1. The New Chemistry Research Building, whose construction is nearing completion just north of Sterling/Kline Laboratories, is scheduled to open in the Fall of 2005. The Prospect Street entrance will have a gate bearing ornamentation related to four areas of chemistry: organic, inorganic, theory/physical, and biological. Ornamentation gate are the two peptides shown below. What is the message? [Thanks to Professor Valentine for the structure.]

![Peptides](image)

2) The Strecker synthesis converts isobutyraldehyde into (d,l)-valine. When the same reaction is applied to (d,l)-2-methylbutanal (α-methyl butyraldehyde) in an attempt to prepare racemic isoleucine (2R*, 3S*),

a) What problem may arise? Explain and illustrate.

b) Draw the Fischer projection of L-isoleucine. Provide a mechanism for the formation of α-methyl butyraldehyde from isoleucine using the ninhydrin reaction.

3) Design a synthesis of d,l-aspartic acid from oxalic acid using the Claisen condensation.

4) An undecapeptide A is digested in the presence of trypsin to form Phe-Gly-Arg, Val-Glu-Pro-
Lys, and Trp-Ser-Leu-Asp. Sanger analysis of the undecapeptide produces $\text{C}_{11}\text{H}_{13}\text{N}_{3}\text{O}_{6}$ after hydrolysis.

a) What are the structures of A and B? Explain.

b) What peptide fragments are formed in the presence of chymotrypsin?

5) Without the use of an automated peptide synthesizer, prepare ala-gly-val. The three α-amino acids are available to you.

6) When peptides are liberated from a Merryfield resin, anisole is usually included with the HF (See page 1150). Explain.