Physics 211 EXAM 2 2004 November 22

Answer five questions: #1 and four of the remaining questions

Physical Constants

$\sigma = 5.6705 \times 10^{-8}\ \mathrm{W \cdot m^{-2} \cdot K^{-4}}$
$R = 8.3145\ \mathrm{J/(K \cdot mol)}$
$N_A = 6.0221 \times 10^{23}$
$k = 1.3807 \times 10^{-23}\ \mathrm{J/K}$
$1\ eV = 1.6022 \times 10^{-19}\ \mathrm{J}$
$1\ \mathrm{atm} = 1.0133 \times 10^{5}\ \mathrm{Pa}$

Properties of H_2O

$L_V = 2256\ \mathrm{J/g}$
$c_w = 4.19\ \mathrm{J/(g \cdot K)}$
$L_f = 333\ \mathrm{J/g}$
$c_i = 2.22\ \mathrm{J/(g \cdot K)}$
$\rho_w = 1000\ \mathrm{kg/m^3}$

1. Consider the following cycle starting with 1 m^3 of a monoatomic ideal gas at a pressure of 1 atm and a temperature of 300 K.

   (a) The volume is compressed and the pressure increased in such a way that the pV curve is a straight line. Final pressure is 2 atm; final volume is $\frac{1}{3}$ m^3.

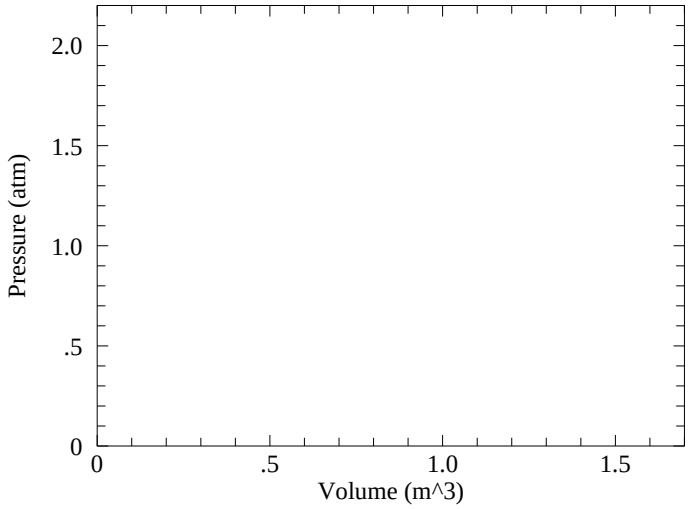
   (b) In a constant-pressure (a.k.a., isobaric) process, the volume is returned to 1 m^3.

   (c) An adiabatic expansion reduces the pressure to 1 atm.

   (d) A constant-volume (a.k.a., isochoric) process returns the temperature to 300 K.

   (e) An isothermal process returns the system to the initial state.

   On the below graph, accurately plot and label each leg of this cycle. This will require calculating various pVT values at the end of some cycles. Fill in the below table giving the sign $(+, -, 0)$ of the quantity for each leg of the cycle.



path:	a	b	c	d	e
ΔT					
ΔE_{int}					
Q					
W					
ΔS					