```
%Ex 65

s=tf('s');
Sys=(100*pi^2)/(s^2+10*pi*s+100*pi^2);

%[ys, ts]=step(Sys)
%plot(ts,ys);
%figure
step(Sys)
%figure
%bode(Sys)
damp(Sys)


%Ex tab_1

T1=2;
T2=5;
K1=3/2;
K2=2;
s = tf('s')
G1=K1/(1+s*T1);
G2=K2/(1+s*T2);
G3=K2/((1+s*T1)*(1+s*T2));

%[num3, den3] = tfdata(G3)
[num3, den3] = tfdata(G3, 'v');
%G1=tf(K1, [T1 1]);
roots(G3.den{1});
pole(G3);
zero(G3);
%figure;
pzmap(G1,G2,G3);
grid;
pzmap((G2*G3)/(1+G2*G3));
pole((G2*G3)/(1+G2*G3));
zero((G2*G3)/(1+G2*G3));
grid;

%figure
G4=((G2*G3)/(1+G2*G3));
pzmap(minreal(G4))

%Application sur G1 d'un echelon
```

```
%methode simple pour un echelon ; step(G, t) précise l'échelle de temps
[ys, ts]=step(G1)
%t=[0:0.01:20];
t=ts; %Pour avoir la même echelle de temps
y=K1*(1-exp(-t/T1)); %Diapo 2-42
plot(ts, y, ts, ys);

Gs=G1/s
[coef, pol, PE] = residue(Gs.num{1}, Gs.den{1})

%=Y(s)=G1*U(s) ; U(s) = echelon en laplace
yresidue=coef(1)*exp(pol(1)*t)+coef(2)*exp(pol(2)*t)

%Ex_tab2

K1=2;
T1=3;
K2=1/2;
T2=1;

%Sys 1 : ---[G1]---[G2]---

%Sys 2 :
%
%    |---[G1]----|
%----|           |---
%    |---[G2]----|
%

%Pour le Sys1, on peut utiliser : G1*G2 ou "series(G1,G2)"
%Pour le Sys2, on peut utiliser : G1+G2 ou "parallel(G1,G2)"
s=tf('s')
G1=K1/(1+s*T1);
G2=K2/(1+s*T2);

S1=series(G1,G2);
S2=parallel(G1,G2);

opt = stepDataOptions('StepAmplitude',0.5);
[ys, ts]=step(S1, opt);
[ys2, ts2]=step(S2,opt);

plot(ts,ys, ts2, ys2)

%Sys3
K3=3;
```

```
p1=-3; %s+3
p2=-1; %s+1
G3=3/((s+3)(s+1);

S3=zpk([],[p1,p2],k3);


%Ex_tab_3

%u(t) = sin(2*pi*f*t)
%f=0.1 ; %Hz
%y(t)= ?
%u(t) --- [G] --- y(t)
%xi=0.3;
%w0=1/sqrt(2);

clear all;

s=tf('s');
%K = 100 * pi*pi;
%w = 100 * pi*pi;
%psi = 10*pi/(2*sqrt(w));
%G = K/(s*s +2*psi*sqrt(w)*s + w);
%G

%D1 = 100*exp(- pi*psi/(sqrt(1-psi*psi)))

%subplot(2,1,1)
%bode(G)
%grid minor

%damp(G)

xi = 0.3;
w0 = 1/sqrt(2);
K=1;
G = K/(s*s +2*xi*w0*s + w0*w0);

f = 0.1;
t = 0:0.1:100;
u=sin(2*pi*f*t);
w = 2*pi*f;

% On a G(s), il faut transformer u(t) en U(s)
Us = w /(s*s +w*w); %Laplace de u(t)
y4 = Us*G;
```

```
[yt,t4] = impulse(y4)

subplot(2,1,2)
plot(t4,yt)


%Bonus

s=tf('s');
num=1;
den=[1 5 6];
G=tf(num, den);
den1=conv([1,2], [1,3]); %den 1 = den
G1=tf(num,den1);
G2=1/((s+2)*(s+3));
step(G);
%[y,t] = step(G);
[numG, denG]=tfdata(G);
G.den{1};
roots(G.den{1});
yy=(1/6)+(1/2)*exp(-2*t)+(-2/3)*exp(-3*t);
plot(t, [y yy]);
```