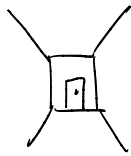
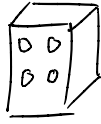


Q: Why care about edge detection / image derivatives?

A1: Humans like edges!



hallway

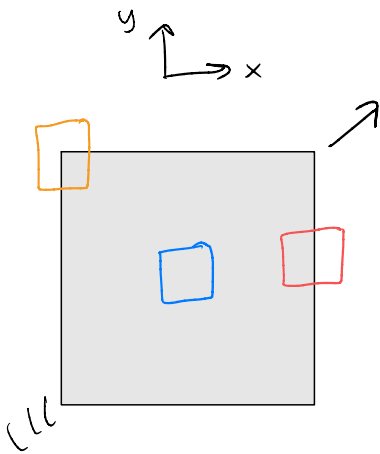



building





road

A2: Feature tracking



 no apparent movement  
"blank wall problem"

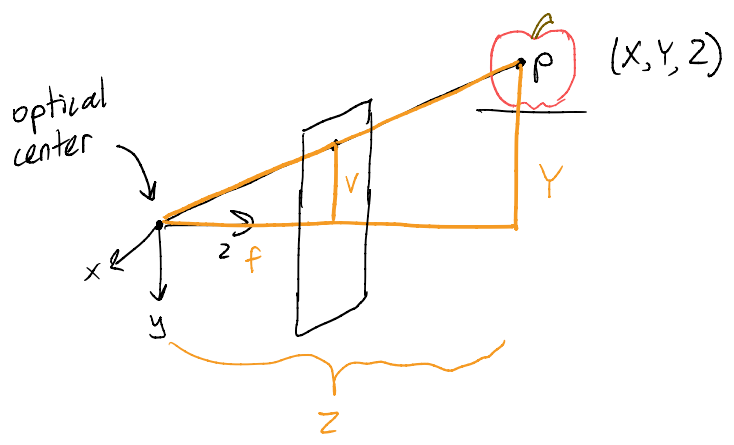
 x-component only  
"aperture problem"

 x- and y-axis components  
"keypoint"

Keypoints are useful for:

- Estimating object velocity
- Object tracking
- Estimating camera velocity  $\Rightarrow$  state estimation / localization!
- Correspondence between images

# Problem 6



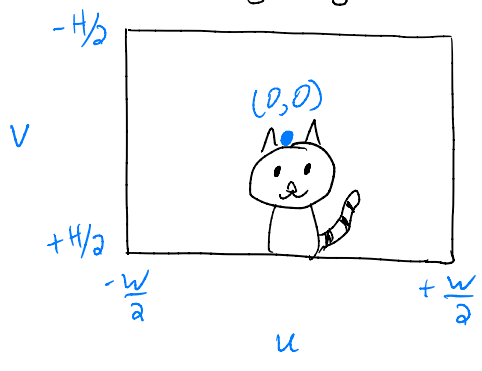
$$\frac{Y}{Z} = \frac{v}{f} \Rightarrow v = f \frac{Y}{Z}$$

$$\frac{X}{Z} = \frac{u}{f} \Rightarrow u = f \frac{X}{Z}$$

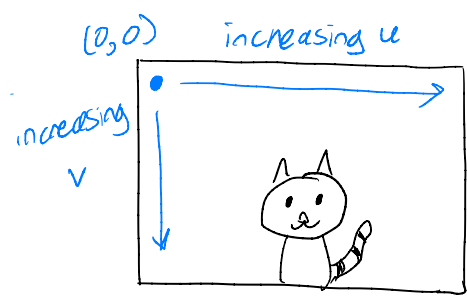
# Problem 8

Let picture of width  $W$ , height  $H$ :

Originally:



Goal:



$$u = f_x \frac{X}{Z} + \underline{x_0}$$

usually  $W/2$   
↓

$$v = f_y \frac{Y}{Z} + \underline{y_0}$$

usually  $H/2$   
←

# Problem 10

