

# Exercise 5.

Projection is given by  $PX$

$$\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 \end{pmatrix} \begin{pmatrix} 1 \\ 2 \\ 3 \\ 1 \end{pmatrix} = \begin{pmatrix} 1 \\ 2 \\ 4 \end{pmatrix} = \text{projection of } X_1$$

Projection of  $X_2 = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$  &  $X_3 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$

Geometric interpretation the projection is a vanishing point.  
Where two parallel lines converge.

Camera center by finding null space.  $\rightarrow \begin{matrix} X \\ Y \\ Z+W \end{matrix} = 0 \rightarrow \begin{cases} X=0 \\ Y=0 \\ Z=-1 \\ W=1 \end{cases}$

Camera center:  $(0 \ 0 \ -1 \ 1)$

The principal axis =  $(0 \ 0 \ -1)$   $\rightarrow$  viewing direction.