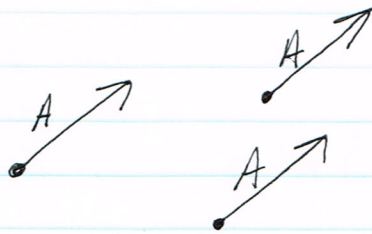


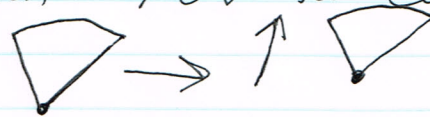
# Math Theory Foundation

## Affine Transformation

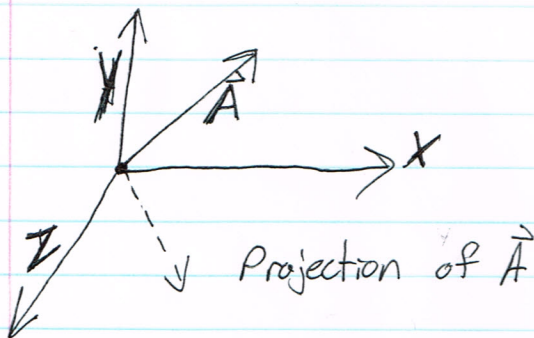


Same "Size"  
Same Orientation  
Same Vector  
Same Length

Application: FoV for cameras



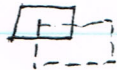
## Projective Transformation



Not Necessarily the same size  
Almost a "Shadow" of  $\vec{A}$   
Add up the component vectors  
to get the projection

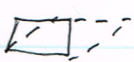
Affine Matrix

Translation



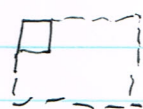
$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ t_x & t_y & 1 \end{bmatrix}$$

Shear



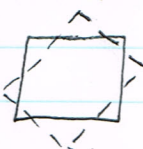
$$\begin{bmatrix} 1 & sh_y & 0 \\ sh_x & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

Scale



$$\begin{bmatrix} s_x & 0 & 0 \\ 0 & s_y & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

Rotate



$$\begin{bmatrix} \cos(a) & \sin(a) & 0 \\ -\sin(a) & \cos(a) & 0 \\ 0 & 0 & 1 \end{bmatrix}$$