1. (5 pts) Which of the following substances is the best reducing agent?
   a) F⁻  b) Mg  c) Li⁺  d) Ag⁺  e) Zn

2. (5 pts) Which of the following substances is the best oxidizing agent?
   a) F⁻  b) Mg²⁺  c) O₃  d) Ag⁺  e) Cu

3. (10 pts) Balance the following reaction in acidic solution.
   \[ \text{S}_2\text{O}_3^{2-}(aq) + \text{OCl}^-(aq) \rightleftharpoons \text{S}_4\text{O}_6^{2-}(aq) + \text{Cl}^-(aq) \]

4. (10 pts) Balance the following reaction in basic solution:
   \[ \text{BiO}_3^-(aq) + \text{Cr}^3+(aq) \rightleftharpoons \text{Bi}^{3+}(aq) + \text{CrO}_4^{2-}(aq) \]

5. (5 pts) Write the oxidation state for the underlined element in the box following each compound.
   a) LiAl\text{H}_4  
   b) Ba₃(AsO₄)₂  
   c) Na₂NiCl₄  
   d) CaSO₃  
   e) H₂O₂
6. (15 pts) Calculate the redox potentials for the following reactions. Show the two half cell reactions, written in the proper direction and their potentials used to calculate your answer.

   a) \[ \text{H}_2(g) + 2\text{Li(s)} \rightleftharpoons 2\text{H}^-(soln) + 2\text{Li}^+(soln) \]

   \[ E^\circ = \]

   b) \[ 4\text{H}^+(aq) + \text{O}_2(g) + 2\text{Cu(s)} \rightleftharpoons 2\text{H}_2\text{O} + 2\text{Cu}^{2+}(aq) \]

   \[ E^\circ = \]

   c) \[ \text{F}_2(g) + 2\text{Cl}^-(aq) \rightleftharpoons 2\text{F}^-(aq) + \text{Cl}_2(g) \]

   \[ E^\circ = \]

   d) \[ \text{Cu(s)} + 2\text{Ag}^{2+}(aq) \rightleftharpoons \text{Cu}^{2+}(aq) + 2\text{Ag(s)} \]

   \[ E^\circ = \]

   e) \[ 3\text{Pb}^{2+}(aq) + 2\text{Al(s)} \rightleftharpoons 3\text{Pb(s)} + 2\text{Al}^{3+}(aq) \]

   \[ E^\circ = \]

7. (10 pts) Library/web research topic: Describe in your own words the chemistry (with formulas) involved in a lithium-ion battery. Is lithium metal used? What is the voltage of this electrochemical reaction? List two main advantages and two main disadvantages of lithium-ion batteries with BRIEF explanations. DO NOT COPY DIRECTLY FROM ANY REFERENCE (except for chemical formulas). List your primary reference used at the end.