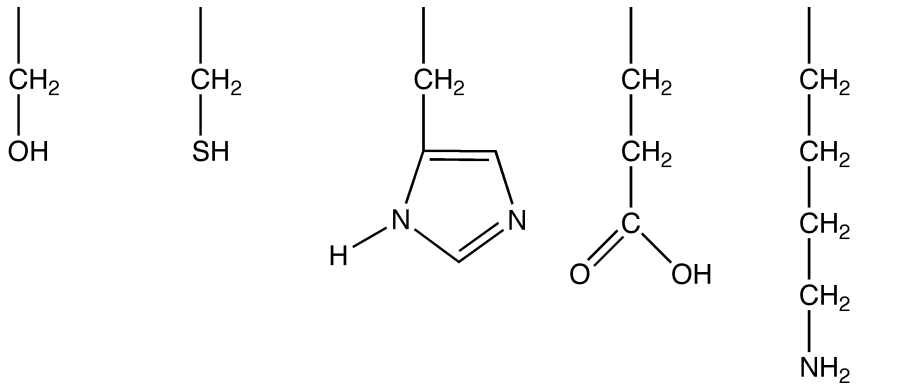
Chem 352, Fundamentals of Biochemistry
Lecture 3, Part I – Supplemental Questions

1. Using the three-letter codes, identify the amino acids that contain the side chains shown below:

A. _____ B. _____ C. _____ D. _____ E. _____



a. Which of these is aliphatic? (*Circle all that apply.*) A B C D E
b. Which of these can hydrogen bond to water? (*Circle all that apply.*) A B C D E
c. Which of these is aromatic? (*Circle all that apply.*) A B C D E
d. Which of these is charged at neutral *pH* values? (*Circle all that apply.*) A B C D E
e. Which of these is hydrophobic? (*Circle all that apply.*) A B C D E
f. Which of these is basic? (*Circle all that apply.*) A B C D E
g. Which of theses is acidic? (*Circle all that apply.*) A B C D E

2. What contributions did G. N. Ramachandran and Linus Pauling make to our understanding of protein structure?

3. Draw the chemical structure for the tripeptide His-Asp-Lys in its proper charged state at *pH* 7.

a. On your structure, label one example of a φ, a ψ and an ω bond.
b. On your structure, label one example of a *peptide bond*.
c. Draw a titration curve for this tripeptide?
d. What is the ioselectric *pH* (*pI*) for this peptide?

4. Determine the amino acid sequence of a polypeptide given the following data:
   - Treatment with the proteolytic enzyme *carboxypeptidase*, which removes amino acid residues sequentially form the C-terminal end, releases **Val**.
   - The first amino acid released from an Edman degradation of the full length polypeptide is **Ser**.
   - Treatment with the proteolytic enzyme *trypsin*, follow by Edman degradation of the resulting fragments, produced the following five fragments:
     Phe-Glu-His-Lys, **Phe-Gly-Arg**, **Pro-Val**, **Ser-Tyr-Ser-Lys**, **Trp-Gly-Lys**.
   - Treatment with the proteolytic enzyme *chymotrypsin*, follow by Edman degradation of the resulting fragments, produced the following five fragments:
   - **Gly-Arg-Trp**, **Gly-LKys-Pro-Val**, **Ser-Lys-Phe**, **Glu-His-Lys-Phe**, **Ser-Tyr**.
   - Total hydrolysis of the polypeptide reveals the following composition:
     Arg, **Glu**, **Gly**(2), **His**, **Lys**(3), **Phe**(2), **Pro**, **Ser**(2), **Trp**, **Tyr**, **Val**.

5. Draw the chemical structure of the peptide that you sequenced in problem 4 in the charged state that it will have at *pH* 8.