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2.A)

Replace the variable k with n (time invarience)

2.B) Input these variables A=0.5 B=2 a=-1 n0=1 into equation of 2.A

x3[n]=

3.1) x[n]=2µ[n]

x[-n]=2µ[-n] x[n] not even

-x[-n]=-2µ[-n] x[n] not odd neither

2µ[n]+ 2µ[-n])= u[n]+u[-n]

x[n]= u[n]+u[-n]+

x[n]= 2µ[n]

3.2) x[n]=cos(0.1n)

x[-n]=cos(-0.1n)=x[n] even

4.1) x(t)=-4t

-x(-t)=-(-4(-t))=-4t so its odd

4.2) x(t)=-µ(t-1)+µ(-t-1)

-x(-t)=µ(-t-1)+(-µ(t-1))=x(t) odd

5.A) 5sin(15t-(π/3)) To1= 2sin(7t) To2= x(t)= 5sin(15t-(π/3))+ 2sin(7t)

Ratio of Integers: (To1/ To2)=7/15 so the signal is periodic

Fundamental period of x(t)= 2π/1=2π

6.1) x[t]=cos(πt) T=0.125 seconds x[n]=cos(0.125πn)

x[n+n0]=cos(0.125π(n+n0))=cos(0.125πn+0.125πn0)

0.125πn0=πk

if k=1 then n0=8

number of periods is 1; number of samples is 8

6.2) x[t]=cos(πt) T=0.13 seconds x[n]=cos(0.13πn)

x[n+n0]=cos(0.13π(n+n0))=cos(0.13πn+0.13πn0)

0.13πn0=πk

if k=13 then n0=100

number of periods is 13; number of samples is 100

7)

Proof:

δ(an)=(1/a)δ(n)

let t-(t0/a)= u; dt=du because t0/a is a constant

Solution:

**Matlab Code:**

#1:

t=[-2 -1 -1 0 0 1 2 2 3]

x=[ 0 0 -1 -1 0 0.5 1 0 0]

subplot(211),plot(t,x)

plot(t,x,'linewidth',1.5)

xlabel('t')

ylabel('x(t)')

title('Original');

axis([-3 3 -1 1]);

grid;

subplot(212)

h=((3\*t)-6);

plot(h,x,'linewidth',1.5)

xlabel('h')

ylabel('x(h)')

title('1.a');

axis([-3 3 -1 1])

grid;

subplot(213)

q=((-4\*x)+2);

plot(t,q,'linewidth',1.5)

xlabel('t')

ylabel('Q(t)')

title('1.b');

axis([-3 3 -1 1])

grid;

#2:

n=[-2 -1 0 1 2 3 4]

x3=[-4 -8 -8 -4 0 -4 -4]

stem(n,x3,'linewidth',1.5)

xlabel('n')

ylabel('x3')

title('2.b')

axis([-3 5 -9 1]);

grid;

#3:

t = -1:0.05:1;

y = 2\*ones( size(t) ) .\* (t >= 0) ;

subplot(311),stem(t,y,'linewidth',1.5);

xlabel('t');

ylabel('x(t)');

title('3.1 original');

axis([-1 1 -1 3]);

grid

yeven=(ones( size(t) ) .\* (t >= 0))+(ones( size(t) ) .\* (t <= 0));

subplot(312),stem(t,yeven,'linewidth',1.5)

xlabel('t');

ylabel('x(t)');

title('Even');

axis([-1 1 -1 3]);

grid

yodd=(ones( size(t) ) .\* (t >= 0))-(ones( size(t) ) .\* (t <= 0));

subplot(313),stem(t,yodd,'linewidth',1.5)

xlabel('t');

ylabel('x(t)');

title('Odd');

axis([-1 1 -1 3]);

grid;

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t = -100:0.01:100;

y=cos(.1\*t);

subplot(211),plot(t,y)

stem(t,y,'linewidth',1.5)

xlabel('t')

ylabel('x(t)')

title('Original')

axis([-100 100 -4 4])

grid

t = -100:0.01:100;

yeven=cos(.1\*t);

subplot(212),plot(t,yeven)

stem(t,yeven,'linewidth',1.5)

xlabel('t')

ylabel('x(t)')

title('Even')

axis([-100 100 -4 4])

grid

#4:

t=-5:1:5;

y=-4\*t;

subplot(211)

plot(t,y,'linewidth',1.5)

xlabel('t')

ylabel('x(t)')

title('4.1 Original')

axis([-4 4 -4 4])

grid

y=-4\*t;

subplot(212)

plot(t,y,'linewidth',1.5)

xlabel('t')

ylabel('x(t)')

title('Odd')

axis([-4 4 -4 4])

grid

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t=[-5:.01:5]

u=ones( size(t) ) .\* (t >= 0);

u1=-(ones( size(t) ) .\* (t >= 1));

u2=(ones( size(t) ) .\* (t <= -1));

subplot(211)

plot(t,u1+u2,'linewidth',2)

xlabel('t')

ylabel('x(t)')

title('4.2 Original')

axis([-3 3 -3 3])

grid

subplot(212)

plot(t,u1+u2,'linewidth',2)

xlabel('t')

ylabel('x(t)')

title('Odd')

axis([-3 3 -3 3])

grid

#5:

t=-100:0.5:100;

y=5\*sin(15\*t-pi/3)+2\*sin(7\*t);

plot(t,y)

xlabel('t')

ylabel('x(t)')

title('#5')

axis([-50 50 -8 8])

grid;

#6:

t= -100:0.125:100;

y= cos(pi\*t);

subplot(411),plot(t,y)

xlabel('t')

ylabel('x(t)')

title('#6.1')

axis([-8 8 -2 2])

grid;

subplot(412),stem(t,y,'linewidth',1.5)

xlabel('t')

ylabel('x[t]')

title('#6.2')

axis([-4 4 -2 2])

grid;

t=-100:0.13:100;

y=cos(pi\*t)

subplot(413),plot(t,y)

xlabel('t')

ylabel('x(t)')

title('#6.3')

axis([-8 8 -2 2])

grid;

subplot(414),stem(t,y,'linewidth',1.5)

xlabel('t')

ylabel('x(t)')

title('#6.4')

axis([-4 4 -2 2])

grid;

**Graphs:**













