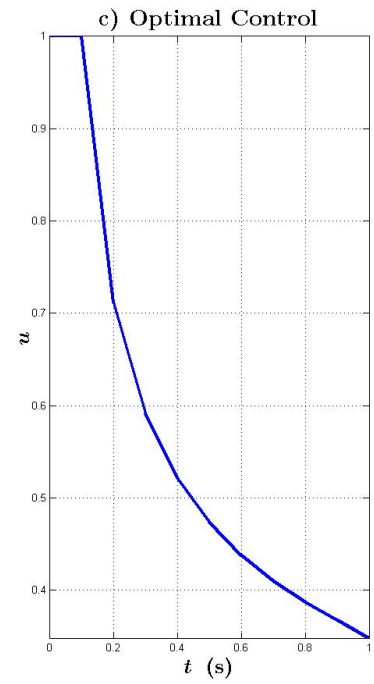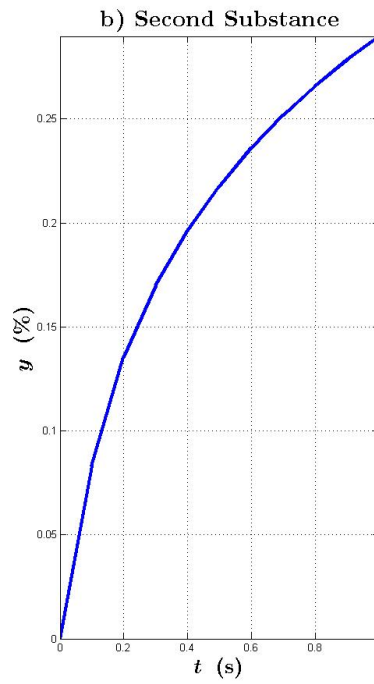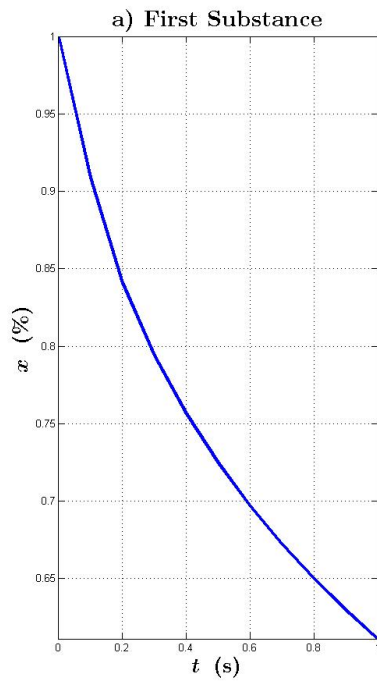# Problem 2

Part a

Following is the plot for the time evolution of the states and control subject to the trapezoidal rule direct method. Code attached on following pages.

a) First Substance b) Second Substance c) Optimal Control

Part b

The final cost at $t_f = 1$ is given by -0.289720 (see output of collocation function). Cost $= -y_f^*$.
Therefore, $y_f^* = \mathbf{28.97\%}$.