Phys 375 HW 2
Fall 2010
Due 20 September, 2010

1. Pedrotti[3], 3rd edition, problem 2-7 (see Fig. 2-33).

2. Write an expression for the $\vec{E}$- and $\vec{B}$-fields that constitute a plane harmonic wave traveling in the +*z*-direction. The wave is linearly polarized with its line of vibration at 45^o to the *yz*-plane.

3. Prove that to someone looking straight down into a swimming pool, any object in the water will appear to be ¾ of its true depth.

4. Light is incident in air perpendicularly on a sheet of crown glass having an index of refraction of 1.552. Determine the reflectance.

5. Show analytically that a beam of light entering a planar transparent plate, as in the figure, emerges parallel to its initial direction. Consider the case where the plate has a side length *t*, and the laser beam has an angle of incidence α, and angle of refraction at the first interface of β. Find an expression for the lateral displacement of the exiting beam relative to the incident beam, *s*, in terms of *t* and trigonometric functions of α and β. Use Snell's law and some geometrical thinking.