

```
close all;

%Dhmiourgia tyxaias diergasias
N=10000;
b=[1]; a=[1.0000 -1.1214 0.6500];
nn=0:N-1;
x=randn(1,N)*5+0;
u=filter(b,a,x);
plot(nn,u);

%Ektimhsh Power Spectral Density (PSD) apo ena deigma
Gu=1/N*abs(fft(u)).^2;
om=((0:N/200-1)/N) * (2*pi);
Gu=Gu(1:N/200);
figure;
plot(om,Gu);
grid;

%Ektimhsh Power Spectral Density (PSD) me spectrum.periodogram
Hs=spectrum.periodogram;
figure;
psd(Hs,x,'Fs',N,'SpectrumType','onesided','NFFT',512)

%Ayth einai h apokrish toy LTI  $H(z)=1-1.1214z^{-1}+0.6500z^{-2}$ 
a=[1];b=[1.0000 -1.1214 0.6500];
[h,om]=freqz(b,a,50,2*pi);
h2=abs(h).^2;

%Perasma tou shmatos u mesa apo to LTI systhma
y=filter(b,a,u);

%Ypologismos tou PSD tou shmatos y apo ena deigma
Gy=1/N*abs(fft(y)).^2;
om=((0:N/200-1)/N) * (2*pi);
Gy=Gy(1:N/200);

%Ypologismos tou  $|H_g|^2*G_u$ 
Gug=Gu.*h2';

%Ektyposh kai sygrish tw'n shmatwn Gy kai  $|H_g|^2*G_u$ 
figure;
plot(om,Gy,om,Gug);
legend('G_y','|H_g|^2G_u');
grid;
```