1. The energetics of glycolysis. The table below summaries values for glycolysis in within a fed cardiac myocyte.

	ΔG° (kcal/mole)	ΔG (kcal/mole)
Hexokinase	-5	-6.5
Phosphoglucose Isomerase	0.52	-0.33
Phosphofructokinase-1	-4.63	-6.19
Aldolase	5.45	-1.41
Triose phosphate isomerase	1.89	0
G-3-P Dehydrogenase + Phosphoglycerate kinase	-3.99	-0.26
Phosphoglycerate mutase	1.12	-0.14
Enolase	-0.76	-0.57
Pyruvate kinase	-5.5	-3.3

   a. Which steps of glycolysis are favorable?
   b. Which steps of glycolysis are spontaneous?
   c. For which steps are the products kept at lower concentrations than the reactants?

2. Chemical "logic" within glycolysis
   a. Try to run glucose-1,6-bisphosphate in the phosphoglucose isomerase reaction. Explain why glucose is (*i*) phosphorylated once, specifically at the C6-OH position, then (*ii*) isomerized fructose, then (*iii*) phosphorylated on the C1-OH.
   b. Why is the reaction catalyzed by glucokinase/hexokinase more favorable than the one catalyzed by phosphofructokinase?
   c. Run glucose-6-phosphate through the reaction catalyzed by aldolase (it is possible). What are the two products? Why has evolution selected to use fructose for this step rather than glucose?
   d. Why is the phosphate on C1 of 1,3-bisphosphoglycerate "high energy" or very labile?
   e. Why is the reaction catalyzed by phosphoglycerate mutase unfavorable

3. Balance sheet:
   a. How many total ATP are produced by the process of glycolysis?
   b. How many total NADH are produced by the process of glycolysis?
   c. How many pyruvate are produced by the process of glycolysis?
   d. How many ATP are used by the process of glycolysis?
   e. How many ATP are netted by the process of glycolysis?
   f. How many C-C and C-H bonds are in glucose?
   g. How many C-C and C-H bonds are in two pyruvate?
   h. How many redox reactions do you expect to find in glycolysis?
   i. How many redox reactions do you find in glycolysis?