%17-35236-2

%AB-CDEFG-H

AMP1 = 35;

AMP2 = 52;

AMP3 = 23;

FREQ1 = 173;

FREQ2 = 352;

FREQ3 = 236;

fs = 800;

f = 400;

t = 0:1/fs:1-1/fs;

x1 = AMP1\*sin(2\*pi\*FREQ1\*t);

x2 = AMP2\*sin(2\*pi\*FREQ2\*t+pi);

x3 = AMP3\*sin(2\*pi\*FREQ3\*t+pi/2);

subplot(3,1,1)

plot(t,x1,'LineWidth',1.5)

hold on

plot(t,x2,'LineWidth',2)

hold on

plot(t,x3,'LineWidth',2.5)

hold off

xlabel('time in seconds')

ylabel('Amplitude in volt')

title('Input signal')

fx1 = fft(x1);

fx2 = fft(x2);

fx3 = fft(x3);

f = fs/2\*linspace(-1,1,fs);

subplot(3,1,2)

plot(f,abs(fx1),f,abs(fx2),f,abs(fx3))

axis([-100 100 0 25])

xlabel('frequency')

ylabel('magnitude')

xcomp = x1+x2+x3;

bandwidth1 = obw(xcomp,fs);

partition = linspace(-4.5,4.5,7);

codebook = linspace(-5,5,8);

[index,quants] = quantiz(xcomp,partition,codebook);

figure

plot(t,xcomp,'x',t,quants,'.')

legend('Original signal','Quantized signal')

axis([-10 10 0 25])

xlabel('time')

ylabel('amplitude')

title('Quantized signal')

A1 = AMP1\*(1/10);

A2 = AMP2\*(1/10);

A3 = AMP3\*(1/10);

powfund = A1^2/2;

powharm = A2^2/2;

varnoise = A3^2;

cs = A1\*sin(2\*pi\*FREQ1\*t)+A2\*sin(2\*pi\*FREQ2\*t+pi)+A3\*sin(2\*pi\*FREQ3\*t+pi/2)

SNR = snr(cs);

bandwidth2 = obw(cs,fs);

capacity = bandwidth2 \* log2(1+SNR);

L = round(2^(capacity/(2\*bandwidth2)));

THD = thd(cs);

SINAD = sinad(cs);

result = [bandwidth1 bandwidth2;capacity L;SNR SINAD];