

**Faculty of Engineering & Technology**

**Electrical & Computer Engineering Department**

**COMMUNICATION SYSTEMS ENEE3309**

**Prepared by:**

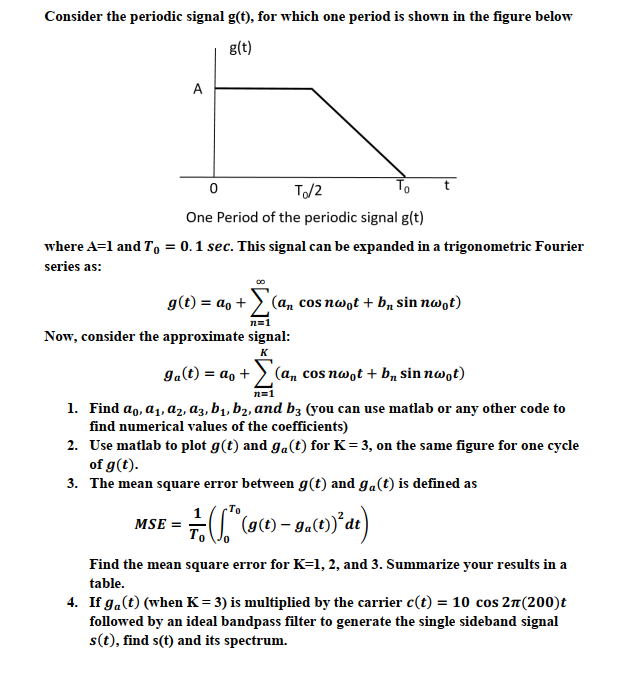
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**Section:** 3

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Solution for 1,2, and 3:

syms d x

T = 0.0001;

d= 0:T:0.1;

T0=0.1;

w0 = 2\*pi/T0;

n = 1:100;

t1=0:T:0.05;

t2=0.05:T:0.1;

t=[t1 t2];

a01 = int(1,x,0,T0/2);

a02 = int(-20\*x+2,x,T0/2,T0);

a0=1/T0\*(a01+a02)

an = (2/T0)\*(int(cos(n\*w0\*x),x,0,T0/2)+int((-20\*x+2)\*cos(n\*w0\*x),x,T0/2,T0))

bn = (2/T0)\*(int(sin(n\*w0\*x),x,0,T0/2)+int((-20\*x+2)\*sin(n\*w0\*x),x,T0/2,T0))

ga\_t=a0;

for c = 1:1:3

ga\_t = ga\_t + an(c)\*cos(c\*w0\*t) + bn(c)\*sin(c\*w0\*t);

end

g\_t=a0;

gt=a0;

for c = 1:1:100

g\_t = g\_t + an(c)\*cos(c\*w0\*t) + bn(c)\*sin(c\*w0\*t);

gt = gt + an(c)\*cos(c\*w0\*x) + bn(c)\*sin(c\*w0\*x);

end

g1=a0 + an(1)\*cos(w0\*x) + bn(1)\*sin(w0\*x);

g2=a0 + an(1)\*cos(w0\*x) + bn(1)\*sin(w0\*x)+ an(2)\*cos(2\*w0\*x) + bn(2)\*sin(2\*w0\*x);

g3=a0 + an(1)\*cos(w0\*x) + bn(1)\*sin(w0\*x)+ an(2)\*cos(2\*w0\*x) + bn(2)\*sin(2\*w0\*x)+ an(3)\*cos(3\*w0\*x) + bn(3)\*sin(3\*w0\*x);

MSE1 = (1/T0)\*vpa(int((gt-g1).^2,x,0,T0))

MSE2 = (1/T0)\*vpa(int((gt-g2).^2,x,0,T0))

MSE3 = (1/T0)\*vpa(int((gt-g3).^2,x,0,T0))

figure

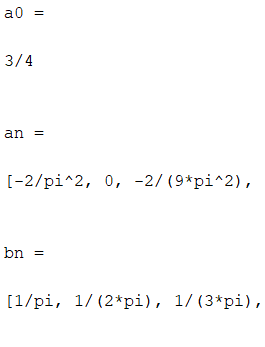
plot(t,g\_t)

hold on

plot(t,ga\_t)

hold off

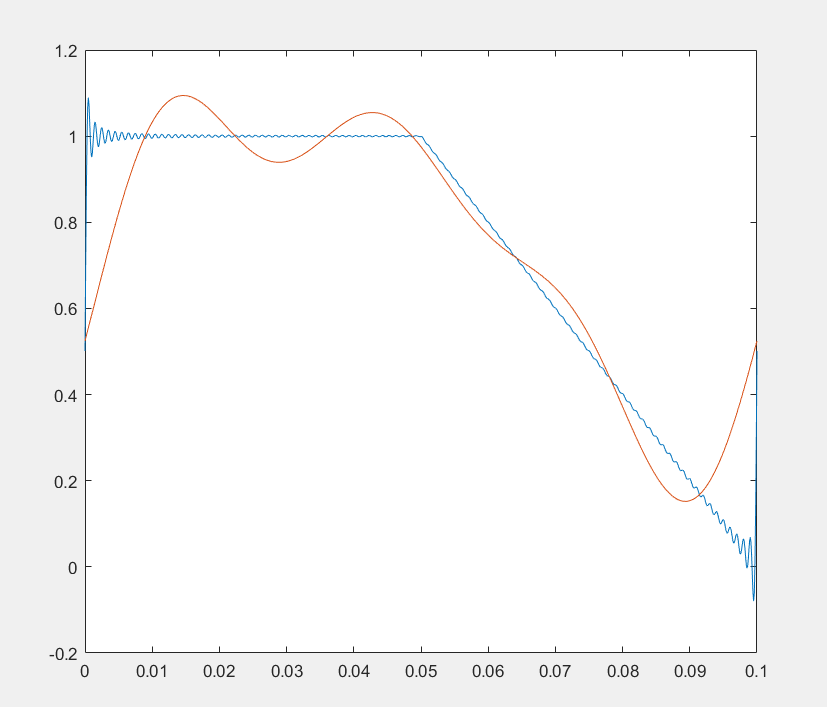
Q1:



I got an and bn as an array so the first 3 elements in the screen represents a1,a2 and a3 and same for bn.

We noticed that an=0 for ---> even n –{0}

Q2:

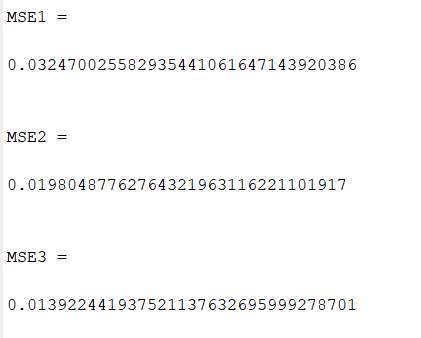


The red figure represents ga(t) for k=3.

And the blue figure represents g(t) for k=100 in the code because we can't do infinity in Matlab.

So we notice that the higher the value of k, the closer the graph is to g(t).

Q3:



These are the three values of the mean square error.

We notice that the higher the value of k, the less value of MSE become, because as I said above the higher the of k the closer the graph is to g(t).

Q4:

