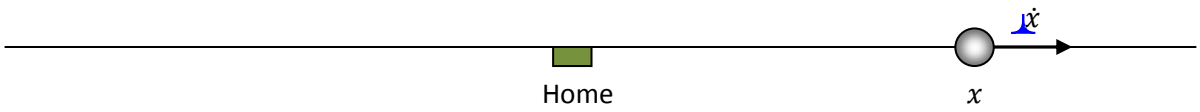
Homework.

Write a ~~Mamdami~~ based control using the antecedents of postion x and velocity $\dot{x}$. Your goal is to get home at $x = 0$ (plus or minus a little slop) and $\dot{x} = 0$ (plus or minus a little slop) in time steps $x(n\Delta t)$. Assume $\dot{x}(n\Delta t) = \frac{x(n\Delta t)-x((n-1)\Delta t)}{\Delta t}$. Assume a maximum acceleration (e.g. $\dot{x}((n+1)\Delta t) \leq a\dot{x}(n\Delta t)$ when $\dot{x} > 0$ and $a > 1$), and maximum braking (e.g. $\dot{x}((n+1)\Delta t) \geq b\dot{x}(n\Delta t)$ when $\dot{x} > 0$ and $0 < b < 1$.)



The choices of $\Delta t, a, b$ and the meaning of "slop" are yours. Choose something reasonable. The goal is to show Mamdami fuzzy control works.

What to hand it:

1. Snapshots at various times of convergence to home for a few initializations of x and $\dot{x}$.
2. A table (matrix) of a range of initilaizations x and $\dot{x}$. The elements of the matrix should be the number of steps needed to get home.
3. Pictures of your fuzzy rule table and membership functions. Specify all parameters you used.
4. I will mostly look at the pictures, but please hand in your code too.

You can either hand in hard copy or email a single pdf file to me.

Have fun and learn.