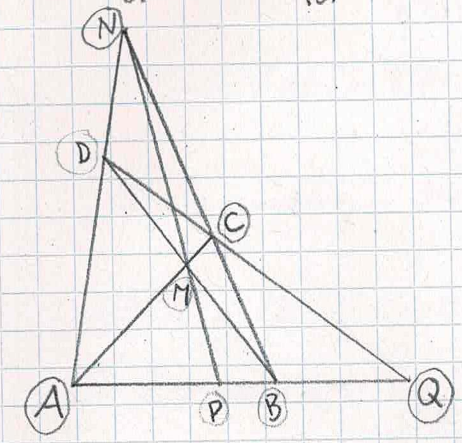
LINAG Ü4

G5 $A=\begin{pmatrix}1\\0\\0\end{pmatrix}$ $Q=\begin{pmatrix}0\\1\\0\end{pmatrix}$ $N=\begin{pmatrix}0\\0\\1\end{pmatrix}$ $C=\begin{pmatrix}1\\1\\1\end{pmatrix}$ $P(\mathbb{R}^{3\times 1})$



ges: Koordinaten / Repräsentanten von D, B, M, P

$D \in [\{A, N\}]$

$\Rightarrow \exists x_a, x_n \in \mathbb{R}: D = x_a \begin{pmatrix}1\\0\\0\end{pmatrix} + x_n \begin{pmatrix}0\\0\\1\end{pmatrix} = \begin{pmatrix}x_a\\0\\x_n\end{pmatrix}$

$D \in [\{C, Q\}]$

$\Rightarrow \exists x_c, x_q \in \mathbb{R}: D = x_c \begin{pmatrix}1\\1\\1\end{pmatrix} + x_q \begin{pmatrix}0\\1\\0\end{pmatrix} = \begin{pmatrix}x_c\\x_c+x_q\\x_c\end{pmatrix}$

$\Rightarrow \begin{pmatrix}x_a\\0\\x_n\end{pmatrix} = \begin{pmatrix}x_c\\x_c+x_q\\x_c\end{pmatrix} \Rightarrow x_a = x_c = x_n = -x_q \Rightarrow D = \begin{pmatrix}x_a\\0\\x_a\end{pmatrix} = \begin{pmatrix}1\\0\\1\end{pmatrix}$

$B \in [\{C, N\}]$

$\Rightarrow \exists x_c, x_n \in \mathbb{R}: B = x_c \begin{pmatrix}1\\1\\1\end{pmatrix} + x_n \begin{pmatrix}0\\0\\1\end{pmatrix} = \begin{pmatrix}x_c\\x_c\\x_c+x_n\end{pmatrix}$

$B \in [\{A, Q\}]$

$\Rightarrow \exists x_a, x_q \in \mathbb{R}: B = x_a \begin{pmatrix}1\\0\\0\end{pmatrix} + x_q \begin{pmatrix}0\\1\\0\end{pmatrix} = \begin{pmatrix}x_a\\x_q\\0\end{pmatrix}$

$\Rightarrow \begin{pmatrix}x_c\\x_c\\x_c+x_n\end{pmatrix} = \begin{pmatrix}x_q\\x_q\\0\end{pmatrix} \Rightarrow x_c = x_q = -x_n \Rightarrow B = \begin{pmatrix}1\\1\\0\end{pmatrix}$

$M \in [\{A, C\}]$

$\Rightarrow \exists x_a, x_c \in \mathbb{R}: M = x_a \begin{pmatrix}1\\0\\0\end{pmatrix} + x_c \begin{pmatrix}1\\1\\1\end{pmatrix} = \begin{pmatrix}x_a+x_c\\x_c\\x_c\end{pmatrix}$

$M \in [\{B, D\}]$

$\Rightarrow \exists x_b, x_d \in \mathbb{R}: M = x_b \begin{pmatrix}1\\1\\0\end{pmatrix} + x_d \begin{pmatrix}1\\0\\1\end{pmatrix} = \begin{pmatrix}x_b+x_d\\x_b\\x_d\end{pmatrix}$

$\Rightarrow \begin{pmatrix}x_a+x_c\\x_c\\x_c\end{pmatrix} = \begin{pmatrix}x_b+x_d\\x_b\\x_d\end{pmatrix} \Rightarrow x_c = x_b = x_d = x_a \Rightarrow M = \begin{pmatrix}2\\1\\1\end{pmatrix}$

$P \in [\{A, Q\}]$

$\Rightarrow \exists x_a, x_q \in \mathbb{R}: P = x_a \begin{pmatrix}1\\0\\0\end{pmatrix} + x_q \begin{pmatrix}0\\1\\0\end{pmatrix} = \begin{pmatrix}x_a\\x_q\\0\end{pmatrix}$

$P \in [\{N, M\}]$

$\Rightarrow \exists x_n, x_m \in \mathbb{R}: P = x_n \begin{pmatrix}0\\0\\1\end{pmatrix} + x_m \begin{pmatrix}2\\1\\1\end{pmatrix} = \begin{pmatrix}2x_m\\x_m\\x_n+x_m\end{pmatrix}$

$\Rightarrow \begin{pmatrix}x_a\\x_q\\0\end{pmatrix} = \begin{pmatrix}2x_m\\x_m\\x_n+x_m\end{pmatrix} \Rightarrow x_m = x_q = \frac{1}{2}x_a = -x_n \Rightarrow P = \begin{pmatrix}2\\1\\0\end{pmatrix}$