

MATH 3900, Spring 2009
Homework 1
Due 01/23/09

1. **(computing)** Go through the MATLAB primer. Try all of the examples for yourself. If you don't understand how any of the results come about, please, ask. This exercise will not be graded, this is for your MATLAB training for the rest of the course

2. Solve the model: equations (M1)-(M9) in class, or (1.5.1)-(1.5.9) in the book (section 1.5)

3. The procedure for finding the numerical values of parameters (normal resting values) is described at the bottom of page 17. The result of this procedure is presented in Table 1.2.

a) Write out the formulae used to construct the table and check that the numerical values in the table are correct.

b) Exercise 1.4, p. 70. Only do the columns for K_R , R_s , V_0

4. **(computing)** Include P_{thorax} in the model: exercise 1.8. Make the required plots in matlab

5. **(extra-credit)** On the volume-pressure diagram, draw the trajectory of the beat, for P_v slightly lower than normal, starting with the opening of the inflow valve. What is the effect on the circulation? (Think about the total volume of blood pumped). Now consider the case when P_v is very close to zero. Draw the first two phases of the beat, starting with the opening of the inflow valve. Can the heart function properly in this case? (The results of this exercise are only valid for a short period time after the drop in P_v . As you can see from our full model, when the cardiac output changes, this will affect P_v itself)