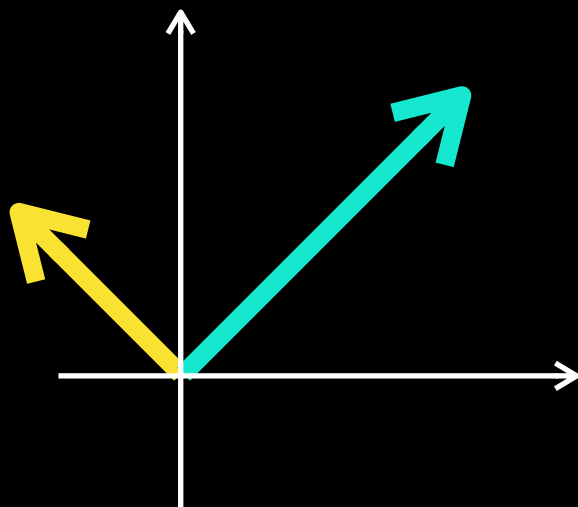


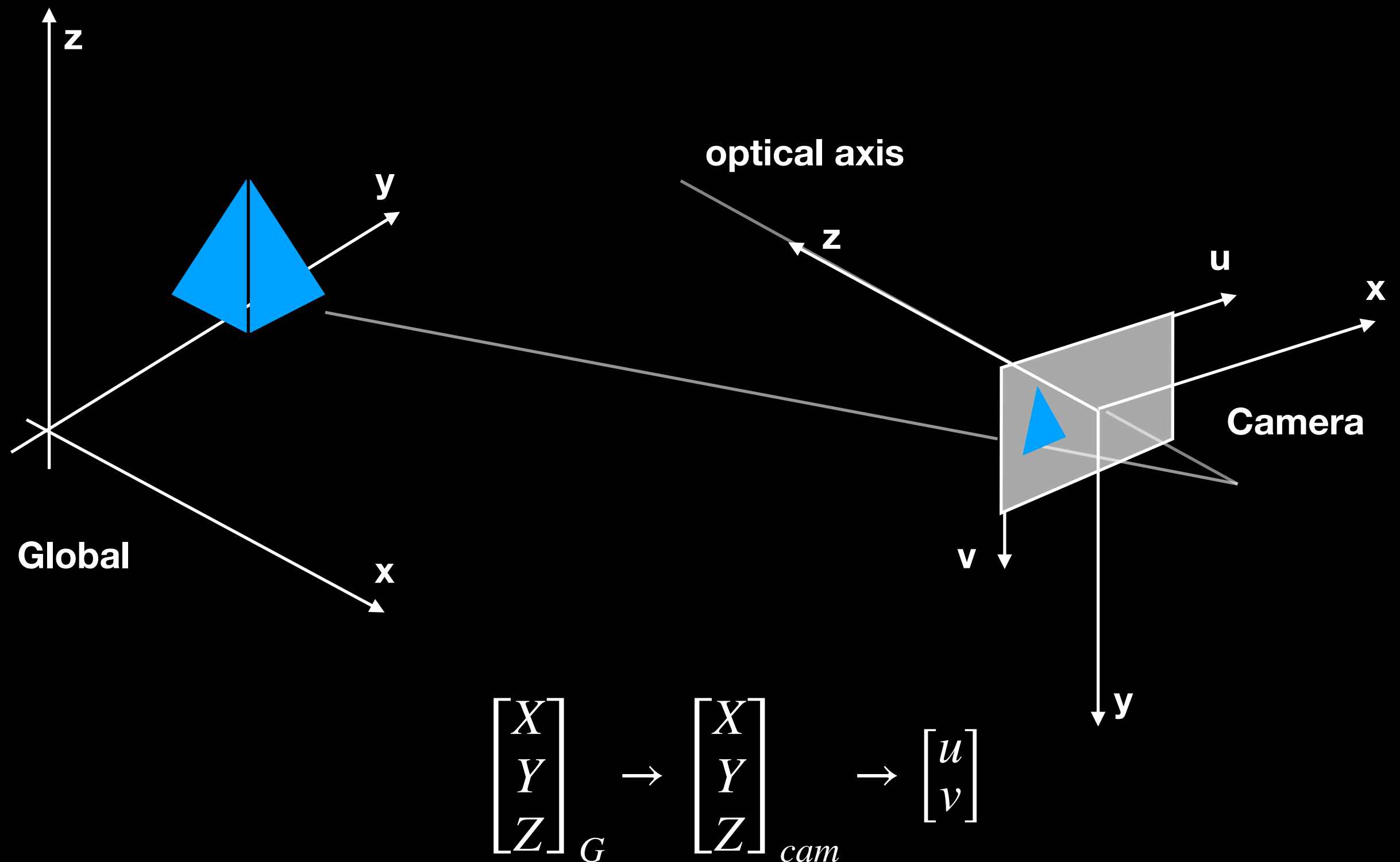
3D / 2D

recap

Linear Algebra Essentials



3D - 2D projection



Camera matrix

Coordinates in global reference frame

$$\begin{bmatrix} X \\ Y \\ Z \end{bmatrix}_G \rightarrow \begin{bmatrix} X \\ Y \\ Z \end{bmatrix}_{cam} \rightarrow \begin{bmatrix} u \\ v \end{bmatrix}$$

Pixels in image reference frame

$$\begin{bmatrix} u \\ v \\ 1 \end{bmatrix} \propto \underbrace{\begin{bmatrix} f & 0 & u_0 \\ 0 & f & v_0 \\ 0 & 0 & 1 \end{bmatrix}}_{\text{intrinsic matrix}} \underbrace{\begin{bmatrix} R^T & | & -R^T t \end{bmatrix}}_{\text{extrinsic matrix}} \begin{bmatrix} X \\ Y \\ Z \\ 1 \end{bmatrix}_{\text{global coords}}$$

pixels