Name: _____ ECE 3510 homework 1 g

Homework should be handed in through Canvas as a .pdf file.
Homework is due by 11:59 p.m. on the due date.

Identify Feedback Systems Listen carefully to lecture 1 and read Chapter 1 of the Bodson text.

1. Look for feedback systems around your house, school and where you work. Think about the subsystems within your computer, your car, and your entertainment equipment. Think back to previous classes and try to identify feedback systems that were used to stabilize circuits. (You don't need to write anything down here, you'll do that in the next problem, possibly using ones you've thought of here.)

2. Identify any feedback system you can identify. For this system:

   a) Draw a system diagram, identifying each of the parts (controller, plant, feedback signal and/or sensor, and possibly others). If you're not sure how the system works or how individual parts of the system work, make educated guesses– think how you would make such a system work. You will almost certainly have to simplify the system, considering only one input, one output, and one type of feedback. Assume all else which may affect the output is held constant.

   b) Identify the input on the drawing (may be zero or some reference value).

   c) Identify the output (response).

   d) Identify the feedback signal (often same as the output).

   e) What would happen if this system did not respond accurately to the control and the output looked like that shown below (or like Figure 1.2 b in the Bodson text)?

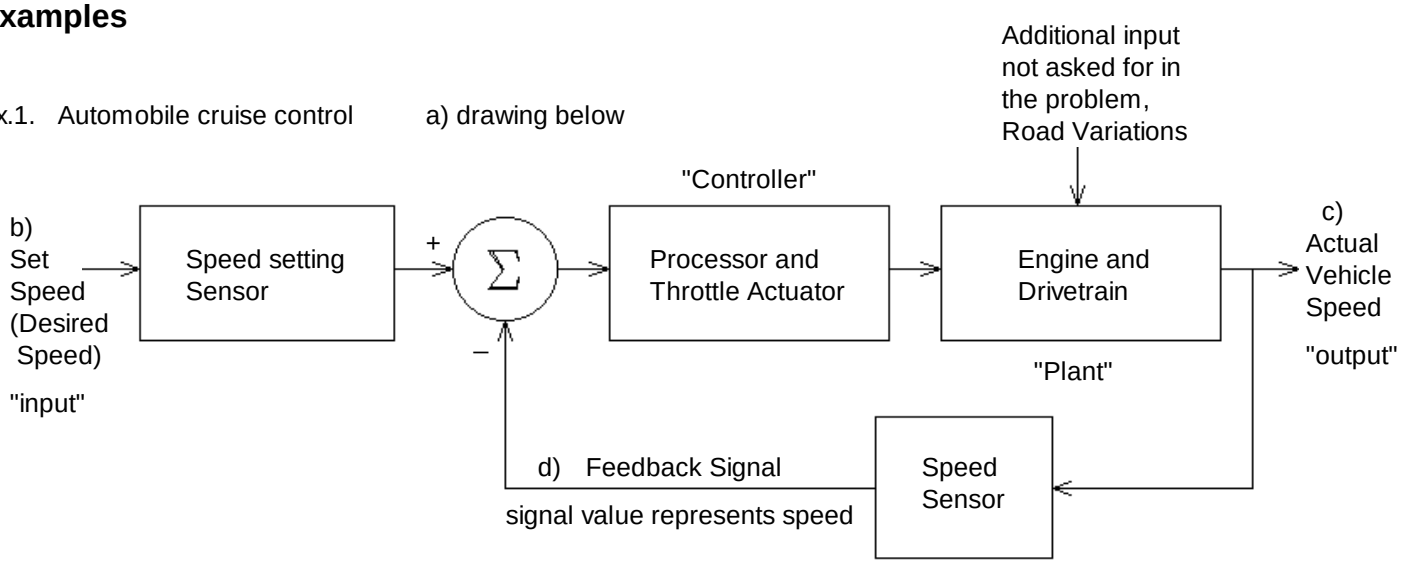
   f) What would happen if this system responded to the control with overshoot or ringing like that shown below (or like Figure 1.2 c in the text)?

3. Repeat problem 2a) - d) for a feedback system outside of your normal environment.

4. Repeat problem 2a) - d) for a natural feedback system, that is, not made by man.

Examples

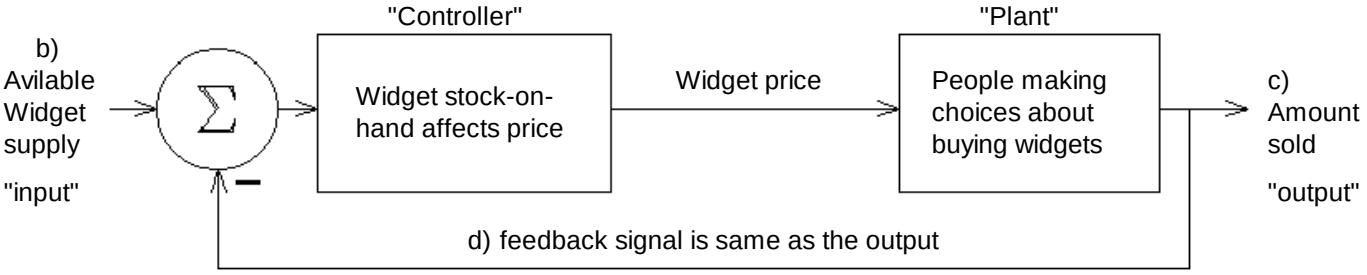
Ex.1. Automobile cruise control a) drawing below



e) The vehicle speed might not match the set speed, or might respond very slowly.

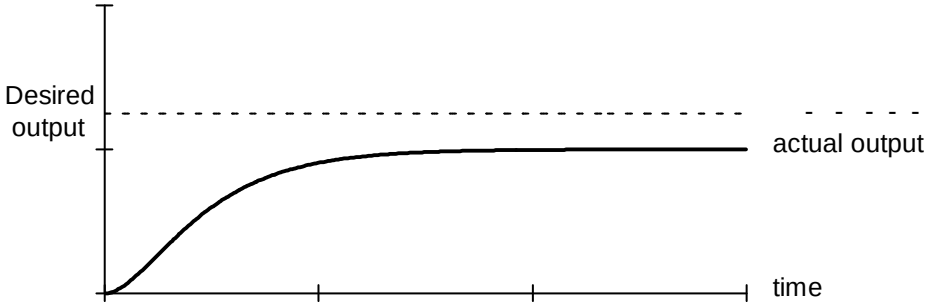
f) The vehicle speed could vary wildly creating a very unsafe situation.

Ex.2 Widget price feedback system.



e) What would happen if this system did not respond accurately to the control and the output looked like that shown below (or like Figure 1.2 b in the Bodson text)?

Output of a feedback or control system

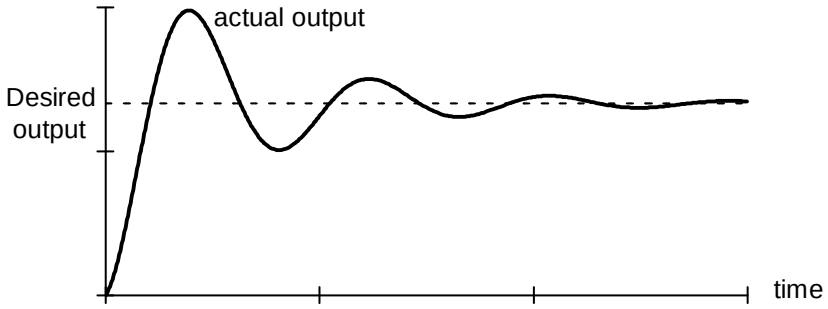


In our widget example

= demand matches supply
= actual demand

Overstock would build up in some sort of storage.

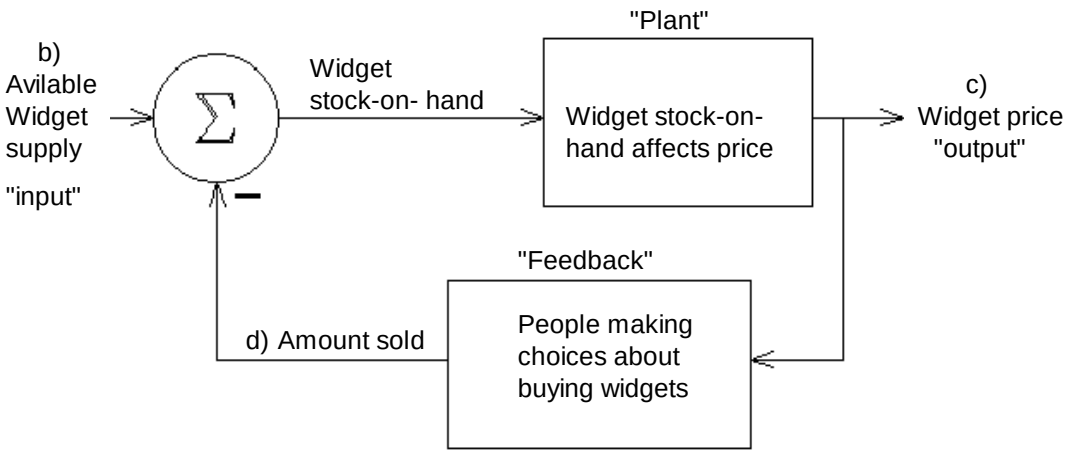
f) What would happen if this system responded to the control with overshoot or ringing like that shown below (or like Figure 1.2 c in the text)?



Response to a change in supply

Widget demand (also price and stock) fluctuate wildly because price is too sensitive to stock variations. Demand eventually settles to match supply.

Note: This same system could also br drawn this way, if you consider the widget price as the "output"



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