

## Biconcave Lens - Ray trace

$$C_1 = -.01/\text{mm}$$

$$t = 5\text{ mm}$$

$$C_2 = .01/\text{mm}$$

$$n = 1.5$$

a) Gaussian properties

Since it is a symmetric lens, we only need to trace one ray - next page

$$\phi = -u'/y_1 \quad y_1 = 1$$

$$\phi = -.010083/\text{mm}$$

$$\text{BFD} = V'F' = -100.83\text{ mm}$$

$$f_e = f_R' = -99.17\text{ mm}$$

$$d' = \text{BFD} - f_R' = -1.66\text{ mm}$$

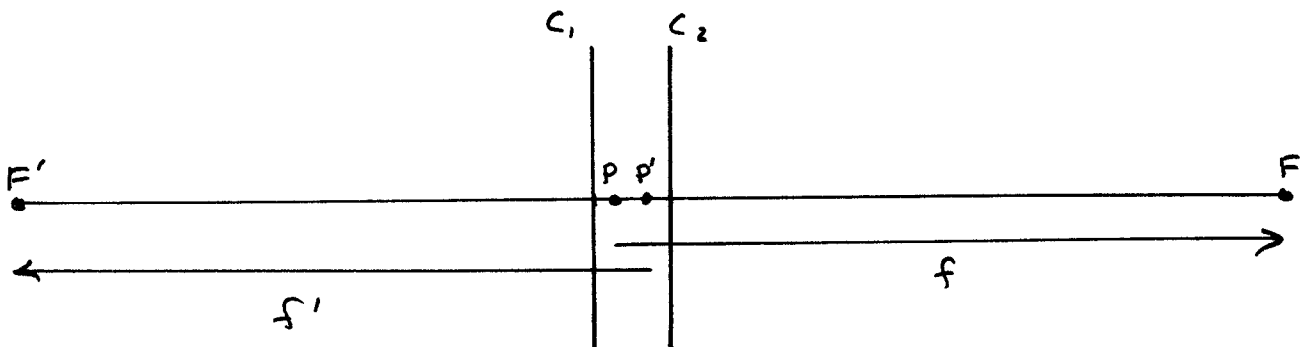
By symmetry

$$f_e = -f_R' = 99.17\text{ mm}$$

$$d = -d' = 1.66\text{ mm}$$

$$\text{FFD} = 100.83\text{ mm}$$

$$PP' = t - d + d' = 1.68\text{ mm}$$



$$PN = P'N' = 0$$

b) Object  $h = 10 \text{ mm}$

$$OV = 100 \text{ mm}$$

$$PO = -101.66 \text{ mm}$$

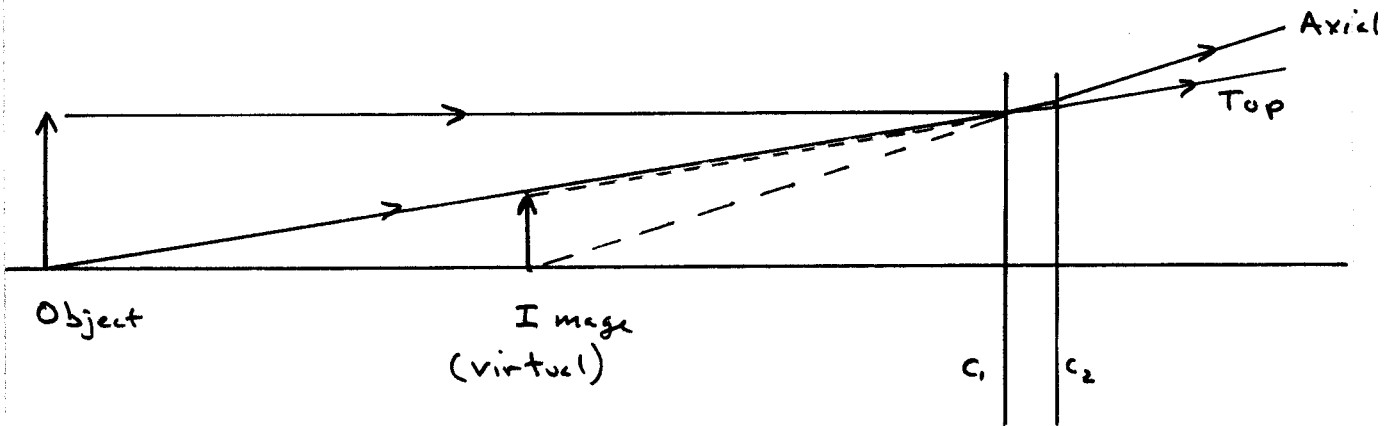
From raytrace:

$$V'I = -51.85 \text{ mm}$$

$$P'I = V'I - d' = -50.19 \text{ mm}$$

$$h' = 4.94 \text{ mm}$$

$$m = .494$$



c) Object  $h = 10 \text{ mm}$

$$OV = -150 \text{ mm}$$

$$PO = 148.34 \text{ mm}$$

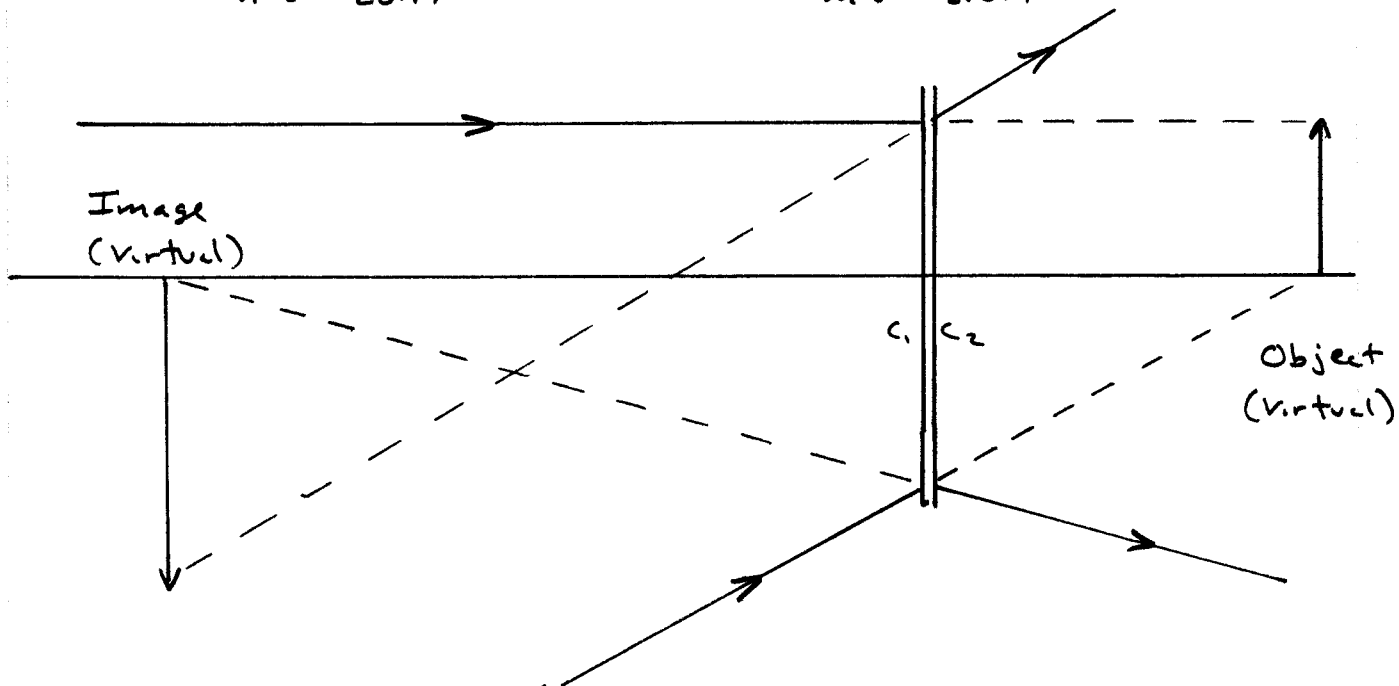
From raytrace:

$$V'I = -300.91$$

$$P'I = V'I - d' = -299.25$$

$$h' = -20.17$$

$$m = -2.017$$



YNU Method

Ray Parallel to Axis

0 1 2 3 4 5 6 7

C											
t											
n											

-φ											
t/n											

y											
nu											
u											

y											
nu											
u											

y											
nu											
u											

$V'F' = -100.83$   
 $u' = .010083$



