1. Name the four structural features of every amino acid found in proteins.

2. One amino acid in our organizational scheme is listed in two categories. Name it.

3. Ionization of tyrosine is rarely a consideration in cells. Why?

4. We never talk about the charge of an amino acid at any of its pKa values. Why?

5. The pI value of aspartic acid is between pKa1 and pKa2 whereas the pI value of lysine is between pKa2 and pKa3. Why?

6. You find an unusual new amino acid with ionizable groups with the following pKa values

   alpha amine = 9.0  
   alpha carboxyl = 2.0  
   R-group carboxyl #1 = 4.0  
   R-group carboxyl #2 = 6.5  
   Sulphydryl = 8.5

Draw a titration curve for this amino acid similar to the ones shown in class. Label the charge of the amino acid at each relevant place on the graph.