

# Exercise on Multi-view Geometry in Computer Vision

Yufei Ye

September 10, 2019



## Chapter 1

# Projective Geometry and Transformation of 3D

(ii) Unit circle is  $I_{3 \times 3}$ . Under projective transformation, it is transformed to  $H^{-T} I H^{-1}$ ,  $A = H^{-1} = \begin{bmatrix} C & d \\ a^T & x \end{bmatrix}$ .

$$A^T I A = A^T A = I$$

The 3-param family is  $SO(3)$ .

geometric interpolation: pure rotation.

(iv) easy to prove by simple calculation. using

$$x' = Hx, l' = H^{-1}l, C' = H^{-T}CH^{-1}$$

(vi) for any  $x$  inside of ellipse, choose any line  $l_i$  passing through  $x$ , find its pole  $x_i$ . all  $x_i$  lies on the same line, which is the polar of  $x$ .