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% Experiment No-7(a)
%            Verification of Linearity of a Discrete System
%   % Verification of Linearity of a given System
%       % a) y(n)=nx(n) b) y=x^2(n)

clc;
clear all;
close all;
n=0:40;
a1=input('enter the scaling factor a1=');
a2=input('enter the scaling factor a2=');
x1=cos(2*pi*0.1*n);
%x1=[2 3 -5 6];
x2=cos(2*pi*0.4*n);
%x2=[2 3 4 5];
x3=a1*x1+a2*x2;
%y(n)=n.x(n);
y1=n.*x1;
y2=n.*x2;
y3=n.*x3;
yt=a1*y1+a2*y2;
yt=round(yt);
y3=round(y3);
if y3==yt
 disp('given system [y(n)=n.x(n)]is Linear');
else
 disp('given system [y(n)=n.x(n)]is non Linear');
end
%y(n)=x(n).^2
y1=x1.^2;
y2=x2.^2;
y3=x3.^2;
yt=a1*y1+a2*y2;
yt=round(yt);
y3=round(y3);
if y3==yt
 disp('given system [y(n)=x(n).^2 ]is Linear');
else
 disp('given system is [y(n)=x(n).^2 ]non Linear');
end
```

output:

enter the scaling factor a1=2

enter the scaling factor a2=3

given system [y(n)=n.x(n)]is Linear

given system is [y(n)=x(n).^2]non Linear