Gibb's Free Energy Worksheet Name: _____ Per.__

1. A(n) _____ is a physical or chemical change that occurs with no outside intervention.

2. The _____ states that spontaneous processes always proceed in such a way that the entropy of the universe increases.

3. For each statement below write *true* or *false*.

   _____ a. A process can spontaneous if it is exothermic & there's an increase in disorder.

   _____ b. A process can be spontaneous if it is endothermic and there's a decrease in disorder.

   _____c. A process can be spontaneous if it is exothermic and there's a decrease in disorder as long as the temperature remains low.

   _____ d. A process can be spontaneous if it is endothermic and there is an increase in disorder as long as the temperature remains high.

   _____ e. A process can never be spontaneous if the entropy of the universe increases.

   _____ f. When ΔG for a reaction is negative, the reaction is spontaneous.

   _____ g. When ΔG for a reaction is positive, the reaction is not spontaneous.

   _____ h. When ΔH for a reaction is negative, the reaction is never spontaneous.

   _____ i. When ΔH for a reaction is large and positive, the reaction is not expected to be spontaneous.

4. Given ΔH_{system}, T, and ΔS_{system}, determine if each of the following processes or reactions is spontaneous or nonspontaneous.

   a. ΔH_{system} = -75.9 kJ, T= 273K, ΔS_{system} = 138 J/K _____

   b. ΔH_{system} = -27.6 kJ, T= 535 K, ΔS_{system} = -55.2 J/K _____

   c. ΔH_{system}= 365 kJ, T= 388K, ΔS_{system} = -55.2 J/K _____