% smootherEx10\_7filt.m A smoothing filter defined as

% y(n) = a\*y(n-1) +(1-a)\*x(n) , y(-1)=0

% x(n) is input signal, y(n) is smoothed output

%

% Test signal is sin(w\*t) with random noise

% INPUT: Weighing factor a

% OUTPUT: Plot of x and y

%

clear, clf

w=2\*pi/5;

t = linspace(0,10,100); % Time steps

s = sin(w\*t); % Noiseless signal

% Add random noise

len=size(t);

na = 0.1; % Noise amplitude

noise = na\*(rand(len)-.5); % (-.05 to +.05)

x = s + noise;

%

% Weighing factor

a = input('Weighing factor a= ')

%

y(1)=(1-a)\*x(1);

for I=2:100

y(I) = a\*y(I-1) + (1-a)\*x(I); % Digital Filter

end

figure(1),plot(t,x,t,y),grid

xlabel('Time'), ylabel('Signals')

title(['Effect of Smoothing Filter Ex 10.7, a = ', num2str(a)])

legend('Input x','Output y')

% Filter

avec=[1 -a]

bvec=[1-a]

yfilt=filter(bvec,avec,x)

figure(2),plot(t,x,t,yfilt),grid,xlabel('Time'),axis([0 10 -1.5 1.5])

title(['Effect of MATLAB Filter Ex 10.7, a = ', num2str(a)])

legend('Input x','Output y')

 