1) Pedrotti, problem 2-4:

“Determine the height of a wall mirror that will permit a 6-ft person to view his or her entire height. Sketch rays from the top and bottom of the person, and determine the position of the mirror such that full image is seen, regardless of the person’s distance from the mirror.”

1) Pedrotti, problem 2-7:

“A small source of light at the bottom face of a rectangular glass slab 2.25 cm thick is viewed from above. Rays of light totally internally reflected at the top surface outline a circle of 7.60 cm in diameter on the bottom surface. Determine the refractive index of the glass.”

3) Pedrotti, problem 2-8.

“Show that the lateral displacement of a ray of light penetrating a rectangular plate of thickness \( t \) is given by

\[
s = \frac{t \sin(\theta_1 - \theta_2)}{\cos \theta_2}
\]

where \( \theta_1 \) and \( \theta_2 \) are the angles of incidence and refraction, respectively. Find the displacement when \( t = 3 \) cm, \( n = 1.50 \), and \( \theta_1 = 50^\circ \).”

4) Show that for the problem above:

\[
n^2 = \sin^2 \theta_1 \left[ 1 + \left( \frac{\cos \theta_1}{\sin \theta_1} \frac{t}{s} \right)^2 \right]
\]

5) You set up an experiment to measure the angle of incidence \( \theta_1 \) and refraction \( \theta_2 \) for light entering a plastic block. The light ray is incident from air, and you can assume the index of refraction for air is 1.0003 (exact). You measure:

\[
\theta_1 = 41^\circ \pm 0.3^\circ \quad \theta_2 = 22^\circ \pm 0.3^\circ
\]

a) What is the measured index of refraction for the block, and standard deviation?

b) The error in which angle’s measurement contributes most to the error in the index of refraction?