Selected Problem Set 9

1. Given $c_1=1.0$, $c_2=0.6$, the speed of light in media 1 and 2, a surface normal $\vec{n}=(1,1,1)$, and a ray with direction $\vec{d}=(0,0,1)$, find $\vec{t}$, the direction of refracted light.

2. Give a numerical example of total internal reflection.

3. Using Snell's law, show that $\cos(\theta_2)=\sqrt{1-\left(\frac{c_2}{c_1}\right)^2 \sin^2(\theta_1)}$.

4. Given that the speed of light in air is 99.97% of $c$, and 75.19% of $c$ in water, find the critical angle for a ray of light coming from water and going into the air.

5. What is the difference between an object with a reflection coefficient of 1 and a mirror?