Physics 240, Review for Test 1.

The test will consist of 4 or 5 problems and several conceptual or short answer questions. These two review problems cover the main concepts we have discussed (there are quite a few concepts covered implicitly here, rather than explicitly). There are a variety of ways these questions could be posed. Other topics we covered include temperature scales, average molecular speeds, the equipartition theorem, and the various statements of the laws of thermodynamics, as described in class and in the book. I would also recommend reviewing the homework, including the conceptual problems. Finally, you could be asked about uncertainty, random errors, and systematic errors.

A handwritten set of solutions to these problems will be posted in WileyPlus.

1) A 25 gram glass container contains 200 mL of water at 24 °C. A block of 30 grams of ice with at temperature of −3 °C is dropped into the container. There is no thermal conduction between the glass and the rest of the room.

   a) What is the final temperature of the drink?

   b) What is the change in entropy of the glass/water/ice system?

2) Two moles of a diatomic gas are carried through the cycle ABCDA shown in the PV diagram below. The segment AB represents an isothermal expansion, the segment BC an adiabatic expansion. The pressure and temperature at A are 5 atm and 600 K. The volume at B is twice that at A. The pressure at D is 1 atm.

   a) What is the pressure at B?

   b) What is the temperature at C?

   c) Find the work done by the gas in one cycle and the thermodynamic efficiency of the cycle.

   d) Find the thermodynamic efficiency of a Carnot engine working between the highest and lowest temperatures in the above cycle.

   e) Find any values of P, V, & T and $\Delta E_{int,}$ Q, & W that were not necessary to answer the above questions.