1. Draw the mechanism (showing electron movement with curved arrows) of the reaction that would occur if 2S-bromo-3S-methyl pentane were heated in methanol. Give a one sentence justification of your predicted major product.

2. Draw the mechanism (showing electron movement with curved arrows) of the reaction between ethylamine and 2-propanone (assume that the reaction occurs in aqueous solution). (Hint: the product is a Schiff base.) Give a one sentence justification of your predicted major product.

3. Specify the stereochemistry (R or S) for each compound below.

![Chemical structures]

Study questions (these do not have to be turned in).

*Lehninger* Problems from chapter 1 (especially 1, 3, 4, 5, 6, 7, 8, 11, and 13).

Why is water so important? What properties make water unusual? Would life (as we know it) be possible if all molecules were equally soluble in water? What is the “hydrophobic effect”? Why is this important in biochemistry?

Why do ionic solids readily dissolve in water, but dissolve poorly in ethyl acetate? (Note that both ethyl acetate and water are polar molecules, with dipole moments of 1.85 and 1.78 D, respectively. The dielectric constants of the solvents at 25°C are 6.02 for ethyl acetate and 78.5 for water.)

Pairs of enantiomers are molecules in which all stereocenters are reversed. How do these molecules differ in physical properties? Can these molecules differ biologically? Why?

Why is $\Delta G$ more useful than $\Delta S$ or $\Delta H$? What does $\Delta G$ tell you? What does it not tell you?

How do $\Delta G$, $\Delta G^\circ$, and $\Delta G^{\prime\prime}$ differ? What are two equations for $\Delta G^{\prime\prime}$? When might you use these equations?

How many different amino acids are there? How many different physiological amino acids are there? How many different amino acids are found in proteins? Are the answers to these three questions the same? Why?

What chemical elements are present in all amino acids? What chemical elements are present in some physiological amino acids, but not in others?

Does the amino acid side chain affect the properties of the $\alpha$-amino and carboxyl group? In what way? Why?