Homework Set #9 Solutions (10/27 - 10/31):

Chapter 13: **Questions** 13, 27, 34 **Exercises** 13, 18

Questions:

13. Heat is a flow of thermal energy, whereas temperature is a measure of the average kinetic energy of the toms and molecules. Notice that temperature is not an energy.

27. The water will freeze if heat is removed, the ice will melt if heat is added.

34. This new liquid would vaporize very rapidly once it is boiling. To boil an egg for ten minutes, you would need to start with a large pot of this liquid.

Exercises:

13. $\Delta T_x = \dfrac{Q}{cm} = \dfrac{(-12\text{ cal})}{(2\text{ cal/g}\cdot\text{°C})(6\text{ g})} = -1\text{°C}$

$\Delta T_y = \dfrac{Q}{cm} = \dfrac{(+12\text{ cal})}{(1\text{ cal/g}\cdot\text{°C})(3\text{ g})} = +4\text{°C}$

18. $Q = mL = (1\text{ kg})(334\text{ kJ/kg}) = 334\text{ kJ}$

Chapter 14: **Questions** 3, 5 **Exercises** 1, 5

Questions:

3. This would violate the second law of thermodynamics because heat will not naturally flow between two reservoirs at the same temperature

5. The second law of thermodynamics requires that some of the energy extracted from the hot region be exhausted to the cold region.

Exercises:

1. $Q_{in} = W + Q_{out} = 300\text{ kJ} + 400\text{ kJ} = 700\text{ kJ}$

5. $\eta = \dfrac{W}{Q_{in}} = \dfrac{50\text{ J}}{200\text{ J}} = 0.25$