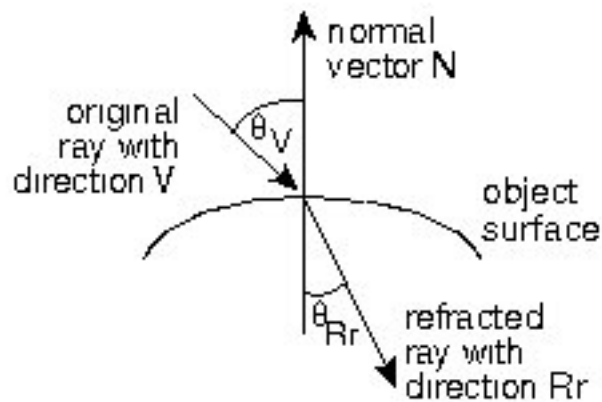


# CMSC 435 / 634 Introduction to Computer Graphics

## Homework Assignment 4 (Due Nov 7 before class)

- The work must be all your own.
  - Be explicit, define your symbols, and explain your steps. (This will make it a lot easier for us to assign partial credit.)
1. (5 points) write the lighting equation for a single light-source that produces ambient, diffusion and specular in one model.
  2. (15 points) The refracted ray occurs if the materials on either side of the surface have different indices of refraction, such as air on one side and water on the other. The ray will bend accordingly. Calculate the direction of the refracted ray  $R_r$  given  $n_1$  (index of refraction of original medium),  $n_2$  (index of refraction of new medium),  $V$  (incoming ray), and  $N$  (normal vector of the object surface.). Note that  $n_1/n_2 = \sin(\theta_v) / \sin(\theta_r)$ .



*To submit, please bring a hard copy to the class. Submission by email is not accepted.*