

AV 331 : DIGITAL SIGNAL PROCESSING

Labsheet - 2

1. Even and Odd signal:
 - a) Plot the even and odd parts of the unit step signal in the range [-10,10].
 - b) $x[n] = \sin(2\pi f_1 t) + \cos(\pi f_2 t)$; $f_1=4$ Hz, $f_2=7$ Hz and sample it at $F_s=100$ Hz and plot the even and odd parts of the resultant $x(n)$.
2. LTI System: Using MATLAB, state whether the given system is linear and/or time invariant.
 - a) $Y_1[n] = x[n + 2]$
 - b) $Y_2[n] = \sin(x[n])$
 - c) $Y_3[n] = x[n - 3] * x[n - 2]$

Use $x_1=u(n)-u(n-10)$ and/or $x_2=n$ for $0 \leq n \leq 10$

3. Find the convolution of given two finite sequences using MATLAB:

$$x_1 = [4 \ 2 \ 6 \ 3 \ 8 \ 1 \ 5]$$

↑

$$x_2 = [3 \ 8 \ 6 \ 9 \ 6 \ 7]$$

↑

- a) Without using inbuilt function
- b) Using in built function

Note: Arrow points to zero location in above sequences. Since MATLAB command does not give time index of the convolved result , derive it from the signals to be convolved.

4. Find the autocorrelation and cross- correlation of the given two finite sequences using MATLAB and verify:
 - a) $x_1 = [4 \ 2 \ 6 \ 3 \ 8 \ 1 \ 5]$ and $x_2 = [3 \ 8 \ 6 \ 9 \ 6 \ 7]$ using inbuilt function - 'xcorr'
 - b) $x_1 = [4 \ 2 \ 6 \ 3 \ 8 \ 1 \ 5]$ and $x_2 = [3 \ 8 \ 6 \ 9 \ 6 \ 7]$ using inbuilt function – 'conv'
5. Find the circular convolution of given two finite sequences using MATLAB:
 - a) $x_1 = [1 \ 2 \ 3 \ 4 \ 5 \ 6]$ and $x_2 = [1 \ 2 \ 3 \ 4 \ 5]$ using inbuilt function
 - b) $x_1 = [1 \ 2 \ 3 \ 4 \ 5 \ 6]$ and $x_2 = [1 \ 2 \ 3 \ 4 \ 5]$ without using inbuilt function

$$x[n] \otimes h[n] = \sum_{m=0}^{N-1} x[m]h[(n-m))_N]$$