%Bode Plots and RC Circuit rc\_w1000cutoff

% bode1and2tlh.m Plot of 1st Order System

% Obtain the Bode plot of the system given by the transfer function

% H(s) =1/(2s + 1)

% Convert the transfer function by substituting s = iw

% H( jw) = 1/(2jw + 1) if doing this by hand.

% Note H(0)= 1 (0dB). H(1/2)= -3dB. H(10\*(1/2)=-20 dB

% wc= 1/2 is the break point or cutoff radian frequency.

num = 1; % 1/(2s+1) as Laplace Transfer Function

den = [2 1];

sys = tf(num,den);

figure(1)

bode(sys),grid

title('Bode Plot for 1st order system, \omega\_c =0.5r/s')

%

% Obtain the bode plot of the system given by the transfer function

% hH(s) = 4 /(s^2 + s + 4) This is 4/(s^2+ 2\*zeta\*wn + wn^2)

num = 4;

den = [1 1 4]; % wn =2 2\*zeta\*wn=1 so that zeta=1/4

sys = tf(num,den);

figure(2)

bode(sys), grid

title('Bode Plot for 2st order system, \omega\_n =2 r/s \zeta =.25')

% Note H2(0)= 1 (0dB). H2(10\*(2)~=-40 dB





% rc\_w1000cutoff See Example 8.8 Harman Eq. 8.48

clear,clc,clf

RC = 0.001; % w\_c=1/RC = 1000 radians/sec

w = 0:50:5000; % Plot range in omega

H = (1/RC)./(j\*w+1/RC);

magH = abs(H); angH = 180\*angle(H)/pi;

figure(1),subplot(211),plot(w,magH)

title('Series RC, \omega\_c = 1000 r/s')

xlabel('Frequency (rad/sec)')

ylabel('|H|'),grid

% the following adds lines that identify the points

% where |H|=.707

hold on

plot([800 1000],[.707 .707],'r:') %,...

hold off

text(200,.707,'0.707'),subplot(212),plot(w,angH);

axis([0 5000 -90 0])

xlabel('Frequency (rad/sec)'),ylabel('Angle(H), degrees'),grid

% Bode Plot H= (1/RC)/(s+1/RC) 1/RC=1000

figure(2)

num=1000

den=[1 1000]

sysrc=tf(num,den)

bode(sysrc),grid

title('Bode diagram for RC circuit \omega\_c = 1000 r/s')

hold

gtext('Use Tools/Data Cursor for Values')

hold off



