

3//Linear colvolution

```
x=input('Enter the array');
l1=length(x);
h=input('Enter the array');
l2=length(h);
N=l1+l2-1;
x1=[x zeros(1,N-l1)];
disp(x1);
h1=[h zeros(1,N-l2)];
disp(h1);
z=conv(x,h);
disp('using function');
disp(z);
z1=zeros(1,N);
for i=1:N
    for j=1:i
        z1(i)=z1(i)+x1(j)*h1(1-j+i);
    end
end
disp(z1);
```

5// Auto correlation

```
x=input('Enter the value=');
disp(x);
%h=input('Enter the value =');
h=x(end:-1:1);
disp(h);
z=[];
for i=1:length(x)
    g=h.*x(i);
    z=[z;g];
end
disp('matrix');
disp(z);
[r c]=size(z);
k=r+c;
t=2;
y=[];
cd=0;
while(t<=k)
    for i=1:r
        for j=1:c
            if((i+j)==t)
                cd=cd+z(i,j);
            end
        end
    end
    t=t+1;
    y=[y,cd];
    cd=0;
end
disp('the auto corelation');
disp(y);
```

4//Circular convolution

```
x=input('Enter the array');
l1=length(x);
h=input('Enter the array');
l2=length(h);
N=max(l1,l2);
x=[x zeros(1,N-l1)];
h=[h zeros(1,N-l2)];
y=zeros(1,N);
for n=1:N
    for m=1:N
        j=mod(n-m,N);
        j=j+1;
        y(n)=y(n)+x(m)*h(j);
    end
end
disp(y);
```

6//cross correlation

```
=input('Enter the value=');
x1=input('Enter the value =');
h=x1(end:-1:1);
z=[];
for i=1:length(x)
    g=h.*x(i);
    z=[z;g];
end
disp('matrix');
disp(z);
[r c]=size(z);
k=r+c;
t=2;
y=[];
cd=0;
while(t<=k)
    for i=1:r
        for j=1:c
            if((i+j)==t)
                cd=cd+z(i,j);
            end
        end
    end
    t=t+1;
    y=[y,cd];
    cd=0;
end
disp('the convolution');
disp(y);
```

77///N point dft

```
N=input('enter number of point');
y=input('enter number of sequence');
L=length(y);
if N<L
    error('problem');
end
y1=[y zeros(1,N-L)];
x2=[];
for k=0:N-1
    for n=0:N-1
        p=exp((-1i*2*pi*n*k)/N);
        x2(n+1,k+1)=p;
    end
end
disp(x2);
disp(y1');
z=x2*y1';
disp(z);
mag=abs(z);
disp(mag');
subplot(2,1,1);
stem(mag);
phase=angle(z)*180/pi;% phase
disp(phase');
subplot(2,1,2);
```

10 // using dft circular convolution

```
x=input('enter number of sequence');
y=input('enter number of sequence');
l1=length(x);
l2=length(y);
N=max(l1,l2);
x1=[x zeros(1,N-l1)];
y1=[y zeros(1,N-l2)];
wn=[];
for k=0:N-1
    for n=0:N-1
        p=exp((-1i*2*pi*n*k)/N);
        wn(n+1,k+1)=p;
    end
end
xdft=wn*x1';
ydft=wn*y1';
dft_xy=xdft.*ydft;
wn2=[];
for k=0:N-1
    for n=0:N-1
        p=exp((-1i*2*pi*n*k)/N);
        wn2(n+1,k+1)=p;
    end
end
conv_xy=(wn2*dft_xy)/4;
disp(abs(conv_xy));
```

9// using dft linear convolution

```
x=input('enter number of sequence');
y=input('enter number of sequence');
l1=length(x);
l2=length(y);
N=l1+l2-1;
x1=[x zeros(1,N-l1)];
y1=[y zeros(1,N-l2)];
wn=[];
for k=0:N-1
    for n=0:N-1
        p=exp((-1i*2*pi*n*k)/N);
        wn(n+1,k+1)=p;
    end
end
xdft=wn*x1';
ydft=wn*y1';
dft_xy=xdft.*ydft;
wn2=[];
for k=0:N-1
    for n=0:N-1
        p=exp((1i*2*pi*n*k)/N);
        wn2(n+1,k+1)=p;
    end
end
conv_xy=(wn2*dft_xy)/4;
disp(abs(conv_xy));
```

1/// sampling time doamin

```
fm=input('enter fm = ');
fu=input('enter fu<2fm fu = ');
fn=input('enter fn>=2fm fn= ');
fo=input('enter fo>>2fm fo= ');
```

```
tm=0:0.01:0.2;
ms=sin(2*pi*fm*tm);
subplot(3,3,2);
plot(tm,ms);
```

```
%under
tu=0:(1/fu):0.2;
mu=sin(2*pi*fm*tu);
subplot(3,3,4);
stem(tu,mu);
```

```
%nyquist
tn=0:(1/fn):0.2;
mn=sin(2*pi*fm*tn);
subplot(3,3,5);
stem(tn,mn);
```

%over

```
to=0:(1/fo):0.2;
mo=sin(2*pi*fm*to);
subplot(3,3,6);
stem(to,mo);
```

```
%reconstruct
```

```
tr=0:(1/fu):0.2;  
mur=interp1(tr,mu,tr);  
subplot(3,3,7);  
plot(tr,mur);
```

```
%reconstruct2
```

```
tr1=0:(1/fn):0.2;  
mnr=interp1(tn,mn,tr1);  
subplot(3,3,8);  
plot(tr1,mnr);
```

```
%reconstruct
```

```
tr2=0:(1/fo):0.2;  
mor=interp1(to,mo,tr2);  
subplot(3,3,9);  
plot(tr2,mor);
```

2// impulse

```
x=input('Enter the nominator = ');  
y=input('Enter the denominato = ');  
N=input('enter point of impulse = ');
```

```
x1=[1,zeros(1,N-1)];  
z=filter(x,y,x1);  
disp(z);
```