%1. Determine whether the system is linear or not. plot the required signals

% to verify the result. Consider two signals x1[n] = n and x2[n] = sin(n).

% a. y[n] = x^2 [n]

clc;

close all;

clear all;

a1=3;

a2=-7;

n= -3:0.1:3;

x1=n;

x2= sin(n);

y1= x1.^2;

y2= x2.^2;

y3= a1\*y1+a2\*y2;

x3= a1\*x1+a2\*x2;

y4= x3.^2;

subplot(2,1,1);

stem(n,y3);

xlabel('n');

ylabel('y3[n]');

title('Verify Linearity/Nikita Silwal/049');

grid on;

subplot(2,1,2);

stem(n,y4);

xlabel('n');

ylabel('y4[n]');

title('Verify linearity/Nikita Silwal/049');

grid on;



%2. Determine whether the system is linear or not. plot the required signals

% to verify the result. Consider two signals x1[n] = n and x2[n] = sin(n).

% b. y[n] = x[n^2]

clc;

clear all;

close all;

a1=3;

a2=-7;

n=-3:0.1:3;

x1 = n;

x2 = sin(n);

y1 = n.^2;

y2 = sin(n.^2);

y3 = a1 \* y1 + a2 \* y2;

x3 = a1 \* x1 + a2 \* x2;

y4 = a1.\*n.^2+a2.\*sin(n.^2);

subplot(2,1,1);

stem(n,y3);

xlabel("n");

ylabel("y3[n]");

title("Verify Linearity/Nikita Silwal/049");

grid on;

subplot(2,1,2);

stem(n,y4);

xlabel("n");

ylabel("y4[n]");

title("Verify Linearity/Nikita Silwal/049");

grid on;



%Determine wether the system is linear or not. Plot the required signals to

%verify result. Consider two signals x1[n] =n & x2[n]=Sin(n).

%b-> y[n]=nx[n]=> Linear

clc;

clear all;

close all;

a1=3;

a2=-7;

n=-3:0.1:3;

x1 = n;

x2 = sin(n);

y1 = n.\*x1;

y2 = n.\*sin(n);

y3 = a1 \* y1 + a2 \* y2;

x3 = a1 \* x1 + a2 \* x2;

y4 = n.\*x3;

subplot(2,1,1);

stem(n,y3);

xlabel("n");

ylabel("y3[n]");

title("Verify Linearity/Nikita Silwal/049");

grid on;

subplot(2,1,2);

stem(n,y4);

xlabel("n");

ylabel("y4[n]");

title("Verify Linearity/Nikita Silwal/049");

grid on;



% 2. Two discrete signals are giveen as h[n]={1,2,1,-1} and x[n]={1,2,3,1}.

% Plot these signals using convolution function.

clc;

close all;

clear all;

h = [1 2 1 -1];

nh = [-1 0 1 2];

x = [1 2 3 1];

nx = [0 1 2 3];

y=conv(x,h);

n = min(nh) + min(nx) : max(nh) + max(nx);

stem(n,y);

xlabel('n');

ylabel('y[n]');

title('With Convolution/Nikita Silwal/049');

grid on;



% 3. Find zeros, poles and gain of given transfer function using

%tf2zpk() function for G(s) = (7s+5)/(s^2+4s+3)

clc;

close all;

clear all;

num= [7 5];

den= [1 4 3];

[z p k]= tf2zp(num,den);

sys= tf(num,den);

pzmap(sys);

grid on;

sgrid;



%4.plot autocorrelation sequence of sine wave with frequency 1hz,

% sampling frequency is 200hz.

clc;

close all;

clear all;

A=1;

f=1;

fs=200;

w=2\*pi\*(f/fs);

t= 0:0.001:1024;

x= A\*sin(w\*t);

subplot(2,1,1);

plot(t,x);

xlabel('t');

ylabel('x(t)');

title('Sine/Nikita Silwal/049');

grid on;

y=xcorr(x);

subplot(2,1,2);

plot(y);

xlabel('t');

ylabel('y(t)');

title('Autocorrelation/Nikita Silwal/049');

grid on;

