

**2.2** Consider two transparent media of indices of refraction  $m_1$  and  $m_2$ , separated by an interface of arbitrary shape. Prove Theorem III by using *Snell's Law* to show that for a bundle of beams passing through the interface, the intensity  $I_1$  within the bundle in medium 1 is related to the intensity  $I_2$  in medium 2 within the refracted beam through  $I_1/m_1^2 = I_2/m_2^2$ .

**2.3** A Lambertian disk of radius  $a$  emits a quasi-isotropic intensity  $\mathcal{I}$ . Show that the outward flux at a point lying on the axis of the disk a distance  $z$  from the center of the disk is given by

$$F(z) = \pi \mathcal{I} \frac{a^2}{(a^2 + z^2)}.$$