Report for Auto Control Lab3 and 4

Jacky Yeh 4107064003

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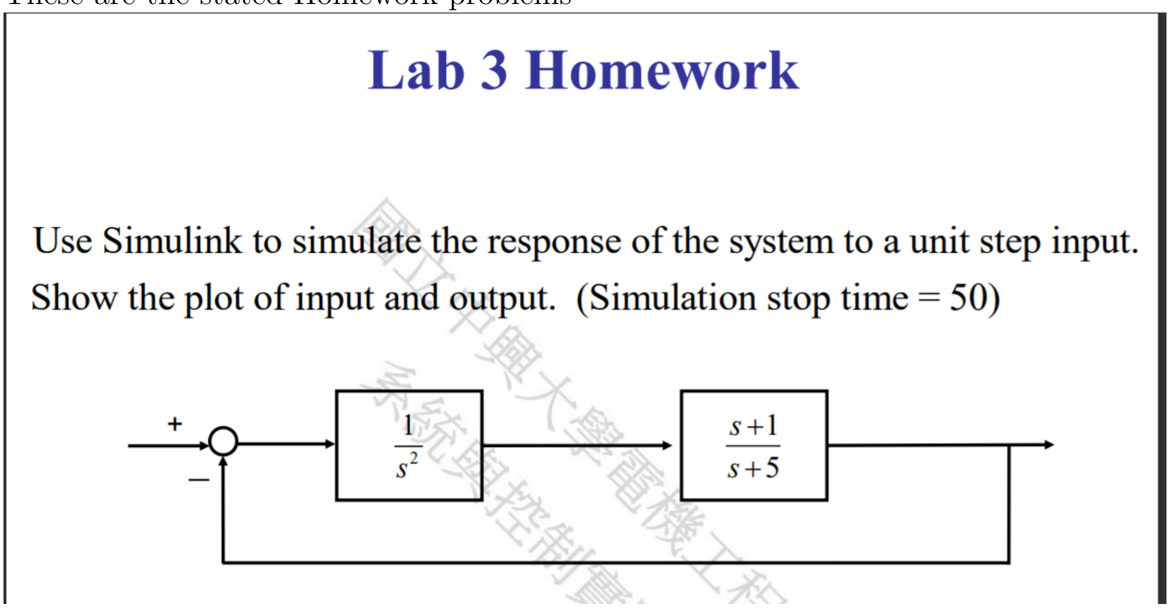
1 Introduction

This is the second Experiment of Auto Control Lab where TAs taught us some the use of SIMULINK, a certain block diagram like system flow control interface in MATLAB for us to better understand the use of system flow control and control system plotting.

2 LAB3

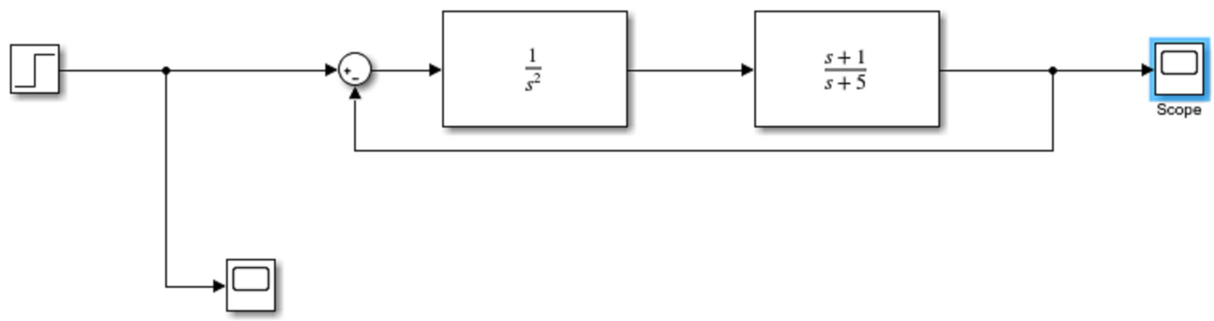
2.1 Basic usages of SIMULINK and its Interfaces

Objective:To perform basic operations on SIMULINK.
These are the stated Homework problems



2.2 SIMULINK SYSTEM BLOCK DIAGRAM FOR LAB3

In order to perform the tasks, SIMULINK flow graph blocks are needed.The following is the control flow graph for SIMULINK



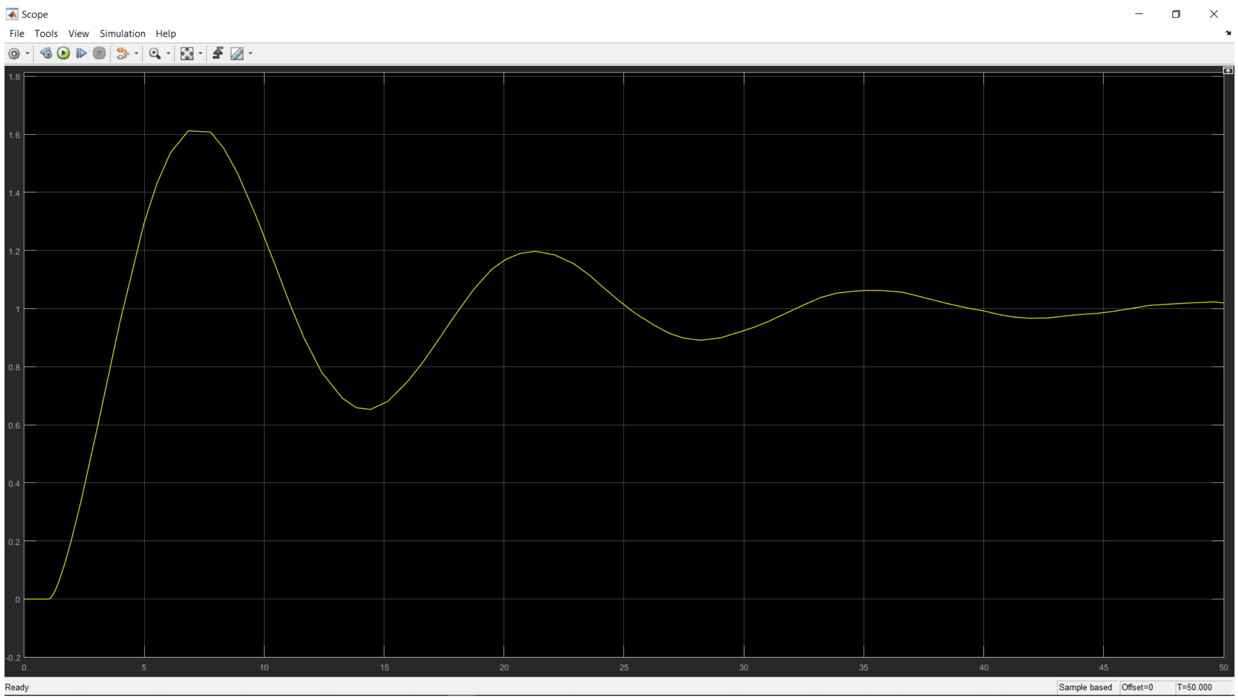
2.3 Results of SIMULINK PLOT

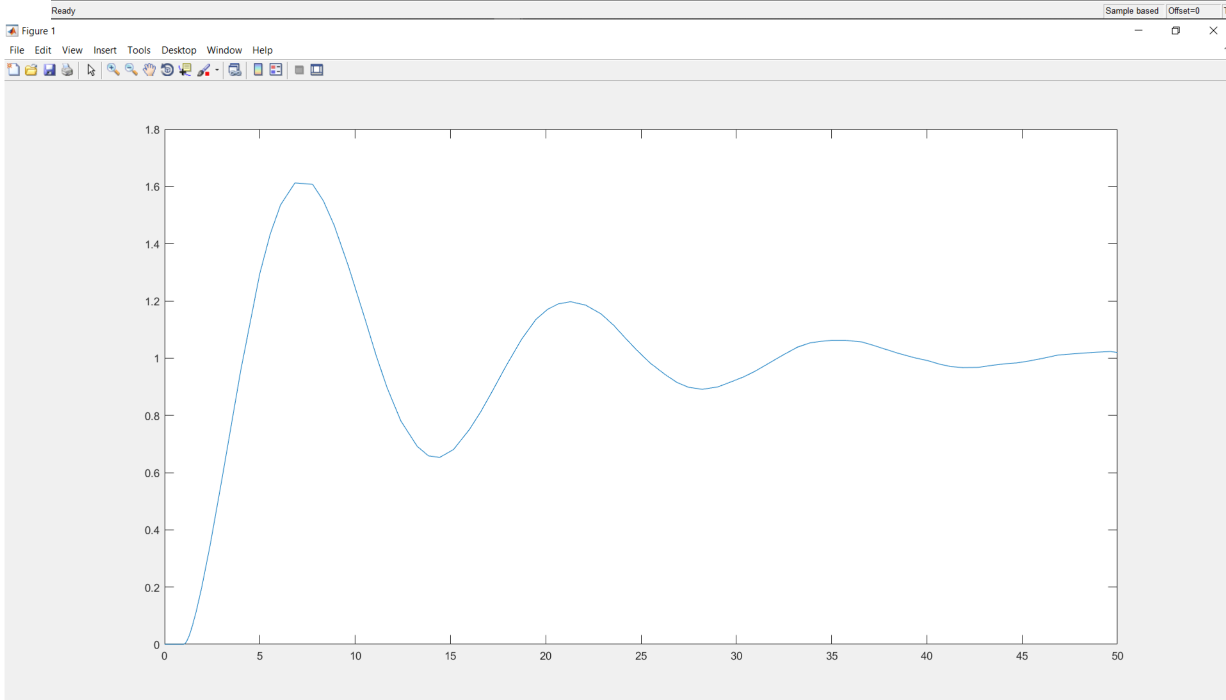
The results contains of Input and output, where input is a unit step function and output is the plot of this certain transfer function for this system

Input of the unit step function

$$u(t), \forall t >= 0$$

Output of this in MATLAB AND SCOPE for this complex SYSTEM





3 LAB4

3.1 More basic usages with SIMULINK, the graph of PID controller system

Objective:To perform more basic functions on Simulink and some introduction on PID controller, and its influence on the system with P, PI and PID controller block diagram involved

HW for LAB4

Lab 4 Homework

Use Simulink to simulate the response of the system in Figure 1 to a unit step input. What is the steady-state error of following conditions?

Q1. no controller

Q2. add P controller (Kp=100)

Q3. add PI controller(Ki=10, Kp=18)

$$E(s) = R(s) - Y(s)$$
$$= [1 - G_{CL}(s)]R(s)$$

$$e_{ss} = \lim_{s \to 0} sE(s)$$

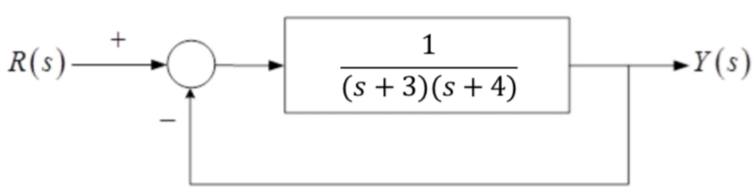
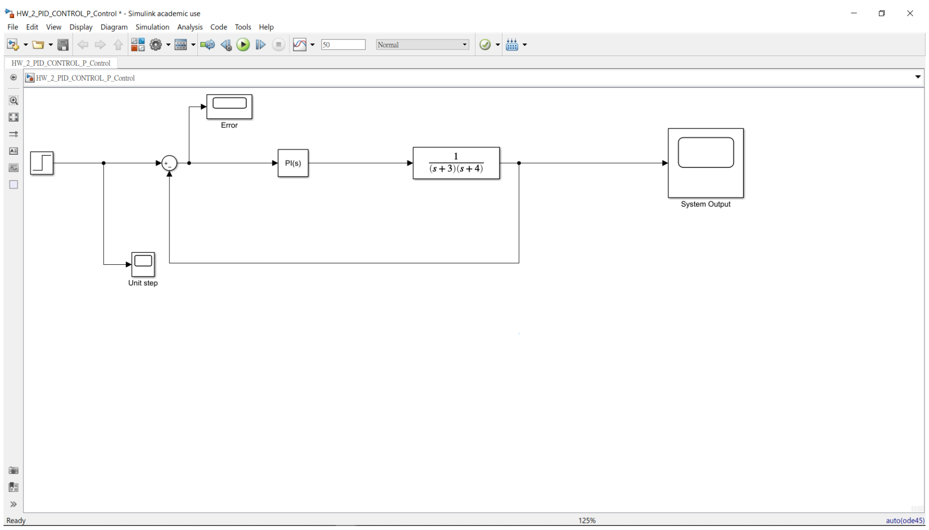


Figure 1

3.2 SIMULINK BLOCK DIAGRAM for Lab4

Problem 1,System with no PID control and its error function plot

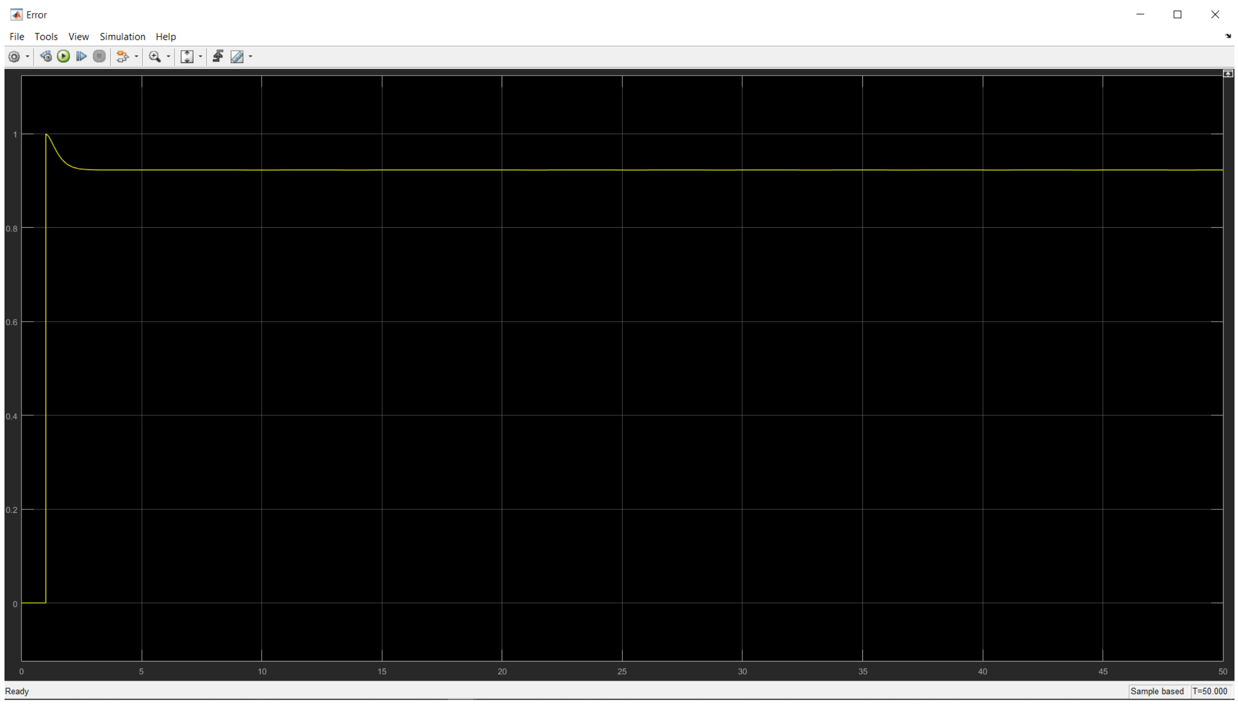
The block diagram in SIMULINK for problem 1



Input of the unit step function

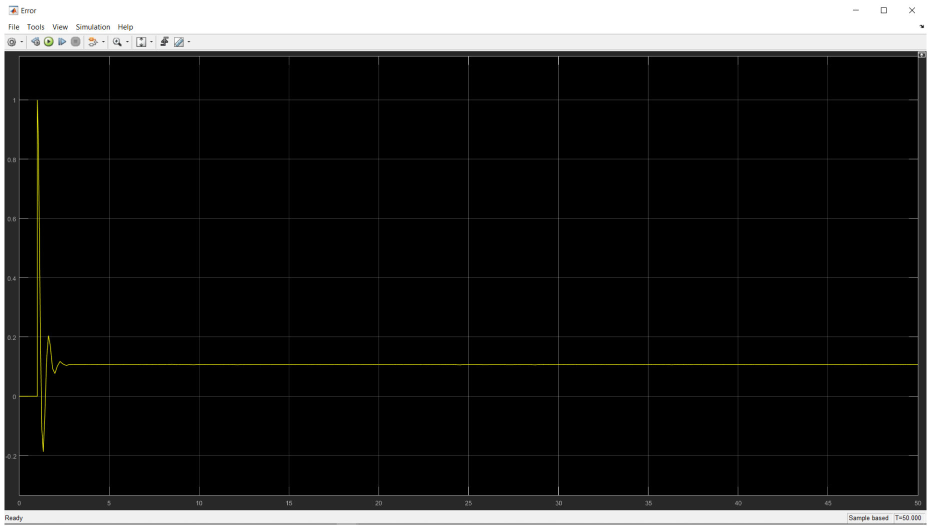
$$u(t), \forall t >= 0$$

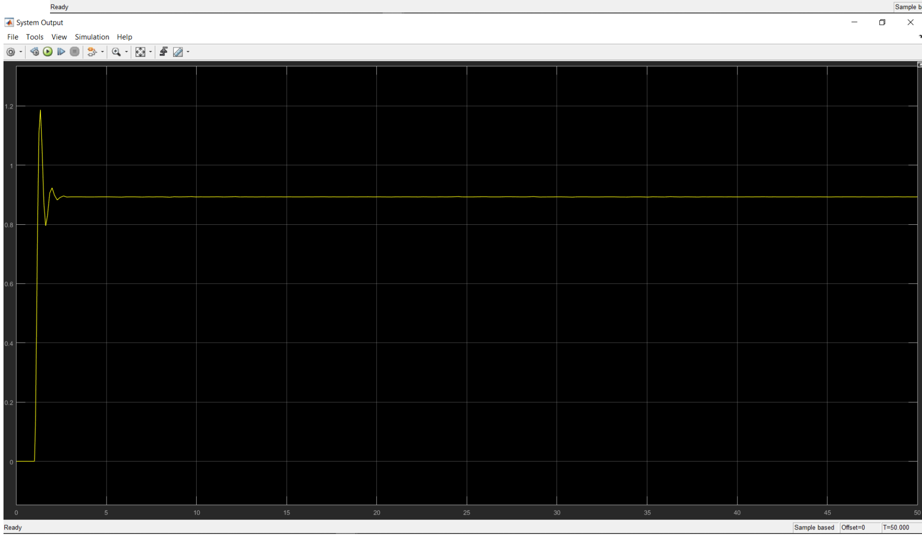
The computed results and Error function are shown below for problem 1



Problem 2, system with P controller

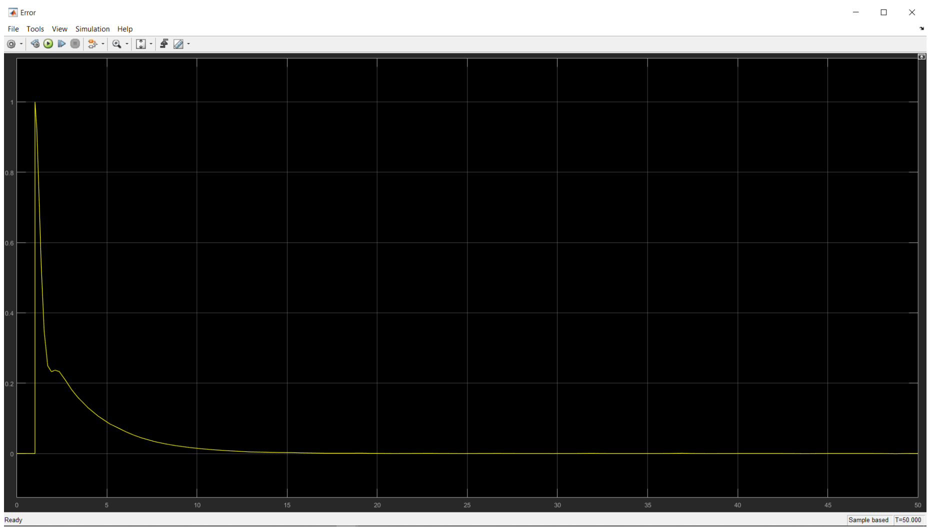
The computed results and Error function are shown below for problem 2

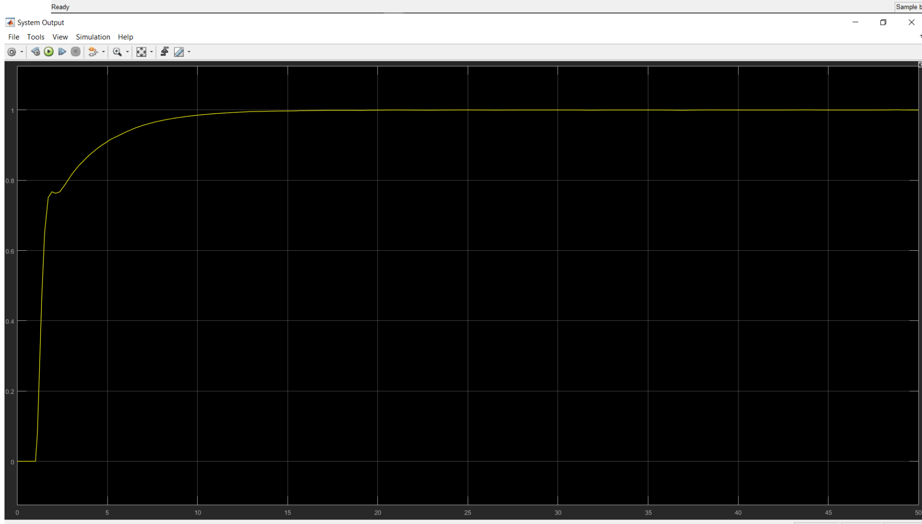




Problem 3, system with PI controller

The computed results and Error function are shown below for problem 3





4 Conclusion

This is the second Lab for auto control , today TAs teach us how to ultilize the powerful usages of MATLAB in SIMULINK block interface. Which makes visualise control flow system an easy task. As always, these usages in plotting graph and observing system output and building systems shall be trained as an intuition for further course in MATLAB programming, otherwise without the knowledge with these operations, you might have problems in dealing with even more complex system

This concludes the second Week of Auto Control LAB