ELEG240- Spring, 2006
Homework 3, due 3/8 at noon

1. Light has a velocity of $2x10^8$ meters/second in a material. A light ray is incident on the material from air at an angle of 50 degrees from surface-normal. What will be the angle of the ray from normal after it enters the material?
2. After light passes through 1 centimeter of a material only 50 % of it remains. What is the absorption coefficient in the material?
3. For the material of problem 2, the wavelength of the light was 1 micron if the light was in free space. What is the imaginary part of the refractive index?
4. The focal point of a semi-spherical lens is the point at which it collects all light rays incident parallel to its axis, as shown in this figure. For the spherical lens of the drawing, calculate x in terms of R, the refractive index of the lens *n*, and θ_1. That's all I require, but for the students with a real interest, use a computer to plot x/R vs. θ_1 from 0 to 90^o. You will not be able to plug in θ_1=0, as that will give a 0/0 in the equation, so just get as close as you can. What does this imply about the focal "point" using a spherical lens?