ECE 8740 - Spring 2014 **Test 2 Out-of-Class Component** Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(20 points total)

Instructions:

1. The test is due on Wednesday March12 in class at 11:15AM.
2. You must show all steps in your solutions
3. **Your exam solutions are to be your own work, you are not to give or receive assistance of any kind on this exam.**

Given the system:



Design a control system for the input u(t).

1. (8 pts) Use the hand-crafted backstepping control design approach to design the control input *u(t)* such that *x1(t)->0.* Be sure to include control gains () with your feedback terms. Show all work and that all signals are bounded. 
2. (2) Find the equilibrium of the **closed-loop** system.
3. (10 pts) Simulate the control system in Simulink using the initial condition *x1(0)=0.2, x2(0) =0*.6
   1. Show *x1(t), x2(t)* on one plot.
   2. Show on a plot.
   3. Show *u(t)*





