CHEM106 PS-5 Due at the beginning of class; please show all work and all equations to receive any credit

1. Calculate the pH, pOH, [OH⁻], and [H_3O^+] concentration for a 0.00200 M calcium hydroxide solution.

2. Serine has pK_a's of 2.21 and 9.15. For a solution with a pH of 10.50, draw the complete Lewis structures and calculate the ratio of the two most prevalent forms of serine; clearly show which form is present at higher concentration.

3. Tyrosine has pK_a's of 2.20, 9.11, and a side chain pK_a of 10.07.

   a. For pH's of 3.20 and 4.20 respectively, calculate the ratio for the two most concentrated forms that are present and draw the Lewis structures (OK to use a ring representation as was done in class for the aromatic portion of this molecule) for these forms.

   b. Draw the Lewis structures for the two most concentrated forms present at a pH of 8.11.

   c. Draw the Lewis structures for the most concentrated form present at a pH of 11.

4. Lysine has pK_a's of 2.18, 8.95, and 10.53 (side chain).

   a. Draw the complete Lewis structure of lysine that is most prevalent at physiological pH.

   b. Draw the complete Lewis structures and calculate the ratio of the two most prevalent forms of lysine at a pH of 1.0.