UNIVERSITY OF ALABAMA

Department of Physics and Astronomy

Department of Electrical and Computer Engineering

PH 495/ECE 493 LeClair & Kung   Spring 2011

Problem Set 4

Instructions:

1. Answer all questions below. All questions have equal weight. Show your work for full credit.
2. All problems are due Thursday March 3, 2011 by 11:59pm.
3. You may collaborate, but everyone must turn in their own work.

1. *Hecht 6.19.* Using the matrix method seen in class for thick lenses, prove that the planar surface of a concava-planar or convex-planar lens does not contribute to the system matrix. The system matrix is the product of the refraction matrix through the 1st surface, by the transfer matrix, by the refraction matrix through the 2nd surface.

2. *Hecht 6.22.* A concave-planar glass lens (n=1.50) in air has a adius of 10.0 cm and a thickness of 1.00 cm. Detemrine the system matrix and check that its determinant is 1. At what positive angle (in radians measured above the axis) should a ray strike the lens at a height of 2.0 cm, if it is to emerge from the lens at the same height but parallel to the optical axis?