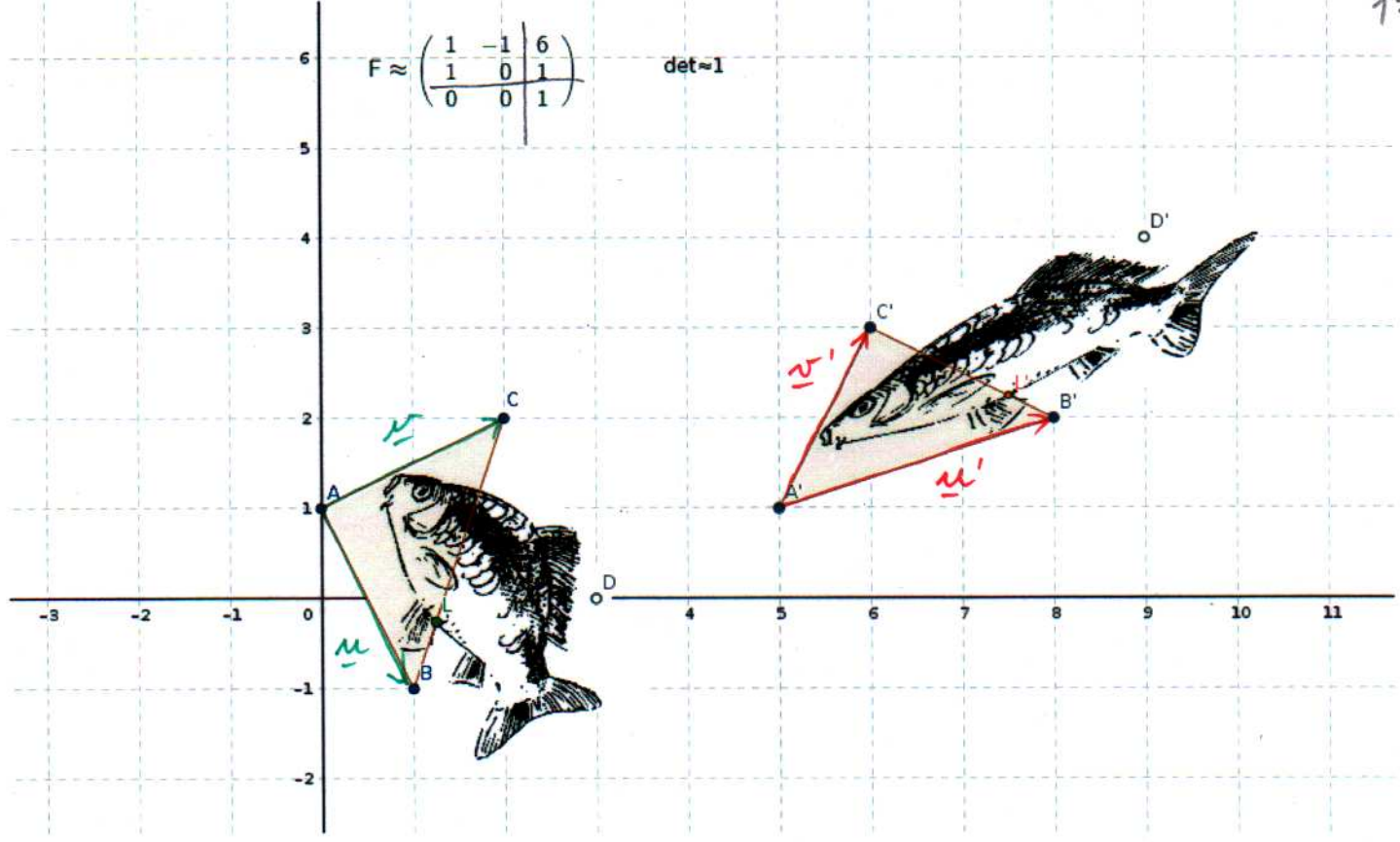


$$F \approx \begin{pmatrix} 1 & -1 & 6 \\ 1 & 0 & 1 \\ 0 & 0 & 1 \end{pmatrix}$$

det=1



(A) přímo (NESNADNO) z předchozího:

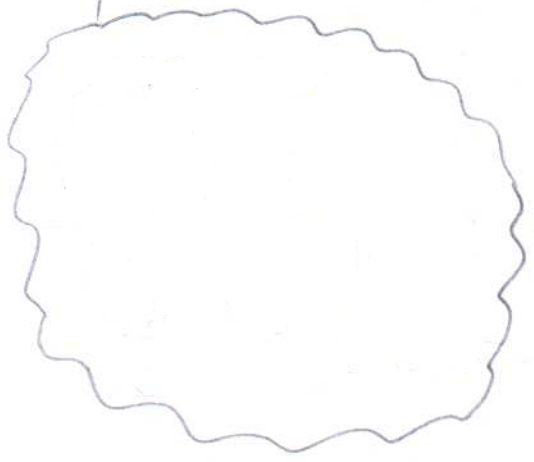
$$\begin{aligned} \underline{e}_1 &= \square \underline{u} + \square \underline{v} \\ \underline{e}_2 &= \square \underline{u} + \square \underline{v} \end{aligned}$$

$$0 = A - \underline{e}_2$$

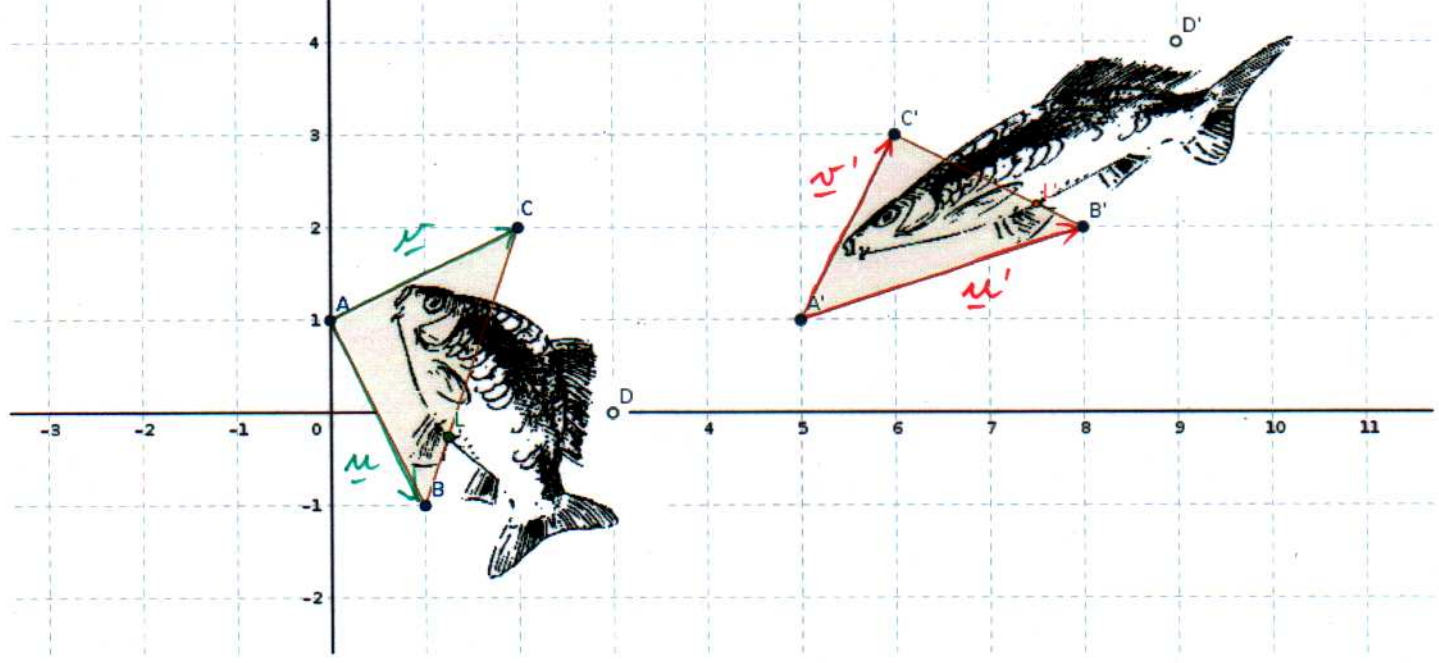
$$\underline{e}'_1 = \square \underline{u}' + \square \underline{v}'$$

$$\underline{e}'_2 = \square \underline{u}' + \square \underline{v}'$$

$$0' = A' - \underline{e}'_2$$



$$F \approx \left(\begin{array}{cc|c} 1 & -1 & 6 \\ 1 & 0 & 1 \\ 0 & 0 & 1 \end{array} \right) \quad \det=1$$



A) přímou (NESNADNO) z předchozího:

$$\begin{aligned} \underline{e}_1 &= \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix} \underline{u} + \begin{bmatrix} 2 \\ 0 \\ 0 \end{bmatrix} \underline{v} \\ \underline{e}_2 &= \begin{bmatrix} -2 \\ 1 \\ 0 \end{bmatrix} \underline{u} + \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix} \underline{v} \end{aligned}$$

$0 = A - \underline{e}_2$

soustava rovnic
"souřadnice
vektorů $\underline{e}_1, \underline{e}_2$
v bázi $(\underline{u}, \underline{v})$
..."

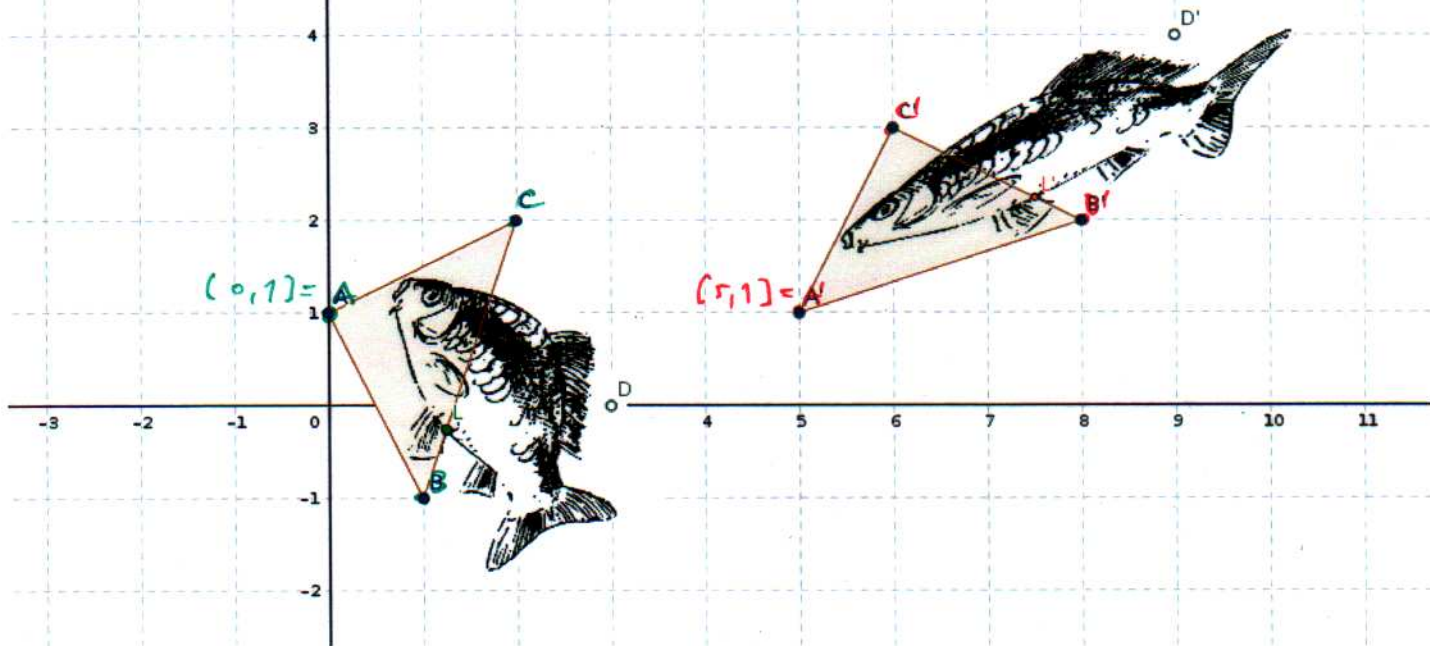
$$\underline{e}'_1 = \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix} \underline{u}' + \begin{bmatrix} 2 \\ 0 \\ 0 \end{bmatrix} \underline{v}' = (1, 1)$$

$$\underline{e}'_2 = \begin{bmatrix} -2 \\ 1 \\ 0 \end{bmatrix} \underline{u}' + \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix} \underline{v}' = (-1, 0)$$

$$0' = A' - \underline{e}'_2 = (6, 1)$$

$$F = \left(\begin{array}{cc|c} 1 & -1 & 6 \\ 1 & 0 & 1 \\ \hline 0 & 0 & 1 \end{array} \right)$$

$$F \approx \left(\begin{array}{cc|c} 1 & -1 & 6 \\ 1 & 0 & 1 \\ 0 & 0 & 1 \end{array} \right) \quad \det=1$$



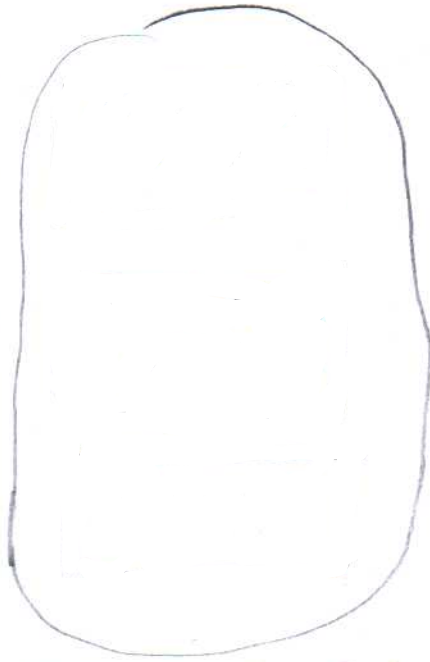
B) NEPRÍMO — dosazení dvojic bodů :

$$\begin{pmatrix} x_1' \\ x_2' \\ 1 \end{pmatrix} = \begin{pmatrix} a & c & k \\ b & d & l \\ 0 & 0 & 1 \end{pmatrix} \cdot \begin{pmatrix} x_0 \\ x_2 \\ 1 \end{pmatrix}$$

• $A \rightarrow A'$: $\begin{pmatrix} 5 \\ 1 \\ 1 \end{pmatrix} = \begin{pmatrix} \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot \end{pmatrix} \cdot \begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix} (\Leftrightarrow)$

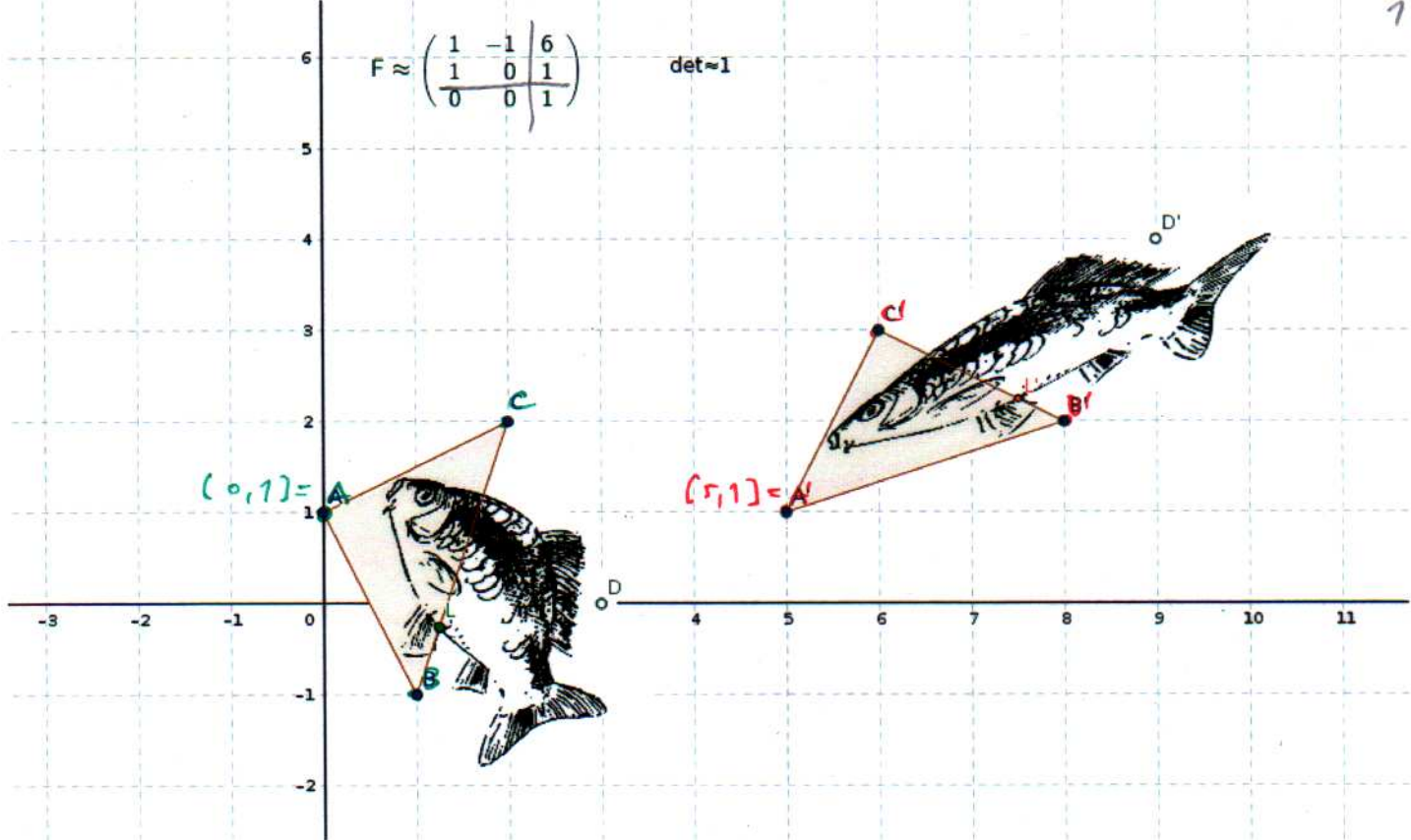
• $B \rightarrow B'$: $\begin{pmatrix} 8 \\ 2 \\ 1 \end{pmatrix} = \begin{pmatrix} \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot \end{pmatrix} \cdot \begin{pmatrix} -1 \\ -1 \\ 1 \end{pmatrix} (\Leftrightarrow)$

• $C \rightarrow C'$: $\begin{pmatrix} 6 \\ 3 \\ 1 \end{pmatrix} = \begin{pmatrix} \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot \end{pmatrix} \cdot \begin{pmatrix} 2 \\ 2 \\ 1 \end{pmatrix} (\Leftrightarrow)$



CELKEM lin. ROVNIC / nerovnámych ...

$$F \approx \left(\begin{array}{cc|c} 1 & -1 & 6 \\ 1 & 0 & 1 \\ 0 & 0 & 1 \end{array} \right) \quad \det=1$$



B) NEPŘÍMO — dosazení dvojic bodů:

$$\begin{pmatrix} x_1' \\ x_2' \\ 1 \end{pmatrix} = \begin{pmatrix} a & c & k \\ b & d & l \\ 0 & 0 & 1 \end{pmatrix} \cdot \begin{pmatrix} x_1 \\ x_2 \\ 1 \end{pmatrix}$$

• $A \rightarrow A'$: $\begin{pmatrix} 5 \\ 1 \\ 1 \end{pmatrix} = \begin{pmatrix} \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot \end{pmatrix} \cdot \begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix} \Leftrightarrow$

• $B \rightarrow B'$: $\begin{pmatrix} 8 \\ 2 \\ 1 \end{pmatrix} = \begin{pmatrix} \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot \end{pmatrix} \cdot \begin{pmatrix} -1 \\ -1 \\ 1 \end{pmatrix} \Leftrightarrow$

• $C \rightarrow C'$: $\begin{pmatrix} 6 \\ 3 \\ 1 \end{pmatrix} = \begin{pmatrix} \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot \end{pmatrix} \cdot \begin{pmatrix} 1 \\ 2 \\ 1 \end{pmatrix} \Leftrightarrow$

$$\begin{aligned} 5 &= c + k \\ 1 &= d + l \\ 8 &= a - b + k \\ 2 &= b - d + l \end{aligned}$$

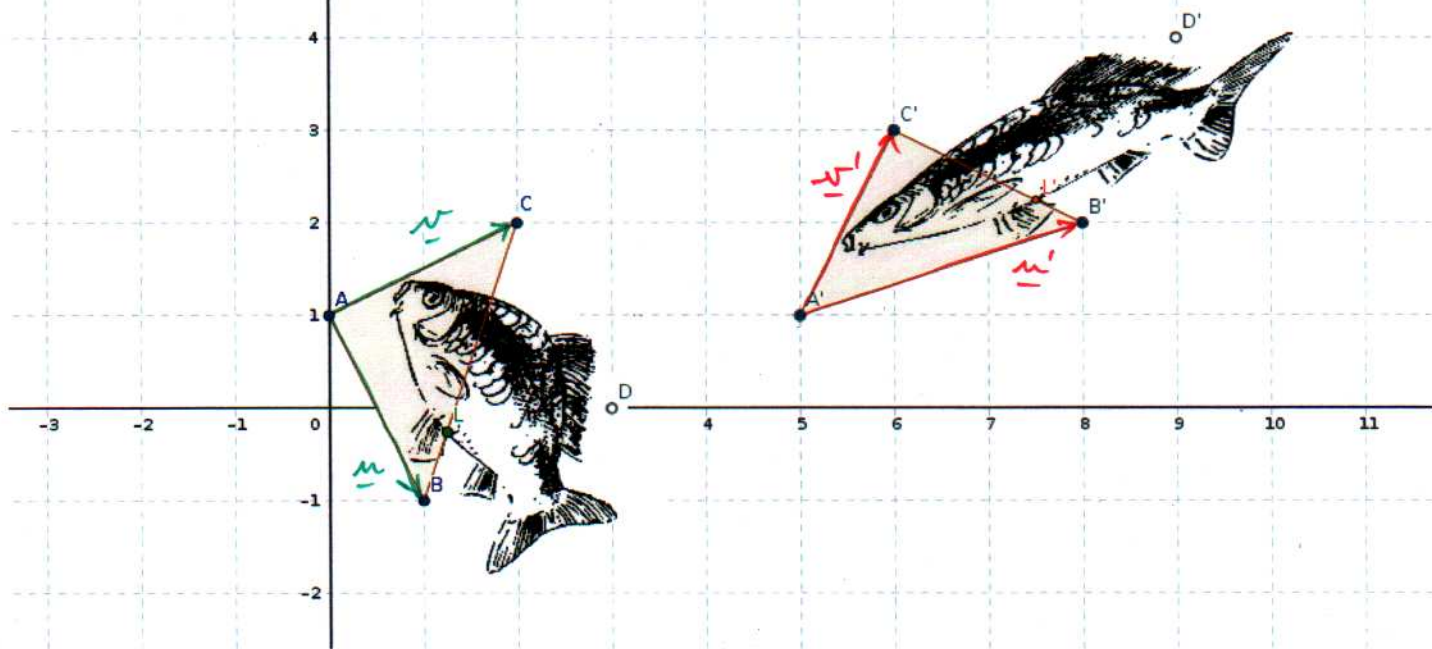
CELKEM 6 lin. ROVNIC / 6 neznámých ...

... jednoznačné řešení:

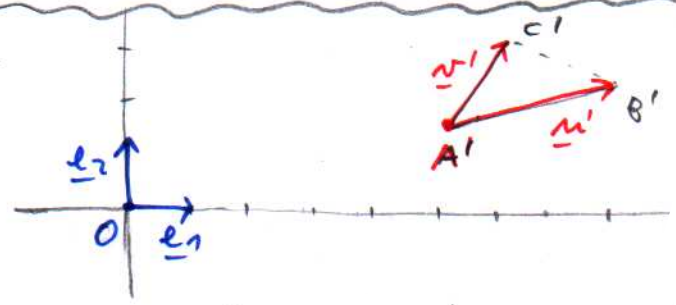
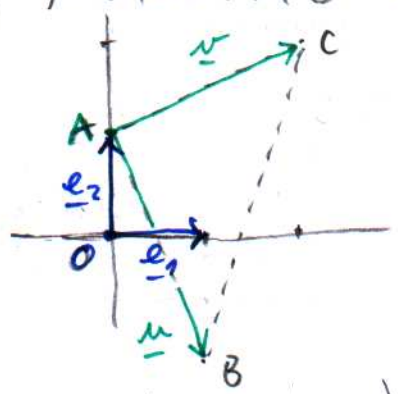
$$\begin{aligned} a &= 1 & c &= -1 & k &= 6 \\ b &= 1 & d &= 0 & l &= 1 \end{aligned}$$

$$F \approx \left(\begin{array}{cc|c} 1 & -1 & 6 \\ 1 & 0 & 1 \\ 0 & 0 & 1 \end{array} \right)$$

det ≈ 1



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$$G = \begin{pmatrix} \quad & \quad \\ \quad & \quad \end{pmatrix}$$

$$H = \begin{pmatrix} \quad & \quad \\ \quad & \quad \end{pmatrix}$$

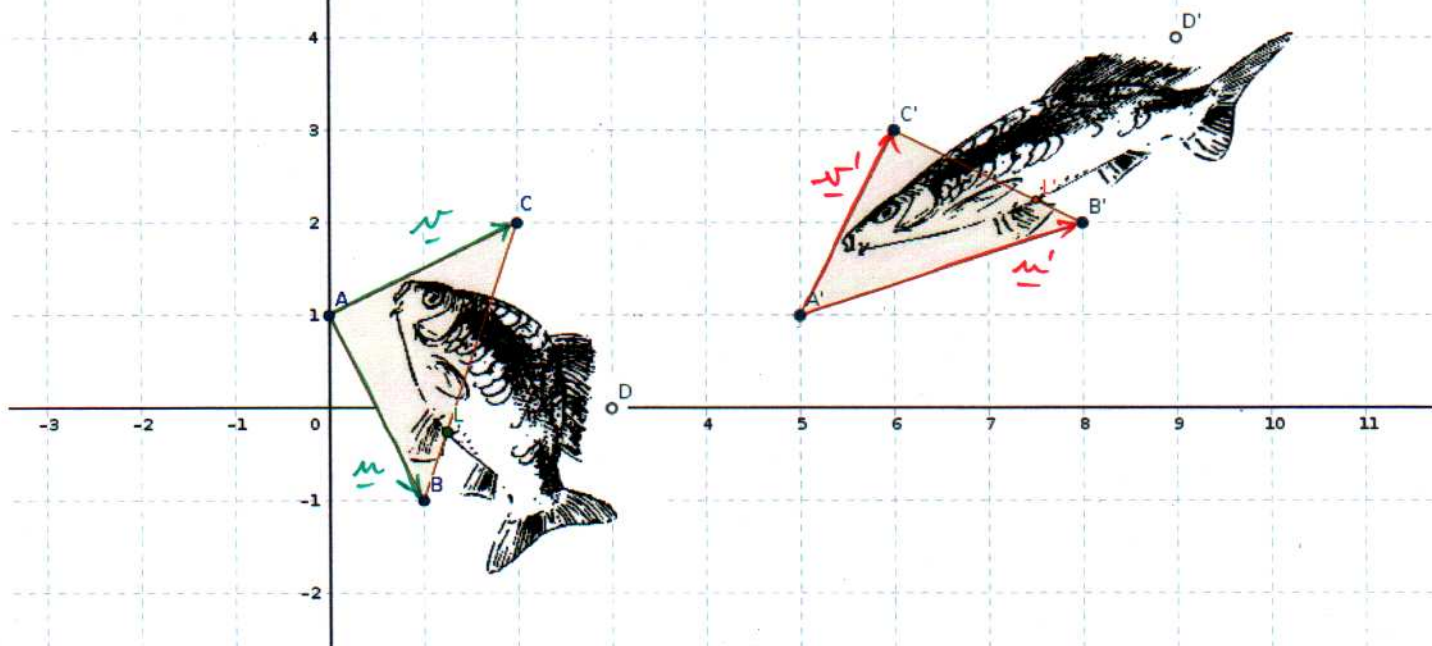
$$F \circ G = H, \text{ tj. } F = H \circ G^{-1}$$

$$F = \begin{pmatrix} \quad & \quad \\ \quad & \quad \end{pmatrix} \cdot \begin{pmatrix} \quad & \quad \\ \quad & \quad \end{pmatrix} = \begin{pmatrix} \quad & \quad \\ \quad & \quad \end{pmatrix}$$

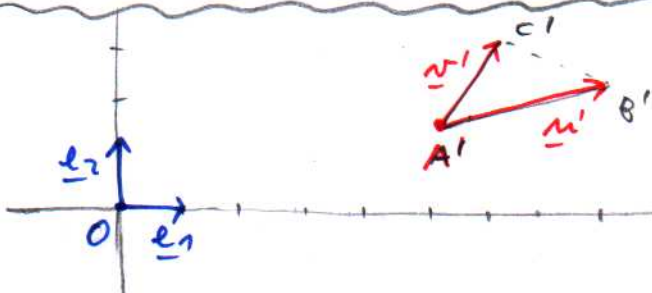
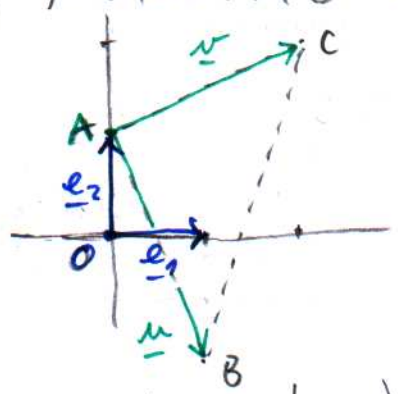
=====

$$F \approx \left(\begin{array}{cc|c} 1 & -1 & 6 \\ 1 & 0 & 1 \\ 0 & 0 & 1 \end{array} \right)$$

det ≈ 1



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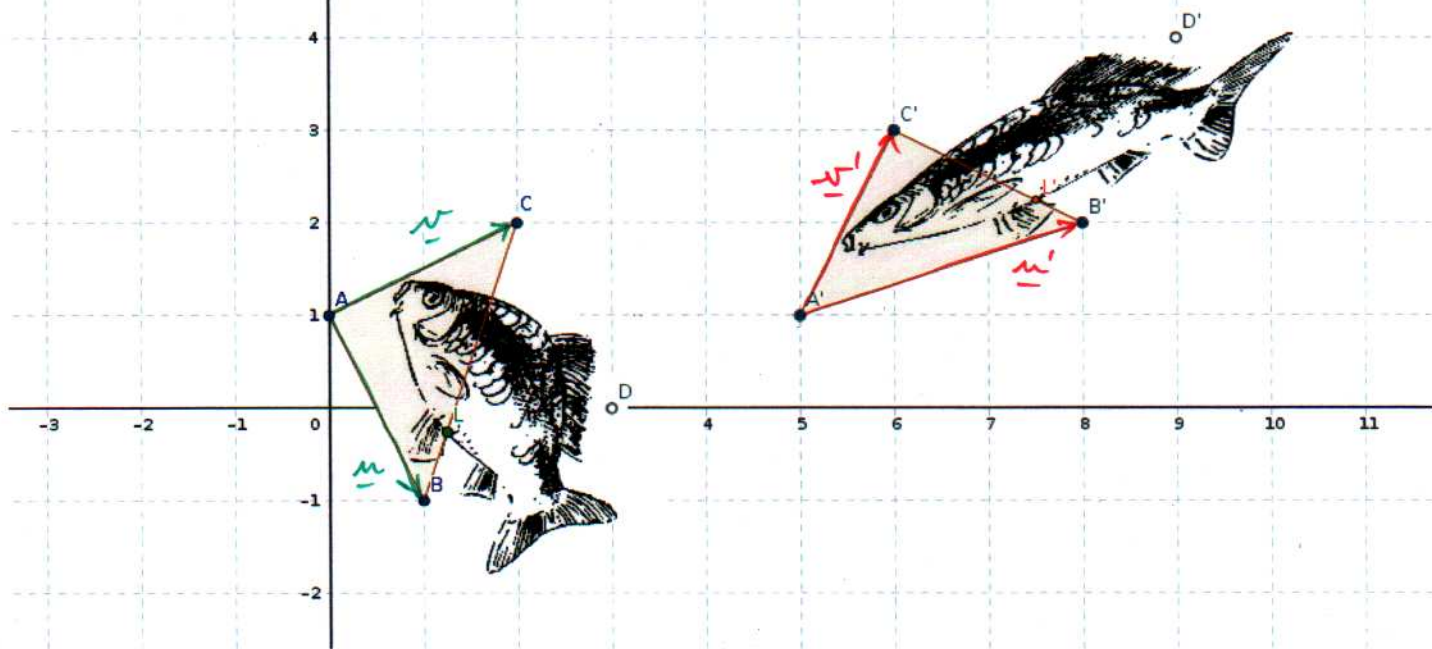
$$G = \left(\begin{array}{cc|c} 1 & 2 & 0 \\ -2 & 1 & 1 \\ \hline 0 & 0 & 1 \end{array} \right)$$

$$H = \left(\begin{array}{cc|c} 3 & 1 & 5 \\ 1 & 2 & 1 \\ \hline 0 & 0 & 1 \end{array} \right)$$

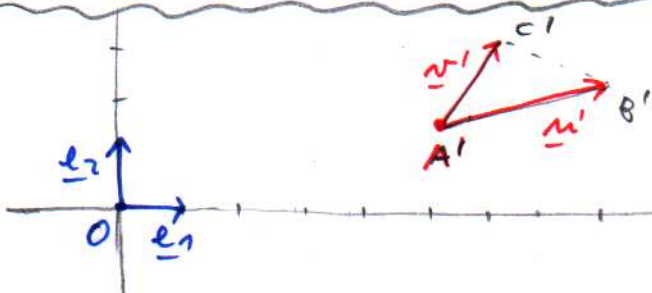
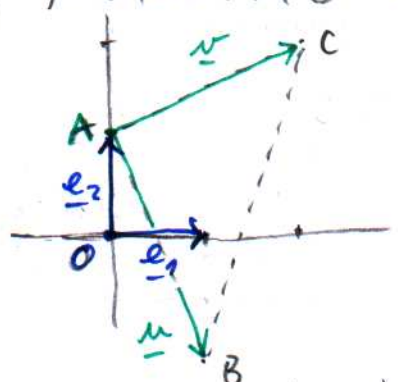
$F \circ G = H$, tj. $F = H \circ G^{-1}$

$$F = \left(\begin{array}{cc|c} 3 & 1 & 5 \\ 1 & 2 & 1 \\ \hline 0 & 0 & 1 \end{array} \right) \cdot \left(\begin{array}{cc|c} 1/5 & -2/5 & 2/5 \\ 2/5 & 2/5 & -1/5 \\ \hline 0 & 0 & 1 \end{array} \right) = \left(\begin{array}{cc|c} 1 & -1 & 6 \\ 1 & 0 & 1 \\ \hline 0 & 0 & 1 \end{array} \right)$$

$$F \approx \left(\begin{array}{cc|c} 1 & -1 & 6 \\ 1 & 0 & 1 \\ 0 & 0 & 1 \end{array} \right) \quad \det \approx 1$$



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$$G = \left(\begin{array}{cc|c} 1 & 2 & 0 \\ -2 & 1 & 1 \\ 0 & 0 & 1 \end{array} \right)$$

$$H = \left(\begin{array}{cc|c} 3 & 1 & 5 \\ 1 & 2 & 1 \\ 0 & 0 & 1 \end{array} \right)$$

podobnost s koef. na 3,17 NENÍ nahodná!

$$F \circ G = H, \text{ tj. } F = H \circ G^{-1}$$

$$F = \left(\begin{array}{cc|c} 3 & 1 & 5 \\ 1 & 2 & 1 \\ 0 & 0 & 1 \end{array} \right) \cdot \left(\begin{array}{cc|c} 1/5 & -2/5 & 2/5 \\ 2/5 & 2/5 & -1/5 \\ 0 & 0 & 1 \end{array} \right) = \left(\begin{array}{cc|c} 1 & -1 & 6 \\ 1 & 0 & 1 \\ 0 & 0 & 1 \end{array} \right)$$