**Assignment 1**

Name: Swapnil Sevak

Student ID: C0777195

Let x(n) ={2,4,-3,1,-5,4,7}. Generate and plot the samples (use the stem function) of

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the following sequences.

1. x1(n) = 2x(n -3) + 3x(n +4)-x(n)

Code:

clc;

clear;

na = [ -3 : 3 ];

xa = [ 2 , 4 , -3 , 1 , -5 , 4 , 7 ];

[x1,n1] = sigshift(xa,na, 3 );

[x2,n2] = sigshift(xa,na, -4 );

[x3,n3] = sigadd( 2 \*x1,n1, 3 \*x2,n2);

[x,n] = sigadd(x3,n3,-xa,na);

stem(n,x);

title( 'Delta sequence' );

xlabel( 'n' );

ylabel( 'x(n)' );

function [y,n] = sigshift(x,m,n0)

n = m+n0; y = x;

end

function [y,n] = sigadd(x1,n1,x2,n2)

n = min(min(n1),min(n2)):max(max(n1),max(n2));

y1 = zeros(1,length(n)); y2 = y1;

y1(find((n>=min(n1))&(n<=max(n1))==1))=x1;

y2(find((n>=min(n2))&(n<=max(n2))==1))=x2;

y = y1+y2;

end

Output:

Chart, box and whisker chart

Description automatically generated

1. x2(n) = 4x(4 + n) + 5x(n +5)+2x(n)

Code:

clc;

clear;

na = [ -3 : 3 ];

xa = [ 2 , 4 , -3 , 1 , -5 , 4 , 7 ];

[x1,n1] = sigshift(xa,na, -4 );

[x2,n2] = sigshift(xa,na, -5 );

[x3,n3] = sigadd( 4 \*x1,n1, 5 \*x2,n2);

[x,n] = sigadd(x3,n3,2\*xa,na);

stem(n,x);

title( 'Delta sequence' );

xlabel( 'n' );

ylabel( 'x(n)' );

function [y,n] = sigshift(x,m,n0)

n = m+n0; y = x;

end

function [y,n] = sigadd(x1,n1,x2,n2)

n = min(min(n1),min(n2)):max(max(n1),max(n2));

y1 = zeros(1,length(n)); y2 = y1;

y1(find((n>=min(n1))&(n<=max(n1))==1))=x1;

y2(find((n>=min(n2))&(n<=max(n2))==1))=x2;

y = y1+y2;

end

Output:

A picture containing timeline

Description automatically generated

1. x3(n) = x(n+3)x(n -2)+ x(1 -n)x(n+ 1)

Code:

clc;

clear;

na = [ -3 : 3 ];

xa = [ 2 , 4 , -3 , 1 , -5 , 4 , 7 ];

[x1,n1] = sigshift(xa,na, -3 );

[x2,n2] = sigshift(xa,na, 2 );

[x3,n3] = sigmult(x1,n1,x2,n2);

[x4,n4] = sigshift(xa,na, 1);

[x5,n5] = sigshift(xa,na, -1);

[x6,n6] = sigmult(x4,n4,x5,n5);

[x,n] = sigadd(x3,n3,-x6,n6);

stem(n,x);

title( 'Delta sequence' );

xlabel( 'n' );

ylabel( 'x(n)' );

function [y,n] = sigshift(x,m,n0)

n = m+n0; y = x;

end

function [y,n] = sigadd(x1,n1,x2,n2)

n = min(min(n1),min(n2)):max(max(n1),max(n2));

y1 = zeros(1,length(n)); y2 = y1;

y1(find((n>=min(n1))&(n<=max(n1))==1))=x1;

y2(find((n>=min(n2))&(n<=max(n2))==1))=x2;

y = y1+y2;

end

function [y,n] = sigmult(x1,n1,x2,n2)

n = min(min(n1),min(n2)):max(max(n1),max(n2));

y1 = zeros(1,length(n)); y2 = y1;

y1(find((n>=min(n1))&(n<=max(n1))==1))=x1;

y2(find((n>=min(n2))&(n<=max(n2))==1))=x2;

y = y1 .\* y2;

end

Output:

Chart

Description automatically generated

1. x4(n) =2e0.5nx(n)+ cos(0.1n)x(n+2), -10<n<10

Code:

n1 = [ -3 : 3 ];

x1 = [ 2 , 4 , -3 , 1 , -5 , 4 , 7 ];

n = [ -10 : 10 ];

xa = 2 \* exp ( 0.5 \*n);

xb = cos ( 0.1 \* pi \*n);

[x2,n2] = sigmult(xa,n,x1,n1);

[x3,n3] = sigshift(x1,n1, -2 );

[x4,n4] = sigmult(xb,n2,x3,n3);

[x,n] = sigadd(x2,n2,x4,n4);

stem(n,x);

title( 'Delta sequence' );

xlabel( 'n' );

ylabel( 'x(n)' );

function [y,n] = sigshift(x,m,n0)

n = m+n0; y = x;

end

function [y,n] = sigadd(x1,n1,x2,n2)

n = min(min(n1),min(n2)):max(max(n1),max(n2));

y1 = zeros(1,length(n)); y2 = y1;

y1(find((n>=min(n1))&(n<=max(n1))==1))=x1;

y2(find((n>=min(n2))&(n<=max(n2))==1))=x2;

y = y1+y2;

end

function [y,n] = sigmult(x1,n1,x2,n2)

n = min(min(n1),min(n2)):max(max(n1),max(n2));

y1 = zeros(1,length(n)); y2 = y1;

y1(find((n>=min(n1))&(n<=max(n1))==1))=x1;

y2(find((n>=min(n2))&(n<=max(n2))==1))=x2;

y = y1 .\* y2;

end

Output:

Chart

Description automatically generated with medium confidence