$$T_{b\to a} = \begin{pmatrix} \sqrt{12} & -2\sqrt{12} & \sqrt{12} & 0 \\ 0 & \sqrt{12} & 3\sqrt{12} & 0 \\ 0 & 0 & \sqrt{12} & 0 \\ 0 & 0 & 0 & \sqrt{12} \end{pmatrix}$$

$$T_{a\to b} = \frac{1}{\sqrt{12}} \begin{pmatrix} 1 & 2 & -7 & 0 \\ 0 & 1 & -3 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

$$T_{A\to B} = A^{-1} \cdot B$$

$$(T_{A\to B})^{-1} = (A^{-1} \cdot B)^{-1} = B^{-1} \cdot A = T_{B\to A}$$

3) $X' = (T_{B\to B'})^{-1} \cdot X$

$X' = T_{B'\to B} \cdot X$

$p' = T_{b\to a} \cdot p$

$$p' = \begin{pmatrix} 1 & -2 & 1 & 0 \\ 0 & 1 & 3 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix} \cdot \begin{pmatrix} -8 \\ -4 \\ 2 \\ 0 \end{pmatrix} \cdot \sqrt{12} = \begin{pmatrix} 2 \\ 2 \\ 2 \\ 0 \end{pmatrix} \cdot \sqrt{12}$$

$q' = T_{b\to a} \cdot q$

$$q' = \begin{pmatrix} 1 & -2 & 1 & 0 \\ 0 & 1 & 3 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix} \cdot \begin{pmatrix} -18 \\ -8 \\ 3 \\ 1 \end{pmatrix} \cdot \sqrt{12} = \begin{pmatrix} 1 \\ 1 \\ 3 \\ 1 \end{pmatrix} \cdot \sqrt{12}$$