Answer the questions below based on your reading and on your knowledge of chemistry.

1. For each of the following, what effect would an increase in pressure have on equilibrium?
   a. \( \text{N}_2(g) + 3\text{H}_2(g) \rightleftharpoons 2\text{NH}_3(g) \)
   b. \( 4\text{H}_2(g) + \text{CS}_2(g) \rightleftharpoons \text{CH}_4(g) + 2\text{H}_2\text{S}(g) \)
   c. \( \text{CO}(g) + \text{H}_2\text{O}(g) \rightleftharpoons \text{H}_2(g) + \text{CO}_2(g) \)
   d. \( \text{H}_3(g) + \text{F}_2(g) \rightleftharpoons 2\text{HF}(g) \)
   e. \( \text{PCl}_5(g) \rightleftharpoons \text{PCl}_3(g) + \text{Cl}_2(g) \)

2. For each of the following, what effect would an increase in temperature have on equilibrium?
   a. \( \text{N}_2(g) + 3\text{H}_2(g) \rightleftharpoons 2\text{NH}_3(g) \) \( \Delta H = -92 \text{ kJ} \)
   b. \( \text{C}(s) + \text{H}_2\text{O}(g) + \text{heat} \rightleftharpoons \text{CO}(g) + \text{H}_2(g) \)
   c. \( \text{PCl}_3(g) + \text{Cl}_2(g) \rightleftharpoons \text{PCl}_5(g) + \text{heat} \)
   d. \( 2\text{SO}_2(g) + \text{O}_2(g) \rightleftharpoons 2\text{SO}_3(g) + \text{heat} \)
   e. \( \text{H}_2\text{O}(l) \rightleftharpoons \text{H}^+(aq) + \text{OH}^-(aq) \) \( \Delta H = 55.8 \text{ kJ} \)

3. For the reaction, \( \text{H}_2(g) + \text{I}_2(g) \rightleftharpoons 2\text{HI}(g) \) \( [\Delta H = 52.7 \text{ kJ}] \), what effect will each of the following have on equilibrium?
   a. Addition of \( \text{H}_2(g) \)
   b. Removal of \( \text{I}_2(g) \)
   c. Increase in temperature
   d. Increase in pressure
   e. Addition of \( \text{HI}(g) \)

4. Explain LeChateliers’s principal based on collision theory.

5. If heat speeds up all reactions, both forward and reverse, why does it effect equilibrium?