

Download the file template.m from the MIT Server.

(1) Read it. It's a long computer code, most of it commentary. It simulates a process in a feedback control loop, integrating the equations over a period of time and displaying the traces. Read the code to understand how this task is performed. Notice particularly the sections marked for USER INPUT - that's where you'll be doing your work. I can't grade you on this step; it's up to you. But don't rest until you are clear in your understanding.

(2) Equation (3.1-2) is a first-order system model. Adapt template.m to compute this model over time; from question (1) you should know where you do this. Do separate cases for different disturbances, so that you reproduce the figures in Sections 3.3, 3.4, and 3.5. You can tell when your result is right. Turn in the plots.

(Notice that there is no control applied, so that you don't need to write the controller code yet.)

(3) Lesson 4 goes through root-finding and other manipulations to predict how two tanks behave under P-mode feedback control. Let's simplify that problem by assuming that the valve is fast, so that its time constant can be regarded as zero. Removing this "lag term" reduces the equation order to 2, and makes it feasible to solve. Do so. Calculate Figures 4.19-1 and 4.20-1 for this simplified case.

(Please use Laplace transforms to solve the equations.)