Matlab Code

```
%% Problem 11.59S

su_bullets = repmat('*', 25, 1); % setting up cmd line output
un_bullets = repmat('-', 25, 1);
fprintf('%c',su_bullets)
fprintf('\nProblem 11.59S\n')
fprintf('%c',su_bullets)
fprintf('\n\n')

% Gp(s) = 1/(s+4)
% Kp = 6    tau = 0.2
% KI = 50   zeta = 0.707
% (a) Construct a Simulink model to simulate this system with a unit-step command

sim('hw9_11_59_a.slx')

f4 = figure;
plot(actuator_output.time,actuator_output.signals.values)
title({'MAE 488, Homework 9, Problem 11.59S (a), Actuator Output vs
Time'},'interpreter','latex','FontSize',16)
grid

f5 = figure;
plot(error.time,error.signals.values)
title({'MAE 488, Homework 9, Problem 11.59S (a), Error vs Time'},'interpreter','latex','FontSize',16)
grid

f6 = figure;
plot(output_response.time,output_response.signals.values)
title({'MAE 488, Homework 9, Problem 11.59S (a), Output Response vs
Time'},'interpreter','latex','FontSize',16)
grid

f7 = figure;
plot(p_term.time,p_term.signals.values)
title({'MAE 488, Homework 9, Problem 11.59S (a), P Term vs Time'},'interpreter','latex','FontSize',16)
grid

f8 = figure;
plot(i_term.time,i_term.signals.values)
title({'MAE 488, Homework 9, Problem 11.59S (a), I Term vs Time'},'interpreter','latex','FontSize',16)
grid


% (b) Construct a Simulink model of an anti-windup system for this application

sim('hw9_11_59_b.slx')

f9 = figure;
plot(output_response_b.time,output_response_b.signals.values, 'r')
title({'MAE 488, Homework 9, Problem 11.59S (b), Output Response vs
Time'},'interpreter','latex','FontSize',16)
grid

f10 = figure;
plot(actuator_output.time,actuator_output.signals.values, 'r')
title({'MAE 488, Homework 9, Problem 11.59S (b), Actuator Output vs
Time'},'interpreter','latex','FontSize',16)
grid

% print(f4,'..\results\problem_11_59S_4.png','-dpng','-r1200');
% print(f5,'..\results\problem_11_59S_5.png','-dpng','-r1200');
% print(f6,'..\results\problem_11_59S_6.png','-dpng','-r1200');
% print(f7,'..\results\problem_11_59S_7.png','-dpng','-r1200');
% print(f8,'..\results\problem_11_59S_8.png','-dpng','-r1200');
% print(f9,'..\results\problem_11_59S_9.png','-dpng','-r1200');
% print(f10,'..\results\problem_11_59S_10.png','-dpng','-r1200');
```

Matlab Figures

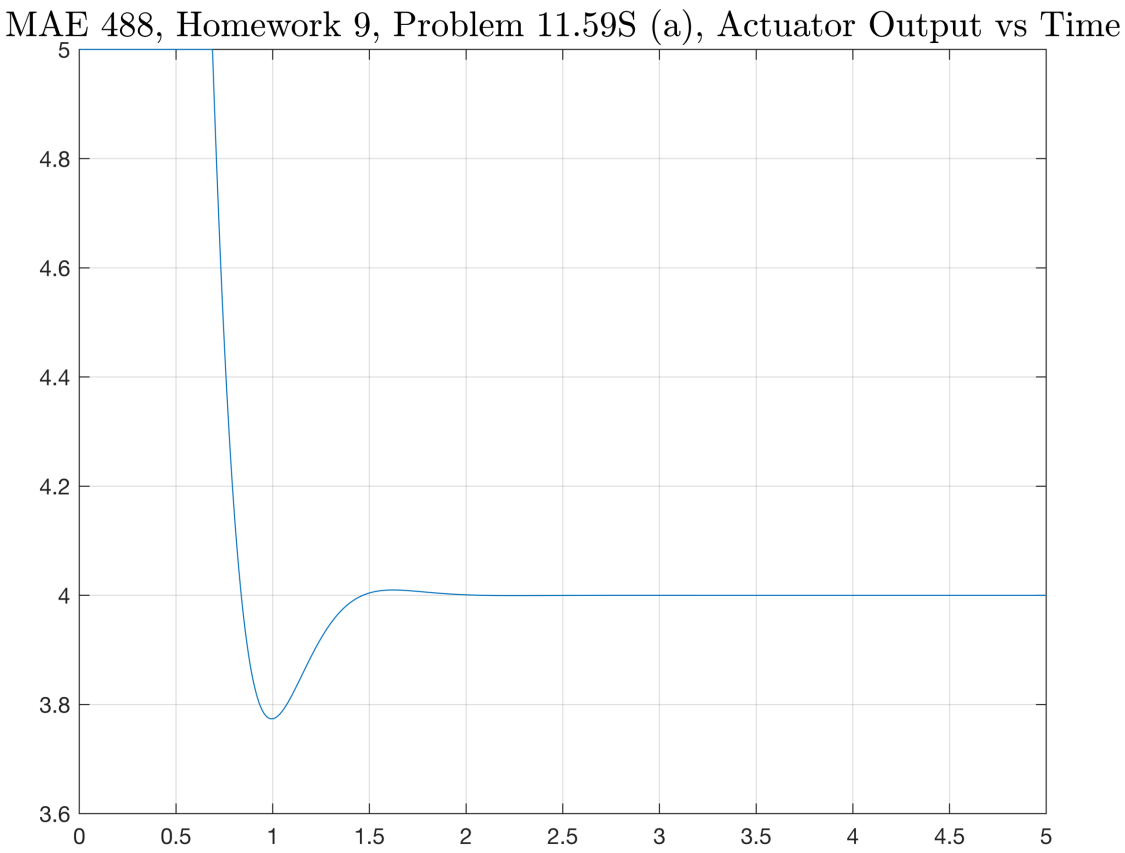


Figure 1: Problem 11.59S Actuator Output vs Time (Part A)

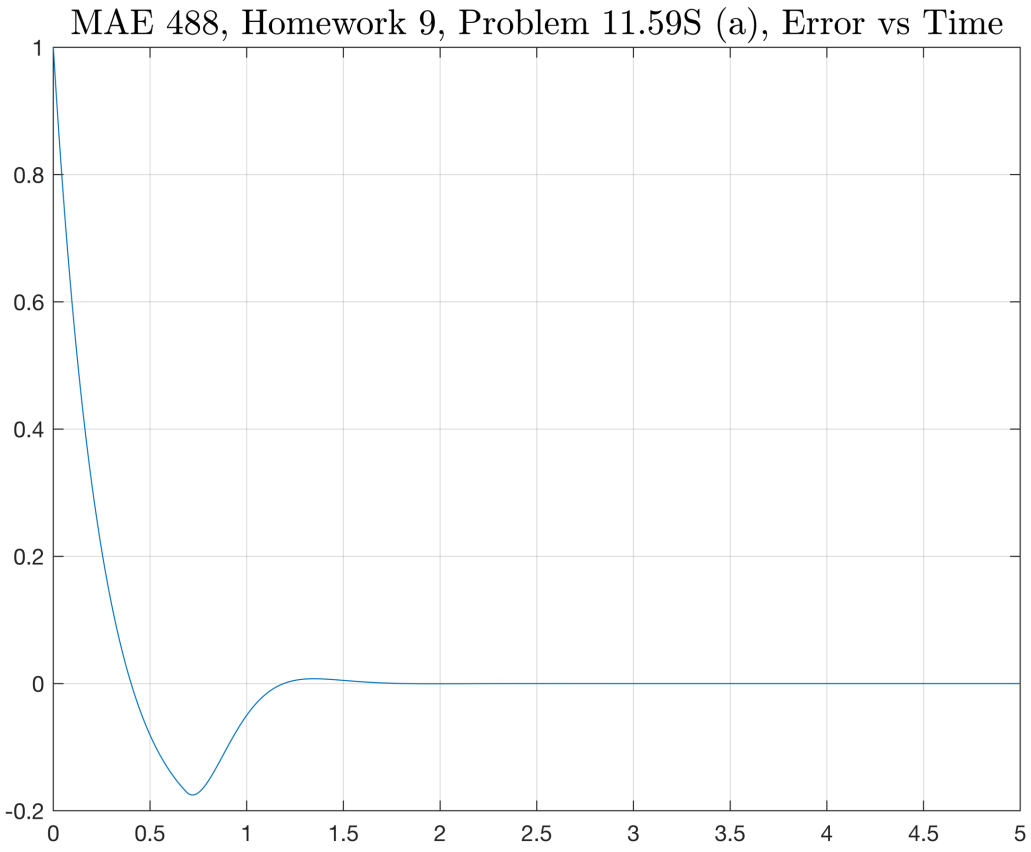


Figure 2: Problem 11.59S Error vs Time (Part A)

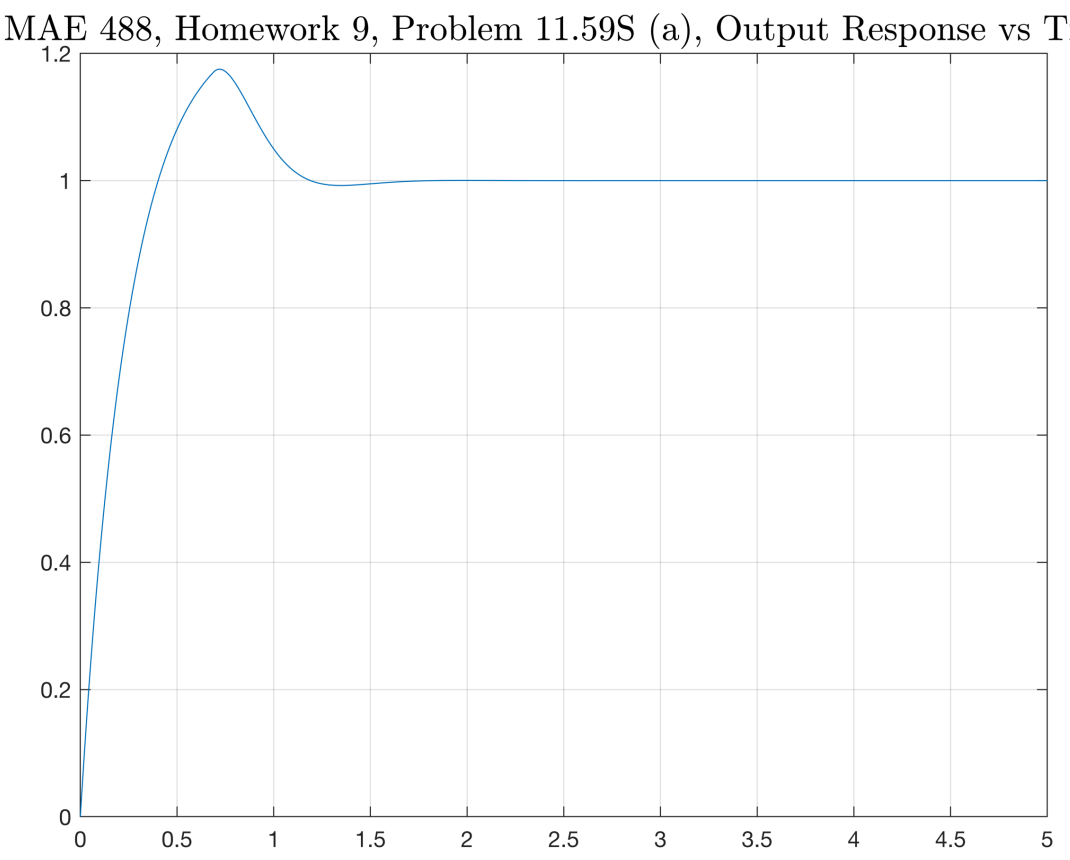


Figure 3: Problem 11.59S Output Response vs Time (Part A)

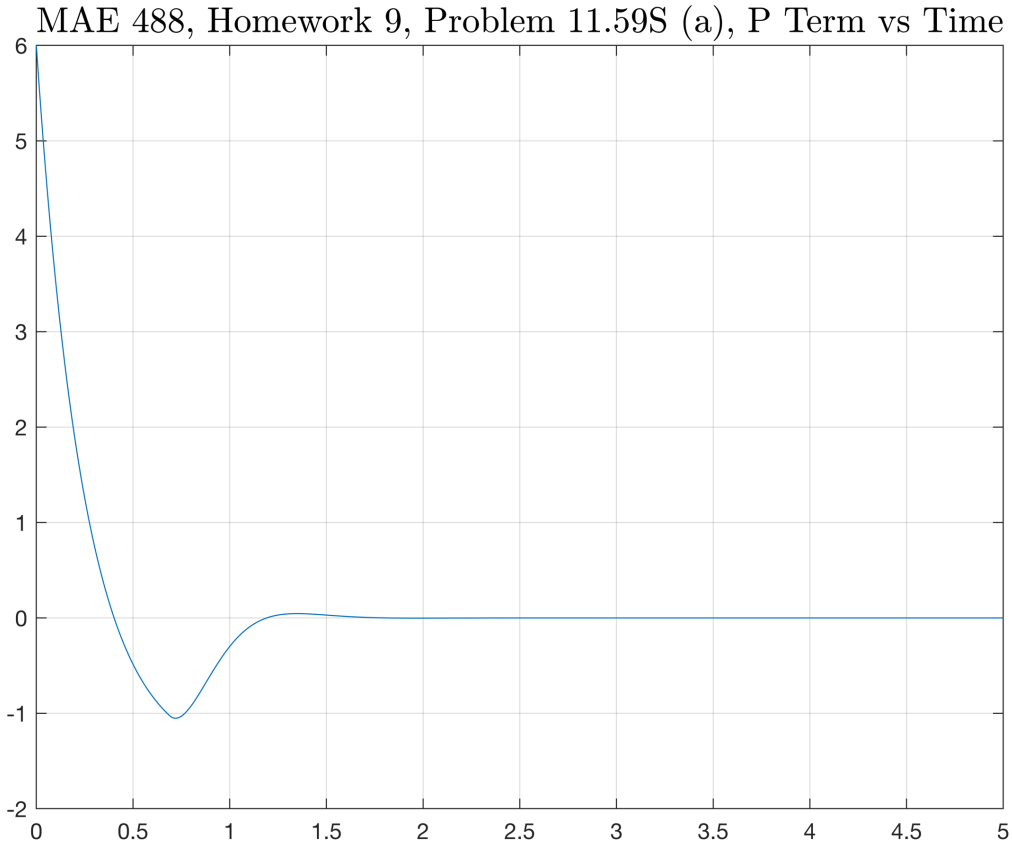


Figure 4: Problem 11.59S Proportional Term vs Time (Part A)

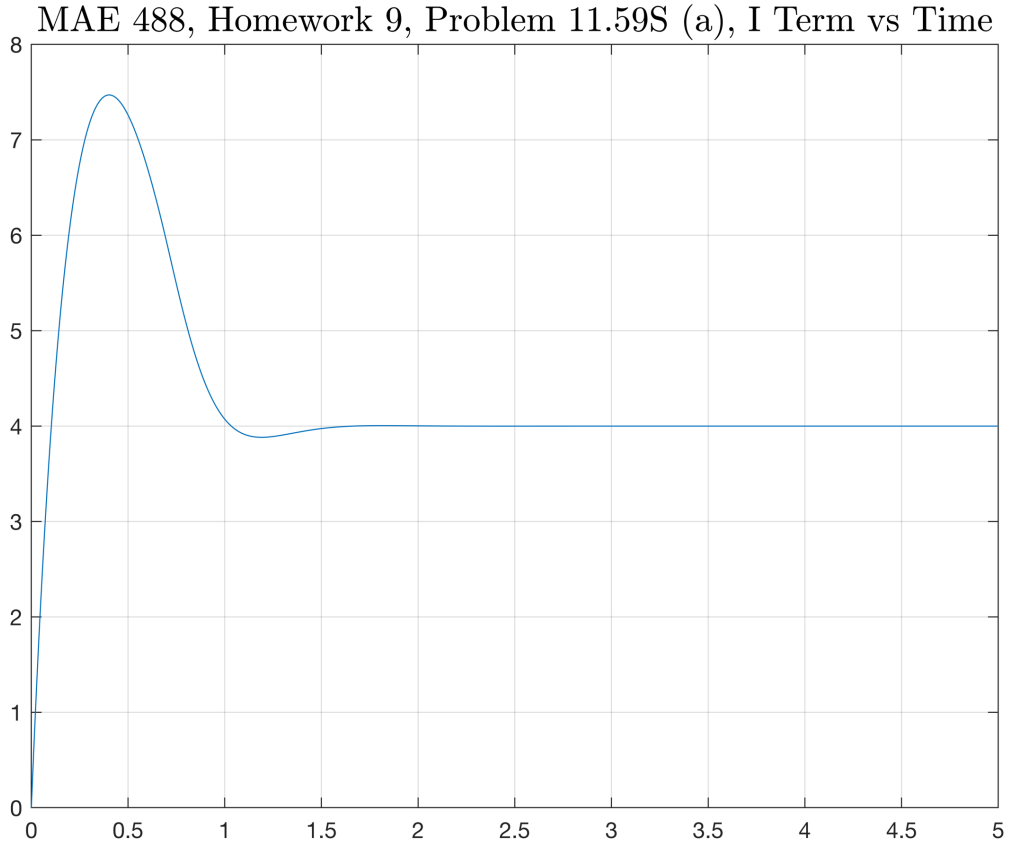


Figure 5: Problem 11.59S Integral Term vs Time (Part A)

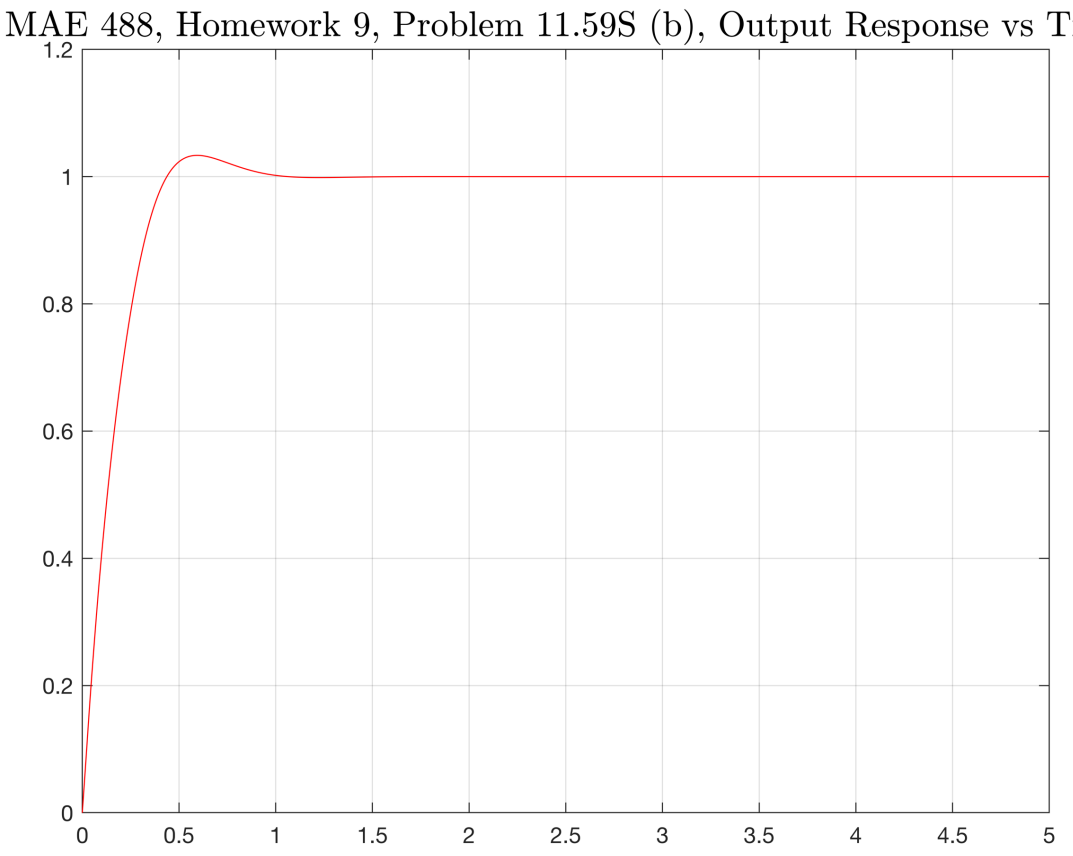


Figure 6: Problem 11.59S Actuator Output vs Time (Part B)

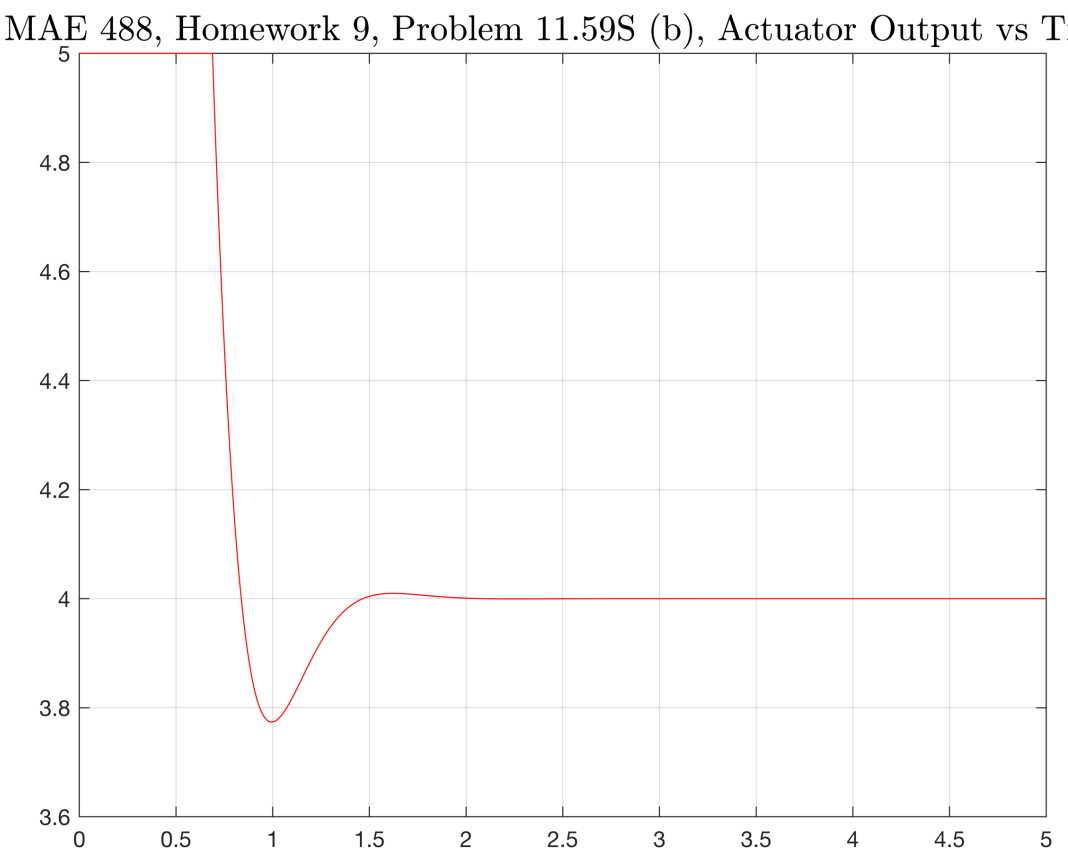
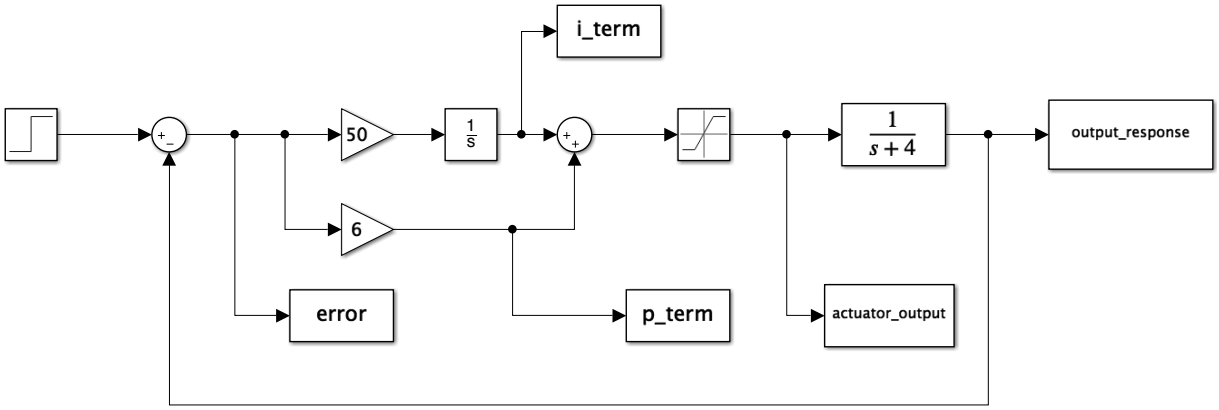
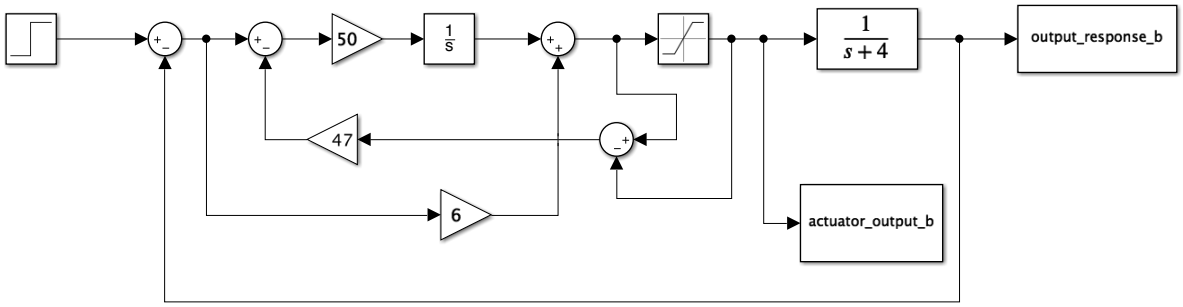


Figure 7: Problem 11.59S Actuator Output vs Time (Part B)

Simulink Diagrams



11.59S Part A



11.59S Part B