Problem 4.4–2. Be sure to give clear and convincing reasons for your conclusions. To get you started, assume that the vibrations of the glass are modeled by an underdamped system of the form $my'' + by' + ky = f(t)$. Then take a look at the natural frequency of the underdamped system. Very little computation is required. All that's needed is some thought.

Problem 4.5–5. Let's see what you do with this one. Note that the discussion begins on the bottom of page 441. The diagram shows a floating cube of side length a along with the forces acting on the cube. Determine the buoyancy force $\beta(y)$, and then use Newton's second law of motion to obtain the differential equation.