

1) Photographic camera

- a) [10 points] The size of a standard 35 mm negative is actually  $25 \times 36 \text{ mm}^2$ . If you use a 50 mm focal length lens, what would be the field of view at a distance of 5 m?
- b) [15 points] Suppose you take a picture of a group of your friends standing at this distance of 5 m, with a lens opening of  $f/5.6$  and shutter speed of  $1/250 \text{ sec}$ . Now you change the opening to  $f/16$ . What shutter speed should you use to keep the same exposure? What happens to the depth of focus in your picture?

a) Magnification is  $\approx \frac{5000 \text{ mm}}{50 \text{ mm}} = 100$

Field is then  $2500 \times 3600 \text{ mm} = 2.5 \times 3.6 \text{ m}$

b)  $f/5.6 \rightarrow f/16$  is 3 stops  
shutter speed needs to be  $1/32 \text{ sec}$

Depth of focus increases.