

$$\begin{bmatrix} x'f_{11} + y'f_{21} + f_{31} & x'f_{12} + y'f_{22} + f_{32} & x'f_{13} + y'f_{23} + f_{33} \end{bmatrix} \begin{bmatrix} x \\ y \\ 1 \end{bmatrix} = 0$$