Lab 04
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EE384

1.a

```matlab
% P1.a
x=[1,2,3,4,5,6,7,8];
Y=fft(x);
```

1.b

```matlab
% P1.b
Yi=ifft(Y);
```

1.c

```matlab
% P1.c
bero_Y=bero_dft(x);
bero_x=bero_idft(bero_Y);
```

bero_dft

```matlab
function [ Y ] = bero_dft( x )
% bero_dft

    N=length(x);
    Y=zeros(N,1);

    for yi = 1:N;
        acc=0;
        for k = 0:(N-1)
            W=( exp( -1i*(2*pi/N)*(yi-1)*k ) );
            acc = acc + (x(k+1) * W);
        end
        Y(yi)=acc;
    end

end
```

bero_idft

```matlab
function [ x ] = bero_idft( Y )
% bero_idft

    N=length(Y);
    x=zeros(N,1);

    for yi = 1:N;
        acc=0;
        for k = 0:(N-1)
            W=( exp( -1i*(2*pi/N)*-(yi-1)*k ) );
            acc = acc + (Y(k+1) * W);
        end
        x(yi)=(1/N)*acc;
    end

end
```
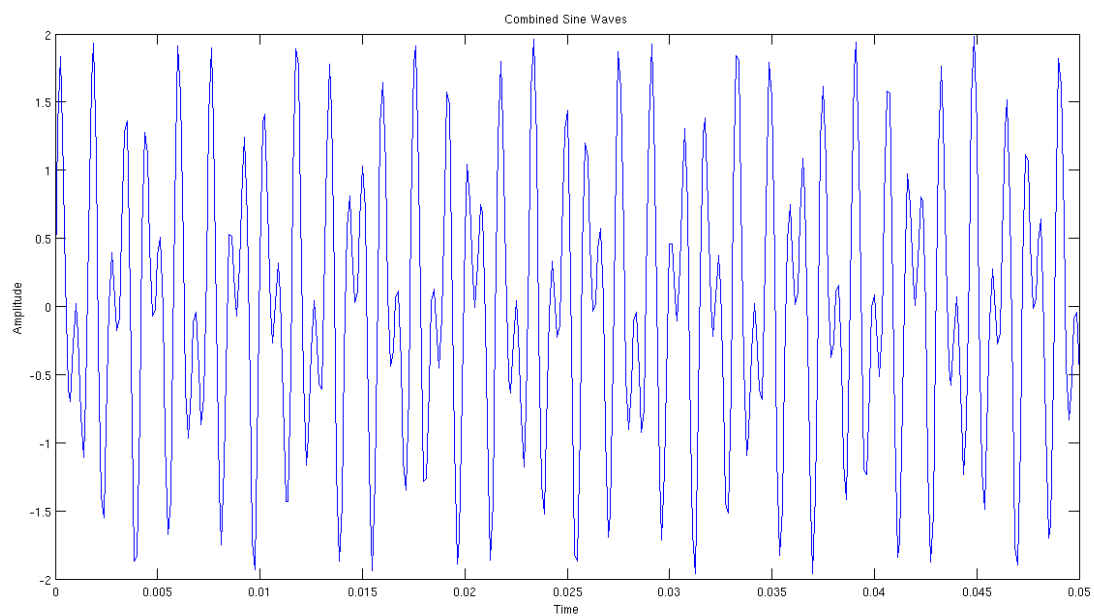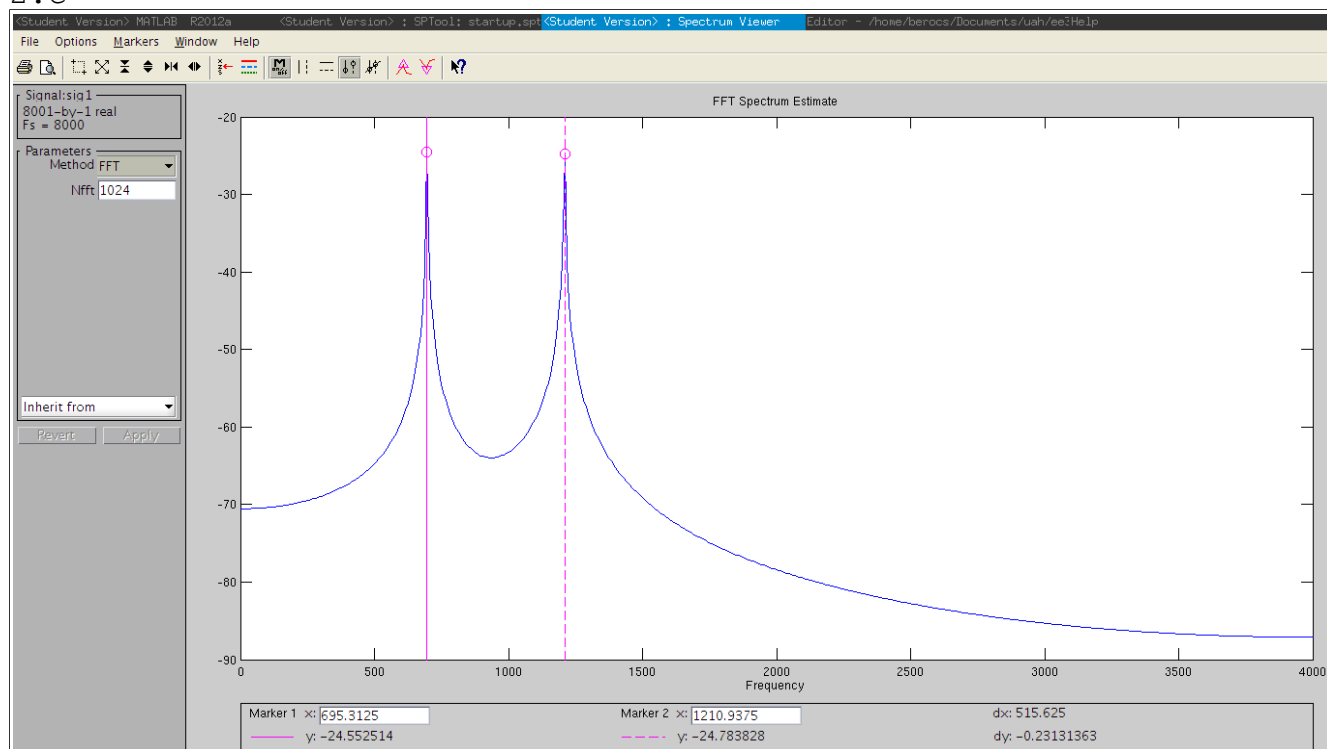
2.a

```
% P2.a
fs=8000;
f1=697;
f2=1209;
t=0:(1/fs):1;
y_t=sin(2*pi*f1*t) + sin(2*pi*f2*t);
figure
plot(t,y_t);
title('Combined Sine Waves');
xlabel('Time');
ylabel('Amplitude');
axis([0 0.05 -2 2]);
```


Combined Sine Waves

2.c

2.d

```
% P2.c
L=8001;
nfft=2^nextpow2(L);
fq=fft(y_t,nfft)/L;
f=fs/2*linspace(0,1,nfft/2+1);
figure
plot(f,2*abs(fq(1:nfft/2+1)));
title('Signal Spectrum');
xlabel('Frequency');
ylabel('Magnitude');
```