

PreLab #2

Question1

```
x=[3 11 7 0 -1 4 2];  
h=[2 3 0 -5 2 1];  
% convolution  
C1 = conv_m(x,h)
```

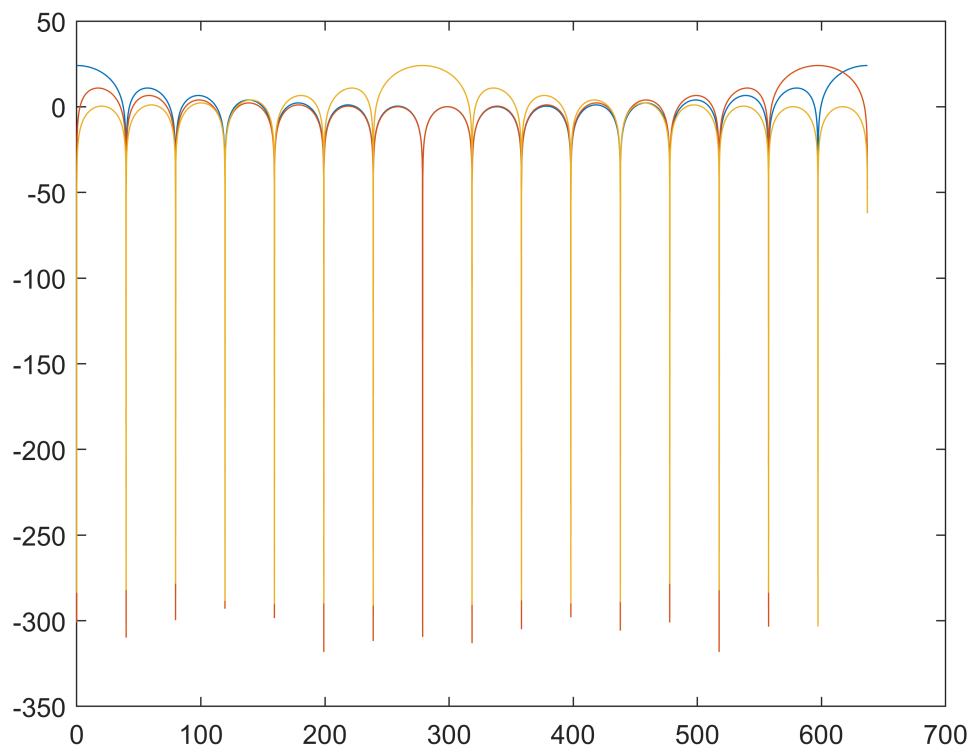
```
C1 = 1×12  
    6    31    47     6   -51    -5    41    18   -22    -3     8     2
```

```
C2 = conv(x,h)
```

```
C2 = 1×12  
    6    31    47     6   -51    -5    41    18   -22    -3     8     2
```

Question3

```
N = 16;  
W = zeros(N,N);  
for i = 1:N  
    for j=1:N  
        W(i,j) = exp((-1i*2*pi*(i-1)*(j-1))/N);  
    end  
end  
Row1=W(1,:);  
Row2=W(2,:);  
Row10=W(10,:);  
num = 256^2;  
[h1,w1] = freqz(Row1,1,num,'whole',2001);  
[h2,w2] = freqz(Row2,1,num,'whole',2001);  
[h10,w10] = freqz(Row10,1,num,'whole',2001);  
db1=20*log10(abs(h1));  
db2=20*log10(abs(h2));  
db10=20*log10(abs(h10));  
  
plot(w1/pi,db1, w2/pi,db2, w10/pi,db10)
```



Question4

$$s(t) = \sum_{-\infty}^{+\infty} a_k p(t - nT_s) \quad , \quad \begin{cases} E\{a_k\} = 0 \\ \sigma^2 = E\{a_k^2\} - E\{a_k\}^2 \\ = E\{a_k^2\} \end{cases}$$

$$R(t+\tau, t) = E\{s(t+\tau) s(t)\}$$

$$= E\left\{ \sum_{-\infty}^{+\infty} a_n p_n(t+\tau - nT_s) \sum_{-\infty}^{+\infty} a_k p_k(t - kT_s) \right\}$$

$$= \sigma^2 \sum_{-\infty}^{+\infty} p(t+\tau - nT_s) p(t - nT_s)$$

نلاحظ: $Q(t) = p(t+\tau) p(t)$

$$\Rightarrow R(t+\tau, t) = \sigma^2 \sum Q(t - nT_s)$$

المسترب !

```
function [Y]=conv_m(x,h)
m=length(x);
n=length(h);
X=[x,zeros(1,n)];
H=[h,zeros(1,m)];
for i=1:n+m-1
    Y(i)=0;
    for j=1:m
        if(i-j+1>0)
            Y(i)=Y(i)+X(j)*H(i-j+1);
        end
    end
end
```

```
% plot results
%figure;
%stem(Y, '-ro');
%ylabel('Y[n]'); xlabel('n'); grid on;
%title('Convolution of Two Signals without conv function');
end
```