The goal of this assignment is to introduce us to reading scholarly journals, and giving us students a chance to code the differential equations and recreate the plots on the Jones and Mann journal. We can see how different k levels and initial conditions affect levels.

We set up main function and set up the following. First we declare initial values of concentration of each species. There are 18 initial conditions, but we only label 6 because the rest are 0. The ones that aren’t zeroes are TF.VIIa, X, V, VII, VII, prothrombin. Then we declare the rate constants vector, k1-k20, used to model the activation of thrombin. Then we set up options and ode solver so that we calculate alterations within the old and new plots. We enter in our option that shows Structure of optional parameters that change the default integration properties like this *[t,y] = solver(odefun,tspan,y0,options)* .

Function 2 is for setting up our differential equations with the k values from the reading. Cdot helps us attain the dot product.

We establish a function for each graph. 1a was a comparison of the formation of thrombin over time seen under experimental conditions. For figure 1a, we just had to use the ODE solver ode15s and plug in values to our thrombin % calculator.

1b tests of the effect of varying enzyme complex formation rate constants on mathematical model results. For 1b, there was the square, circle, diamond line. Each one just had different k values, so we redefined those and recalculated the thrombin percent for each one. We were able to plot all the 3 lines versus t on the same graph by using matlab notation *plot (t, thrombin\_square, '-s', t , thrombin\_diamond,'-d', t , thrombin\_circle,'-o').* We plot and label all axis. Same goes for the rest of the plots, where the different lines with different shapes occur with different k values. Same for figure 2.

In figure 3 and 4, we see how the factors such as Xa, IXa, V, VII, and VIII changes affect thrombin levels. Figure 5A, the effect of pro-cofactors on thrombin formation. In 5b, only TF.VIIa changes to 1 nM. Figure 6 shows the contributions of factor IIa and Xa to factor V and vIII activation over time. We change initial conditions and recalculated thrombin levels to graph thrombin levels changes.

The significance of this computer model is that it shows reaction over a many types of conditions like k changes and initial condition changes and provides a useful tool for the development and management of reaction studies.