

3. Analytische Geometrie

- S. 40 / 8 b

$$D = \begin{vmatrix} a & -2 & b \\ 4 & 1 & 2 \\ 3 & 3 & 9 \end{vmatrix} = 9a - 12 + 12b - 3b - 6a + 72 = 3a + 9b + 60$$

$$D = 0 \Leftrightarrow 3a + 9b + 60 = 0 \Leftrightarrow a + 3b + 20 = 0 \Leftrightarrow \underline{\underline{a = -3b - 20}}$$

- S. 40 / 8 d

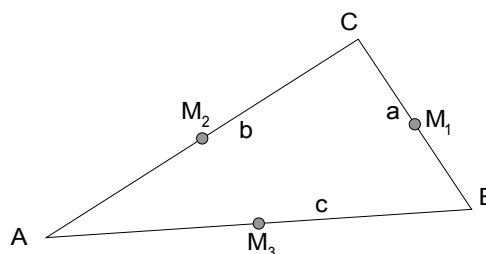
$$D = \begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+a & 1 \\ 1 & 1 & 1+a \end{vmatrix} = (1+a)^3 + 1 + 1 - (1+a) - (1+a) - (1+a) =$$

$$= 1 + 3a + 3a^2 + a^3 - 1 - 3a = a^3 + 3a^2$$

$$D = 0 \Leftrightarrow a^3 + 3a^2 = 0 \Leftrightarrow a^2 \cdot (a+3) = 0 \Leftrightarrow \underline{\underline{a = 0 \vee a = -3}}$$

- S. 86 / 13

$$\begin{aligned} \overrightarrow{AM_1} &= \overrightarrow{AB} + \frac{1}{2}\overrightarrow{BC} = \overrightarrow{OB} - \overrightarrow{OA} + \frac{1}{2}(\overrightarrow{OC} - \overrightarrow{OB}) = \\ &= \frac{1}{2}\overrightarrow{OC} + \frac{1}{2}\overrightarrow{OB} - \overrightarrow{OA} = \\ &= \frac{1}{2} \begin{pmatrix} 13 \\ -15 \\ 17 \end{pmatrix} + \frac{1}{2} \begin{pmatrix} -7 \\ 9 \\ -11 \end{pmatrix} - \begin{pmatrix} 1 \\ -3 \\ 5 \end{pmatrix} = \begin{pmatrix} 2 \\ 0 \\ -2 \end{pmatrix} \\ &\underline{\underline{M_1(2 \mid 0 \mid -2)}} \end{aligned}$$



$$\begin{aligned} \overrightarrow{BM_2} &= \overrightarrow{BC} + \frac{1}{2}\overrightarrow{CA} = \overrightarrow{OC} - \overrightarrow{OB} + \frac{1}{2}(\overrightarrow{OA} - \overrightarrow{OC}) = \\ &= \frac{1}{2}\overrightarrow{OC} + \frac{1}{2}\overrightarrow{OA} - \overrightarrow{OB} = \\ &= \frac{1}{2} \begin{pmatrix} 13 \\ -15 \\ 17 \end{pmatrix} + \frac{1}{2} \begin{pmatrix} 1 \\ -3 \\ 5 \end{pmatrix} - \begin{pmatrix} -7 \\ 9 \\ -11 \end{pmatrix} = \begin{pmatrix} 14 \\ -18 \\ 22 \end{pmatrix} \\ &\underline{\underline{M_2(14 \mid -18 \mid 22)}} \end{aligned}$$

$$\begin{aligned} \overrightarrow{CM_3} &= \overrightarrow{CA} + \frac{1}{2}\overrightarrow{AB} = \overrightarrow{OA} - \overrightarrow{OC} + \frac{1}{2}(\overrightarrow{OB} - \overrightarrow{OA}) = \\ &= \frac{1}{2}\overrightarrow{OA} + \frac{1}{2}\overrightarrow{OB} - \overrightarrow{OC} = \\ &= \frac{1}{2} \begin{pmatrix} 1 \\ -3 \\ 5 \end{pmatrix} + \frac{1}{2} \begin{pmatrix} -7 \\ 9 \\ -11 \end{pmatrix} - \begin{pmatrix} 13 \\ -15 \\ 17 \end{pmatrix} = \begin{pmatrix} -16 \\ 18 \\ -20 \end{pmatrix} \\ &\underline{\underline{M_3(-16 \mid 18 \mid -20)}} \end{aligned}$$