Or , by multiplying the part (KdS) by (zero-pole)block.
Now , to find the rootlocus plot of the PID plant .

Program:

```
Clear
Num=20*[1  0.11];
Den=conv([1  10] , conv(1  0.1) , conv([1  0] , [1  2])));
Rlocus(num , den)
Sgrid([0.707] , [1])
Axis([-1  0  -1  1])
[Kp , poles]=rlocfind(num , den)
Ki=0.11  * Kp
```

Experiment no.10:

Design of lead and lag compensation by using bode daigram

object:

how to customize frequency – domain plot S to display the important information .

command:
bode(num,den)

Cases:

$$1-G(s)=\frac{1000}{s(1+0.1s)(1+0.001s)}$$

$$G_c(s)=\frac{(1+0.016s)}{(1+0.00214s)}$$

$$2-G(s)=\frac{20}{s\ (1+0.5s)(1+0.05s)}$$

$$G_c(s)=\frac{(1+5s)}{(1+50s)}$$

$$3-G(s)=\frac{20}{s(0.2s+1)}$$

$$G_c(s)=\frac{(1+0.0118s)}{(1+0.058s)}$$

$$4-G(s)=\frac{30}{s(1+0.1s)(0.2s+1)}$$

$$G_c(s)=\frac{(1+3.57s)}{(1+35.7s)}$$

Discussions:

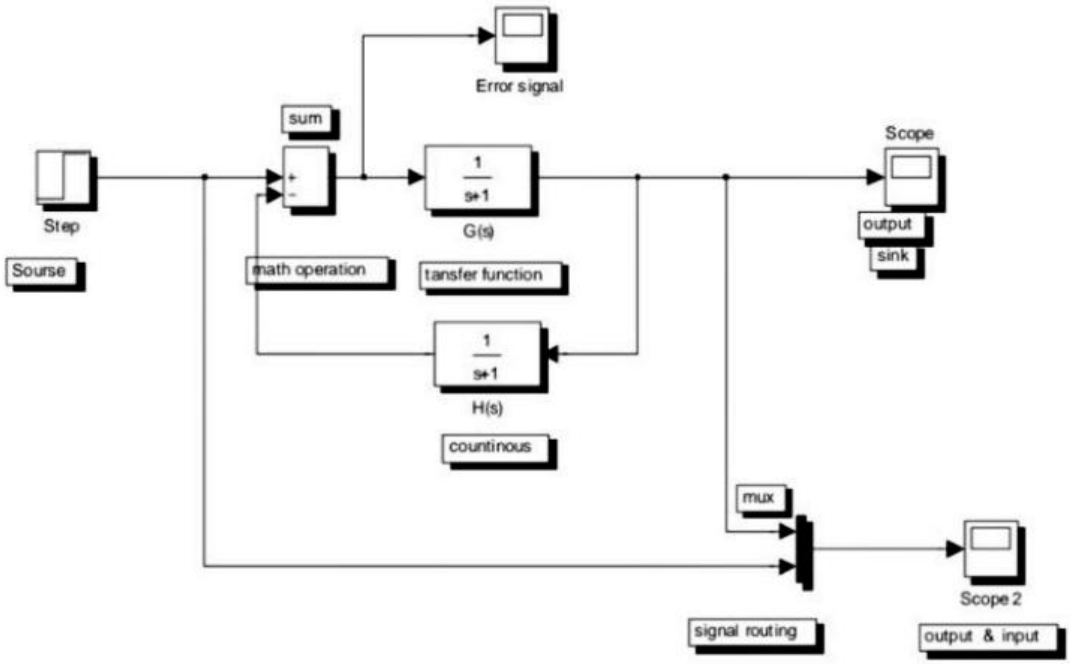
1-Discuses the Stability of each cases-?
2-Draw the bode diagram of all cases by using Matlab program and rules (Theoretical).
3-Compare between the theoretical solution and the results of program.
4-What the effect of lead and lag compensators?

EXPERIMENT NO.11: Transient Response and Steady State Error Analysis

Object:

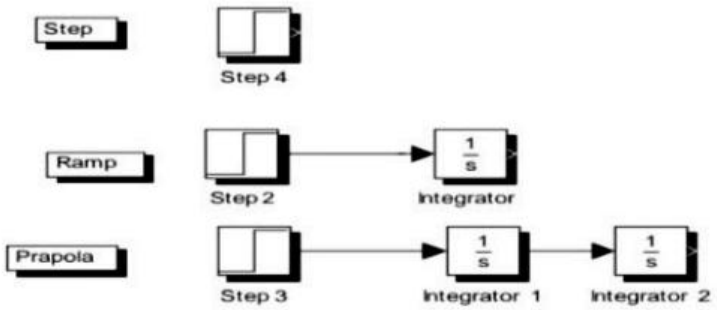
To learn how to used Matlab & Simulink to control system in order to find the steady state error & transient response .

Model connected:



For all cases the inputs are :

1- Step 2- Ramp 3- Parabola



Cases:

$$1-G(s)=\frac{5}{s+2};\quad H(s)=1$$

$$2-G(s)=\frac{10}{s^2+2s+10};\quad H(s)=1$$

$$3-G(s)=\frac{s+2}{s^2+12s+20};\quad H(s)=\frac{2}{s+2}$$

$$4-G(s)=\frac{s(s+5)}{0.1s^2+2s+13};\quad H(s)=\frac{1}{s}$$

$$5-G(s)=\frac{(0.1s+5)}{s(s^2+3s+6};\quad H(s)=\frac{1}{s(s+3)}$$

$$6-G(s)=\frac{20s}{s^2+13s};\quad H(s)=\frac{1}{s(s+3)}$$

$$7-G(s)=\frac{100}{s^2+13s+16};\quad H(s)=\frac{0.1}{(s+0.75)}$$