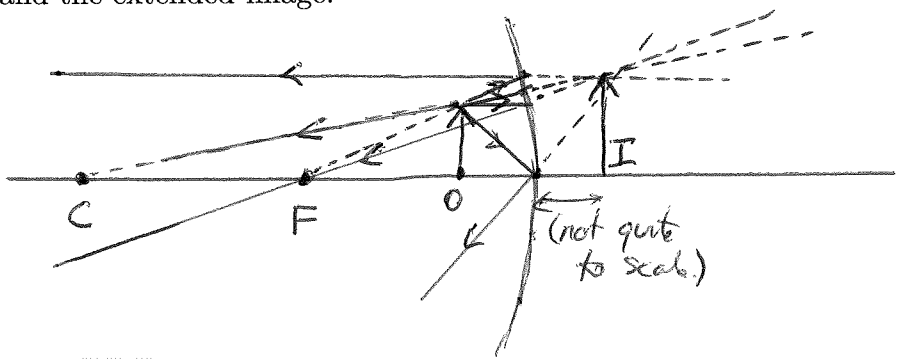
*. (8 points) An extended object is placed 5.0 cm in front of a concave mirror of radius 30 cm.

a. (4 points) Draw a ray diagram showing the mirror, the extended object, at least two light rays, and the extended image.

scale: 1 cm = 5 cm



b. (2 points) Where is the image located? Is it real or virtual?

$f = \frac{1}{2}r = \frac{15}{\cancel{20}}\,\text{cm}$

$\frac{1}{p} + \frac{1}{i} = \frac{1}{f} \Rightarrow i = \left(\frac{1}{f} - \frac{1}{p}\right)^{-1} = \left(\frac{1}{15\,\text{cm}} - \frac{1}{5.0\,\text{cm}}\right)^{-1} = -7.5\,\text{cm}$

7.5 cm behind mirror (virtual)

c. (2 points) Determine the lateral magnification of the object. Is the image upright or inverted?

$m = -\frac{i}{p} = -\frac{(-7.5\,\text{cm})}{5.0\,\text{cm}} = +1.5$

1.5 times larger and upright.