} = \vec{OA} + \frac{\vec{a}}{2} + \lambda \cdot \vec{r} = \vec{OA} - \frac{\vec{d}}{2} + \mu(-\vec{s})$$

$$\Rightarrow \vec{OA} + \frac{\vec{a}}{2} + \lambda \left(\frac{\vec{a}}{2} + \frac{\vec{b}}{2} + \frac{\vec{c}}{2} \right) = \vec{OA} + \left(\frac{\vec{a}}{2} + \frac{\vec{b}}{2} + \frac{\vec{c}}{2} \right) + \mu \left(\frac{\vec{d}}{2} + \frac{\vec{a}}{2} + \frac{\vec{b}}{2} \right)$$

$$\Rightarrow \vec{a} \left(\frac{\lambda}{2} - \frac{\mu}{2} \right) + \vec{b} \left(\lambda - \frac{1}{2} \right) + \vec{c} \left(\frac{\lambda}{2} - \frac{1}{2} + \frac{\mu}{2} \right) = \vec{0}$$

$$\text{resp. } \lambda \left(\frac{\vec{a}}{2} + \frac{\vec{b}}{2} + \frac{\vec{c}}{2} \right) + \mu \left(-\frac{\vec{a}}{2} + \frac{\vec{c}}{2} \right) + \left(-\frac{\vec{b}}{2} - \frac{\vec{c}}{2} \right) = \vec{0} \quad (*)$$

$$\lambda = \mu = \frac{1}{2} \text{ ist Lösung / est solution!}$$

Keine andere Lösung, $((*) \leadsto 2 \text{ Gleichungen, } 2 \text{ Unbek.} \dots$

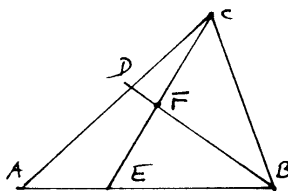
Pas d'autre solution, $((*) \leadsto 2 \text{ équations, } 2 \text{ inconnues.})$

$$\Rightarrow \vec{OE} = \vec{OA} + \frac{\vec{a}}{2} + \frac{1}{2} \left(\frac{\vec{a}}{2} + \frac{\vec{b}}{2} + \frac{\vec{c}}{2} \right) = \vec{OA} + \frac{3}{4}\vec{a} + \frac{1}{2}\vec{b} + \frac{1}{4}\vec{c}$$

$$= \vec{OA} + \frac{3}{4}\vec{OB} - \frac{3}{4}\vec{OA} + \frac{1}{2}\vec{OC} - \frac{1}{2}\vec{OB} + \frac{1}{4}\vec{OB} - \frac{1}{4}\vec{OC}$$

$$\underline{\underline{\vec{OE} = \frac{1}{4}(\vec{OA} + \vec{OB} + \vec{OC} + \vec{OB})}}$$

4



$$\vec{AE} = \frac{1}{3}\vec{AB}, \quad \vec{AD} = \frac{3}{5}\vec{AC}, \quad \vec{BF} = \lambda \vec{BD}$$

$$\lambda = ?$$

$$\vec{AF} = \vec{AB} + \vec{BF} = \vec{AE} + \vec{EF}$$

$$\Rightarrow \vec{AB} + \lambda \vec{BD} = \frac{1}{3}\vec{AB} + \mu \vec{EC}$$

$$\Rightarrow \frac{2}{3}\vec{AB} + \lambda(\vec{AD} - \vec{AB}) = \mu(\vec{AC} - \vec{AE})$$

$$\Rightarrow \frac{2}{3}\vec{AB} + \lambda \left(\frac{3}{5}\vec{AC} - \vec{AB} \right) = \mu \left(\vec{AC} - \frac{1}{3}\vec{AB} \right)$$

$$\Rightarrow \vec{AB} \left(\frac{3}{5} - \lambda + \frac{1}{3}\mu \right) = \vec{AC} \left(-\frac{3}{5}\lambda + \mu \right), \quad \vec{AB} \nparallel \vec{AC}$$

$$\Rightarrow \quad = 0 \quad \quad \quad = 0, \quad \mu = \frac{3}{5}\lambda$$

$$\hookrightarrow \frac{3}{5} - \lambda + \frac{1}{3} \cdot \frac{3}{5}\lambda = 0 \Rightarrow \frac{2}{3} = \frac{4}{5}\lambda \quad | \quad \underline{\underline{\lambda = \frac{5}{6}}}$$