```
%Effect of loop gain of a negative feeedback system on stability
z=[];
p=[-0.5+1i,-0.5-1i -1];
k1=1;
k2=2;
k3=3;
sys1=zpk(z,p,k1);
sys2=zpk(z,p,k2);
sys3=zpk(z,p,k3);
t=0:0.01:20;
[y1,t]=step(sys1,t);
[y2,t]=step(sys2,t);
[y3,t]=step(sys3,t);
plot(t,y1,t,y2,t,y3)
legend('k=1','k=2','k=3')
grid
```

```
%%Step response of a second order system
wn= input('enter the natural frequency');
E=input('enter damping ratio');
num=[wn*wn 0];
den=[1 2*E*wn wn*wn];
sys=tf(num,den);
figure(1)
step(sys);

% 1b) Evaluation of the effect the of additional poles and zeros on time
% response of second order system.
%Program for second order system
Z=[];
P=[-10+30i,-10-30i];
k=1000;
sys=zpk(Z,P,k);
t= 0:0.001:1;
figure(2)
step(sys,t);
grid

% To study the effect of additional poles
%Location of additional pole is -1.
Z=[];
P=[-10+30i,-10-30i,-1];
k=1000;
sys=zpk(Z,P,k);
t= 0:0.001:1;
figure(3)
step(sys,t);
grid

%Location of additional pole is -10.
Z=[];
P=[-10+30i,-10-30i,-10];
k=1000;
sys=zpk(Z,P,k);
t= 0:0.001:1;
figure(4)
step(sys,t);
grid
```