CH302 Spring 2006 Worksheet 2 (Values for ΔS and ΔH can be found in Appendix 2 in the text.)

Part 1. Determining Reaction Spontaneity based on ΔS_{total}

Reaction at 300K, constant P & T	ΔS_{system}	ΔH	$\Delta S_{surroungding}$	ΔS_{total}	Is the rxn spontaneous?
$NaCl(s) \rightarrow Na(s) + ½\ Cl_{2(g)}$					
$CaO(s) + H_20(l) \rightarrow Ca(OH)_{2\ (aq)}$					
$C_6H_{6(g)} \rightarrow 6C(s) + 3H_{2(g)}$					
$Cu_2O(s) + ½\ O_{2(g)} \rightarrow 2CuO_{(s)}$					
$CO_2 + 4H_2 \rightarrow CH_4 + 2H_20(g)$					

Part 2. Finding an Equilibrium Temperature from ΔS (assume that S and H doesn't change much with temperature)

Reaction/Process	ΔS_{system}	ΔH	Temperature which reaction/process is in equilibrium
$CH_3OH_{(l)} \rightarrow CH3OH_{(g)}$			
$I_2(g) \rightarrow I_2(s)$			
$N_{2(g)} + 3/2H_{2(g)} \rightarrow NH_{3(g)}$			
$3O_{2(g)}) \rightarrow 2O_{3(g)}$			

Part 3. True or False (if false, explain your answer)

1. The Second Law of Thermodynamics says that the entropy of any system is always increasing

2. The universe is an isolated system.

3. A process in which ΔS decreases is not spontaneous

4. ΔS equals to $-\Delta H/T$ when the process happens at constant pressure and temperature.

Part 4. Determining Stability of a Compound from the Free Energy of Reaction

Write out and balance the formation reaction at 300K:	ΔH	ΔS	Free energy ΔG (using the formula with ΔH and ΔS)	Is the compound stable at room temperature?
$H_2(g) + ½\ O_2(g) \rightarrow H_20(g)$				
$C + O2 \rightarrow CO_2$				
$H_2 + I_2 \rightarrow 2HI$				
$K(s) \rightarrow K(g)$				
$4P \rightarrow P_4$				