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Geometry III/IV

Problems, set 5.

Exercise 11. For the following affine transformations of $\mathbb{R}^2$, find the fixed points and the simplest form in a suitable coordinate system. (You don't have to find such a coordinate system.)

$$\begin{aligned} f(x) &= \begin{pmatrix} 4 & 9 \\ -1 & -2 \end{pmatrix} x + \begin{pmatrix} -3 \\ 1 \end{pmatrix}, \\ g(x) &= \begin{pmatrix} 5 & 2 \\ -6 & -2 \end{pmatrix} x + \begin{pmatrix} 1 \\ -1 \end{pmatrix}. \end{aligned}$$

Exercise 12. Prove the Theorem of Menelaus. **Hint:** If ΔABC is the standard triangle, choose the line $y = mx + b$ and carry out the calculations. Why is the treatment of this case sufficient?