3–10 (a) Derive an equation similar to that in Problem 3–8 for the work $d'W$ when the temperature of a paramagnetic salt changes by dT and the applied magnetic intensity changes by $d\mathscr{H}$. (b) Find the expression for the work when the temperature is changed and the magnetic intensity is held constant. What is the algebraic sign of W when the temperature rises? What is doing work in this process? (c) Find the expression for the work when the magnetic intensity is increased isothermally. What is the algebraic sign of W when the intensity is decreased?

3–16 The temperature of an ideal gas at an initial pressure P_1 and volume V_1 is increased at constant volume until the pressure is doubled. The gas is then expanded isothermally until the pressure drops to its original value, where it is compressed at constant pressure until the volume returns to its initial value. (a) Sketch these processes in the P-V plane and in the P-T plane. (b) Compute the work in each process and the net work done in the cycle if $n = 2$ kilomoles, $P_1 = 2$ atm and $V_1 = 4\ \text{m}^3$.

3–35 Consider a system consisting of a cylinder containing 0.2 kilomoles of an ideal gas and fitted with a massless piston of area 0.5 m^2. The force of friction between the piston and the cylinder walls is 10 N. The gas is initially at a pressure of 1 atm and the system is to be maintained at 300 K. The volume of the system is slowly decreased 10 percent by an external force. (a) Compute the work done on the system by the external force. (b) Compute the configurational work done on the system. (c) Compute the dissipative work done on the system. (d) How do the above answers change if the piston has a mass of 1 kg and the piston is displaced vertically?