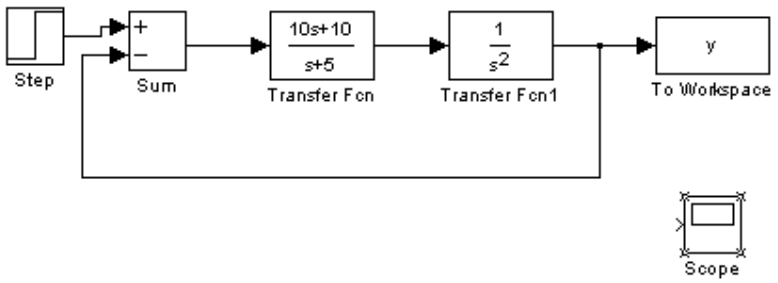
Name _____ ID.No. _____ Date _____

4 Simulink

>> **t**

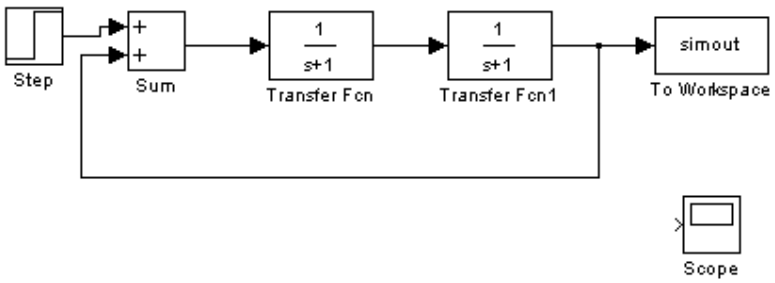
>> y

>> simulink



(a) create model

(press **Ctrl** if need more output line from an output port)



(b) set step

step time: **0**

Initial value: **0**

Final value: **1**

(c) set sum

List of signs: **+-**

(d) set Transfer Fcn (Lead Compensator)

Numerator: **[10 10]**

Denominator: **[1 5]**

(e) set Transfer Fcn1 (Plant)

Numerator: **[1]**

Denominator: **[1 0 0]**

(f) set To Workspace

Variable name: **y**

Maximum number of rows: **100**

(g) Simulation: Parameters

Solver

Start time: **0.0**

Stop time: **9.9**

Type: **Variable-step**

Workspace I/O

/ Time: **t**

/ Output: **y**

(h) Simulation: Start

display scope

(i) File: Save As **Filename**

>> **t**

>> **y**

>> **plot(t,y)**

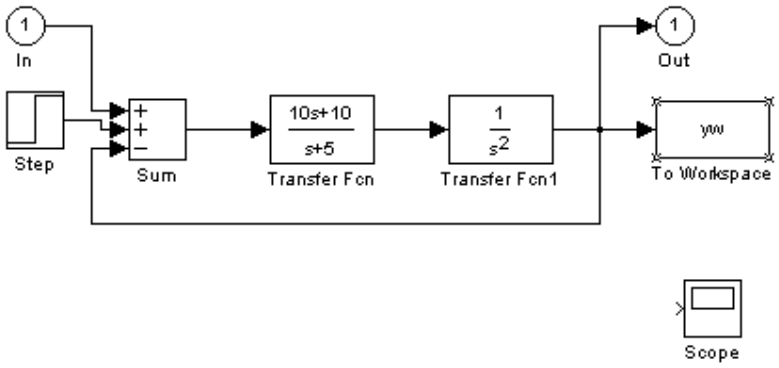
>> **[a,b,c,d] = linmod('Filename')**

>> **[num, den] = ss2tf(a, b, c, d)**

>> **[t1,x1,y1] = sim('Filename', 10)**

>> **plot(t1, x1)**

modify the model



(**Note!** Variable in To Workspace block and Simulation: Parameters: Workspace I/O: Output must be different.)

>> **[a1, b1, c1, d1] = linmod('Filename')**

>> **[num1, den1] = ss2tf(a1, b1, c1, d1)**

>> [num2, den2] = feedback([10 10], [1 5 0 0], [1], [1])

>> **[t2, x2, y2] = sim('Filename', 5)**

>> **plot(t2, x2)** or **plot(t2, x2, t2, y2)**

Name _____ ID.No. _____ Date _____

Exercise

To consider the effect of each action of PID controller, consider a system represented by the transfer function shown below.

$$G(s) = \frac{1}{4s^2 + 5s + 6}$$

By Matlab's Simulink,

(a) Make the model of the compensated system when all the gains are assumed 0s and the input is a unit step function. The scope should be connected with the output.

(b) Vary the proportional gain from 0 to 1 to10 and to 100, see the unit step response of each gain from the scope, then discuss the effect of proportional action.

(c) Keep the proportional gain of 100, vary the derivative gain from 1 to10 and to 100, see the response, then discuss the effect of derivative action.

(d) Keep the proportional gain of 100 and derivative gain of 100, vary the integral gain from 1 to 10 and to 100, see the response, then discuss the effect of integral action.

(e) Keep the proportional gain of 100, derivative gain of 100, and integral gain of 100, change the input to sinusoidal wave of unity amplitude, vary the frequency from 1 to 10 to 100 Hz, see the response, then discuss the response.