Exercise 3
3D Computer Vision

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1 Homography Definition

$$\begin{bmatrix} x'_1 \\ x'_2 \\ \vdots \\ v_{n+1} \end{bmatrix} = \begin{bmatrix} R_{11} & R_{12} & \dots & R_{1,n+1} \\ R_{21} & \ddots & & \\ \vdots & & & \\ R_{n+1,1} & \dots & \dots & R_{n+1,n+1} \end{bmatrix} \text{ or } x' = Hx \text{ with } (n+1)^2 - 1 \text{ DOF}$$

2 Line preservation of homographies

Let $x_1, x_2, x_3 \in \mathbb{P}$ be three points on a line. The definition of aline should hold for every point with the same $l = (a, b, c)$
$lx_1 = 0, lx_2 = 0, lx_3 = 0$

$$\begin{array}{lcl} Hx_1 = h(x_1) & & lh(x_1) = 0 \\ Hx_2 = h(x_2) & \rightarrow & lh(x2) = 0 \\ Hx_3 = h(x_3) & & lh(x_3) = 0 \end{array}$$