EE 475 HW #1

- With whatever help you can find from whichever source you prefer, briefly describe how a real closed-loop control system work. Draw a block diagram for the control system. Be sure to have a reference input, controller, plant, output, disturbance, feedback, error generator, and so on.
- 2. Consider a system described by an ordinary differential equation:

$$\ddot{y} + 5\ddot{y} + 6\dot{y} = 3\dot{u} + u$$

- a. Find the transfer function from input u to output y, its poles and zeros.
- b. Give a state space model for the system, using y, \dot{y} and \ddot{y} as state variables, u as input, and y as output.
- c. Use Matlab to verify that your answers in a and b agree. Specifically, enter the state space model from b into Matlab, and ask Matlab to obtain the transfer function for the model.
- 3. Do B-2-11 first by hand, and then use Matlab to verify your answer.
- 4. B-2-2
- 5. B-2-3
- B-2-4. Provide a 2-column (e is step, e is ramp) 5-row table (one for each controller).Each entry of the table is a hand sketch of the corresponding u(t).
- 7. B-2-7

For the signal flow graph given below, find the transfer function from Y1 to Y6 and from Y7 to Y6.



9. For the block diagram given below, use Mason's gain formula to find the transfer function from R to Y and from N to Y.



10. Amotor control system is represented by the following block diagram. Find the transfer function from θ_r to θ_o .

