BC367, Fall 2018 Problem set #7 Due: Friday, October 26th

(Each problem must be completed on a separate page.)

1. Derive a velocity equation for an *ping pong bi bi* enzyme system using the rapid equilibrium assumption.

2. Derive a velocity equation for an ordered *bi uni* enzyme system with a competitive inhibitor for the substrate that binds *second* using the rapid equilibrium assumption.

3. A particular *uni uni* enzyme has a lysine in its active site that must be protonated for the enzyme to be active. In its local environment, this particular Lys has a pK_a of 8.1. The effect of pH on the activity of an enzyme was assessed. The substrate and the product of the reaction are both negatively charged throughout the pH range of the experiment.

    a. Sketch a graph for V_0 as a function of pH in a situation where the substrate concentration is much greater than the K_M value.

    b. On the same axes, sketch a graph for V_0 as a function of pH in a situation where the substrate concentration is much less than the K_M value.

    c. At what pH with the velocity equal ½ of the maximal velocity attainable under these conditions. *Explain.*