Homework Assignment 1  
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Computer Vision

1. As seen in the lecture, the system of equations for **projective** transformation is:

Each point in the source coordinate system matches a point in the destination system.

To get the conversion matrix, we build the following equation system,

where:

From these two equations, we can build this equation:

And find H such that AH=0, while adding an extra constraint |H|=1 to avoid the obvious solution of H being all zeros. To estimate H, we need at least 4 points (eight equations from the four points, and since H is up to scale, the last equation is a normalization constraint). If there are more than 4 points (as in our case), we can just keep plugging them as new rows in matrix A (to new rows per point). Then we can use SVD (, and select the smallest singular vector of  as the solution to H. To get the matrix form of 3x3 we reshape this vector.

1. In the code.
2. The results: