

ESE-2014 Lab 3

Submitted By
Jerin Joy – C0755173
Shinu Raj -C0749116

Determine analytically the convolution $y(n) = x(n) * h(n)$ of the following sequences, and verify your answers using the `conv_m` function.

Q1. $X(n) = \{2, -4, 5, 3, -1, -2, 6\}$, $h(n) = \{1, -1, 1, -1, 1\}$

```
1 function [y,ny] = conv_m (x,nx,h,nh)
2 % [y,ny]=convolution result
3 % [x,nx]=first signal
4 % [h,nh]=second signal
5 nyb = nx(1)+nh(1);
6 nye = nx(length(x))+nh(length(h));
7 ny = [nyb:nye];
8 y = conv(x,h);
9 end
10
```

```
>> x=[2,-4,5,3,-1,-2,6];
>> nx=[-3:3];
>> h=[1,-1,1,-1,1];
>> nh=[-1:3];
>> [y,ny] = conv_m(x,nx,h,nh)
y =
    2    -6    11    -8     7    -7     9    -4     7    -8     6

ny =
   -4   -3   -2   -1     0     1     2     3     4     5     6

>> |
```

ANALITICAL

```
>> x(n)=[2,-4,5,3,-1,-2,6]
error: 'n' undefined near line 1 column 3
>> x=[2,-4,5,3,-1,-2,6]
x =

    2   -4    5    3   -1   -2    6

>> h=[1,-1,1,-1,1]
h =

    1   -1    1   -1    1

>> conv(x,h)
ans =

    2   -6   11   -8    7   -7    9   -4    7   -8    6

>> |
```

Q.2 $X(n) = \{1, 1, 0, 1, 1\}$, $h(n) = \{1, -2, -3, 4\}$

```
>>
>> x=[1,1,0,1,1];
>> nx=[-2:2];
>> h=[1,-2,-3,4];
>> nh=[-3:0];
>> [y,ny] = conv_m(x,nx,h,nh)
y =

    1   -1   -5    2    3   -5    1    4

ny =

   -5   -4   -3   -2   -1    0    1    2

>> |
```

ANALITICAL

```
>> x=[1,1,0,1,1];
>> h=[1,-2,-3,4];
>> conv(x,h)
ans =

    1   -1   -5    2    3   -5    1    4

>> |
```

Q3:

```
1 x1=stepseq(-1,-1,4) - stepseq(4,-1,4);
2 n=[-1:4];
3 x2=(.25).^(-n);
4 x=x2.*x1;
5 nx=[-1:4];
6 n=[0:5];
7
8 h=stepseq(0,0,5)-stepseq(5,0,5);
9 nh=[0:5];
10 y=conv(x,h)
11 [y,ny] = conv_m(x,nx,h,nh)
12
13
```

Output (using function and analytical)

```
>> lab53
y =

Columns 1 through 9:

    0.25000    1.25000    5.25000   21.25000   85.25000   85.00000   84.00000   80.00000   64.00000

Columns 10 and 11:

    0.00000    0.00000

ny =

Columns 1 through 9:

    0.25000    1.25000    5.25000   21.25000   85.25000   85.00000   84.00000   80.00000   64.00000

Columns 10 and 11:

    0.00000    0.00000

ny =

   -1    0    1    2    3    4    5    6    7    8    9
```

Q4:

```
1 x1=stepseq(0,0,6) - stepseq(6,0,6);
2 n=[0:6];
3 x2=(.25).^n;
4 x=x2.*x1;
5 nx=[0:6];
6
7 n=[-2:3];
8 h=2*(stepseq(-2,-2,3)-stepseq(3,-2,3));
9 nh=[-2:3];
10 y=conv(x,h)
11 [y,ny] = conv_m(x,nx,h,nh)
```

Output(using function and analytical)

```
>> lab54q
y =
Columns 1 through 10:
    0.00000    0.50000    1.50000    3.00000    5.00000    7.50000    7.00000    6.00000    4.50000    2.50000
Columns 11 and 12:
    0.00000    0.00000
y =
Columns 1 through 10:
    0.00000    0.50000    1.50000    3.00000    5.00000    7.50000    7.00000    6.00000    4.50000    2.50000
Columns 11 and 12:
    0.00000    0.00000
ny =
   -2   -1    0    1    2    3    4    5    6    7    8    9
```