PRACTICE PROBLEMS SIMILAR TO COURSE SLO EVALUATION:

Problem 1: One gram of water, with a volume of 1 cm3, is boiled at a constant pressure of 1 atm (1.013x105 Pa), after which its volume is 1971 cm3. The heat of vaporization of water at atmospheric pressure is *Lv* = 2.63 x 106 J/kg. Calculate (a) the work done by the water as it vaporizes, (b) the amount of heat that needs to be supplied to the water to boil it, and (c) the increase in internal energy of the water.

Problem 2: The wavelengths of the visible spectrum of light are approximately 380 nm (violet) to 750 nm (red). (a) Find the angular limits of the first-order visible spectrum produced by a plane grating that has 500 slits per mm when white light falls perpendicular to the grating. (b) Do the first-order and second-order spectra overlap? (c) Do the second-order and third-order spectra overlap? Do your answers depend on the spacing of the grating?

Problem 3: Solve the time-independent Schrödinger equation (eq. 40.25 of Y&F, 14th ed.) for a particle of mass *m*, in a 1-dimensional box of length *L*, with “infinitely deep” side walls. Find expressions for the wave functions, and the energy levels. Your answers should depend on *m*, *L*, and Planck’s constant.