Discrete Time Signals

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E/13/200

SEMESTER 06

Title: **Lab01: Laboratory on Discrete Time Signals**

Date: **2017-09-29**

Objectives: **1.** Plotting the discrete signals

PART 1: Understanding properties of Discrete Time Sinusoidal signals

a) Plot the $x[n] = 10b^n$ for positive n when
   - b = -1.3 (b < -1)
   - b = -0.5 (-1< b < 0)
   - b = 0.5 (0 < b <1)
   - b = 1.3 (b >1)

   The Figure 01 illustrate the plot according to the above specifications.

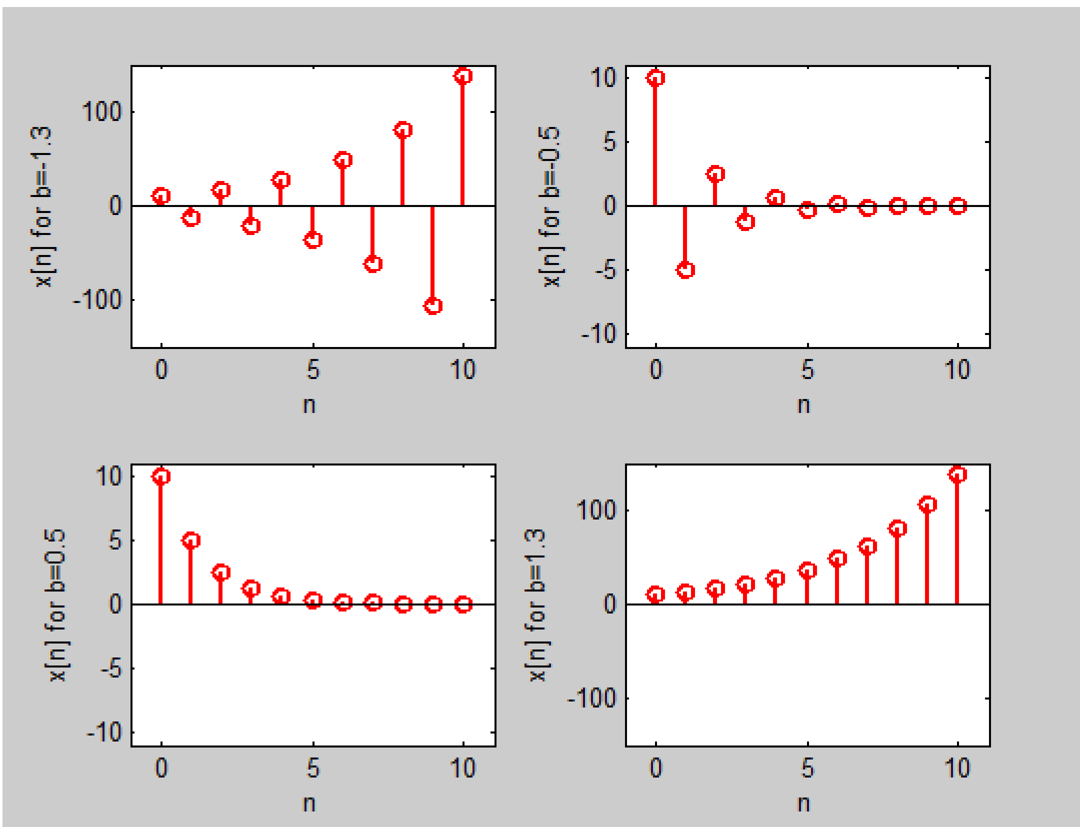

Figure 01

b) Plotting following sinusoidal signals

- $x[n] = \cos(2\pi n/12)$, $x(t) = \cos(2\pi t/12)$
- $x[n] = \cos(8\pi n/31)$, $x(t) = \cos(8\pi t/31)$

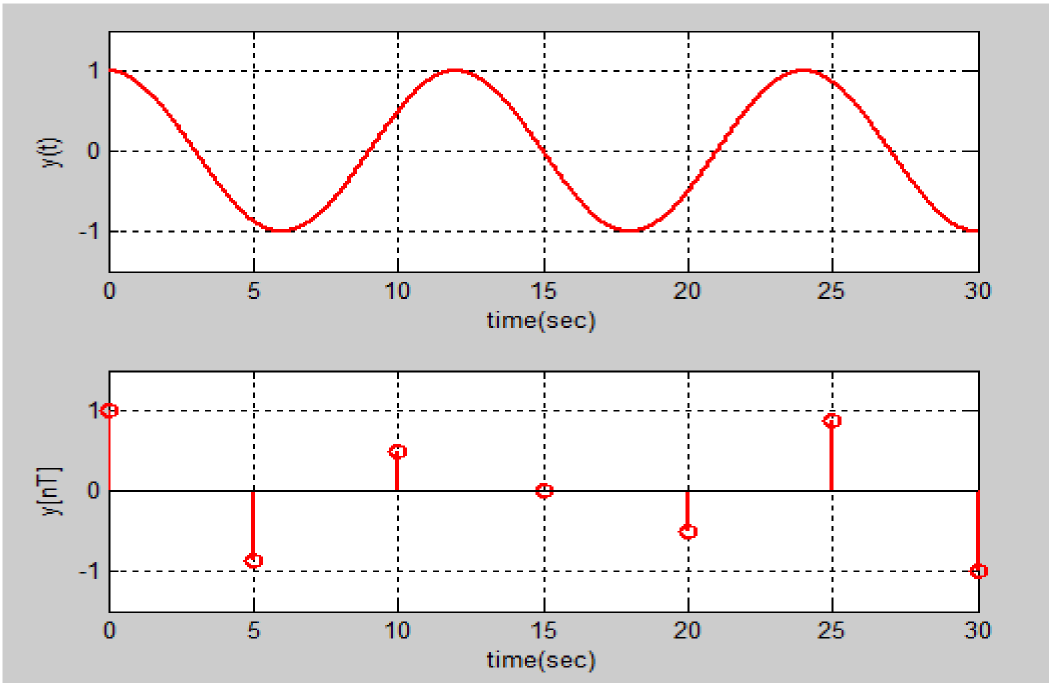

Figure 02

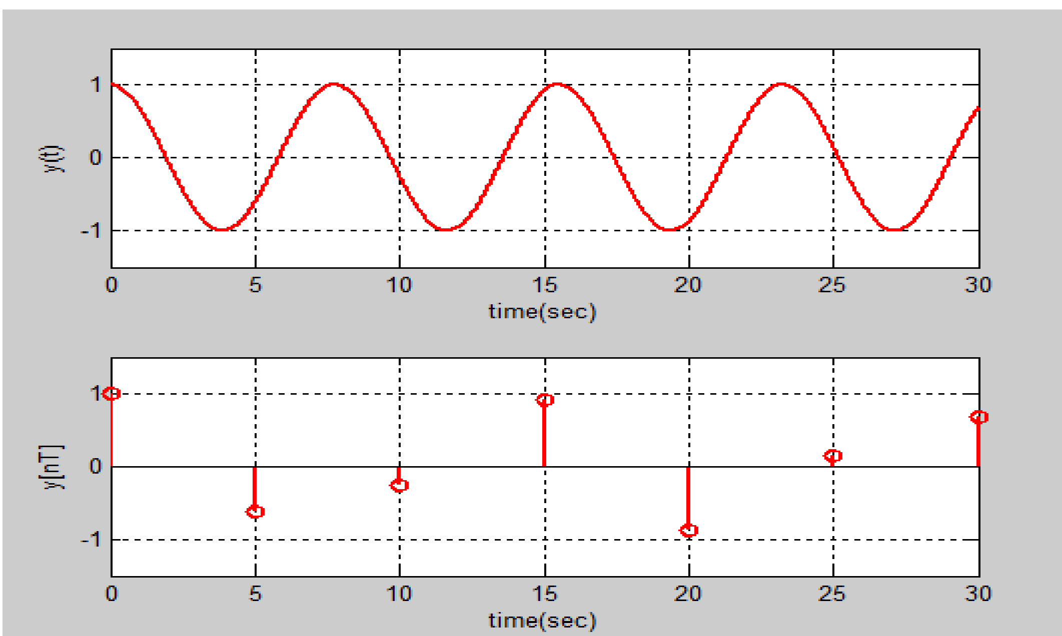

Figure 03

c) see Figure 04 for nine plots

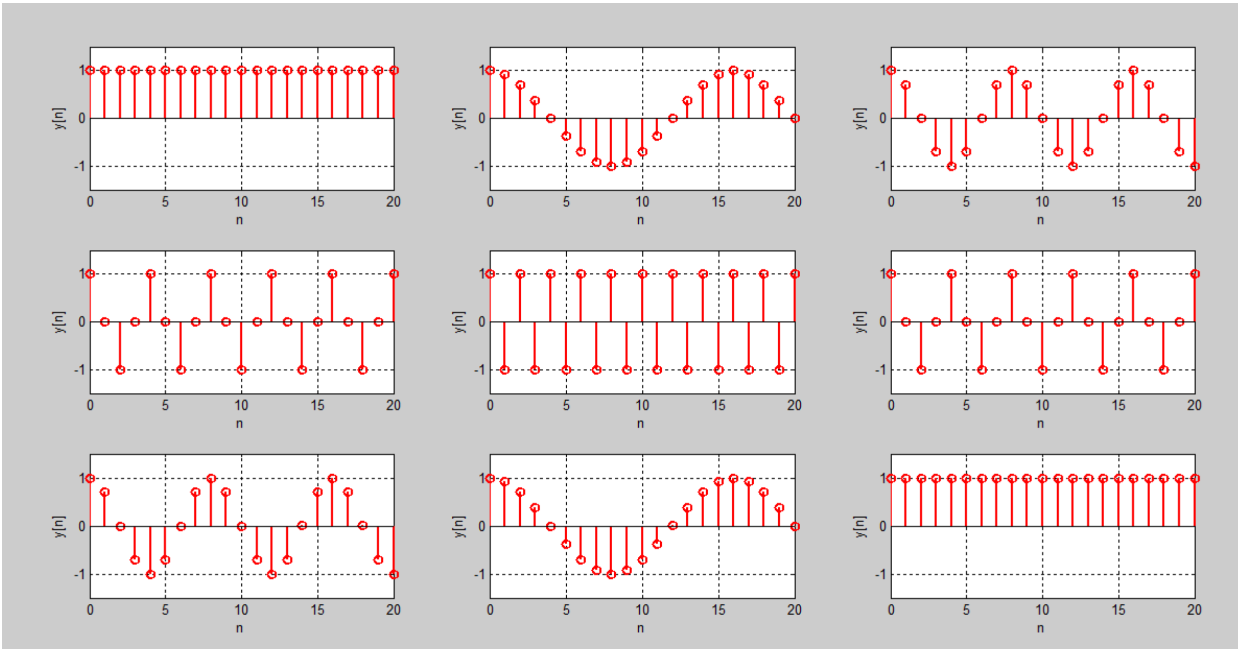

Figure 04

d) When increasing the discrete frequency, it can be observed that the amplitude of samples in same positions have reduced and then after one frequency again it gives the same amplitude

PART 2: Discrete convolution

a) Refer the 'findConvolution.m' MATLAB function for get the convolution. A portion of the function has given below in Figure 05

```
for k=1:size
     reverse_Y(k) = new_Y(size-k+1);
     %display(reverse_Y);
end

%display(size);

for i=1:size
    sum = 0;
    for j=1:i
        sum = sum+new_X(j)*new_Y(i-j+1);
    end
    c(i) = sum;
end

c = c'; % get the transpose
return
```

Figure 05

b) Evaluate the x[n] = 0.5^n u(n) with h(n) = u[n] for n>0 see Figure 06

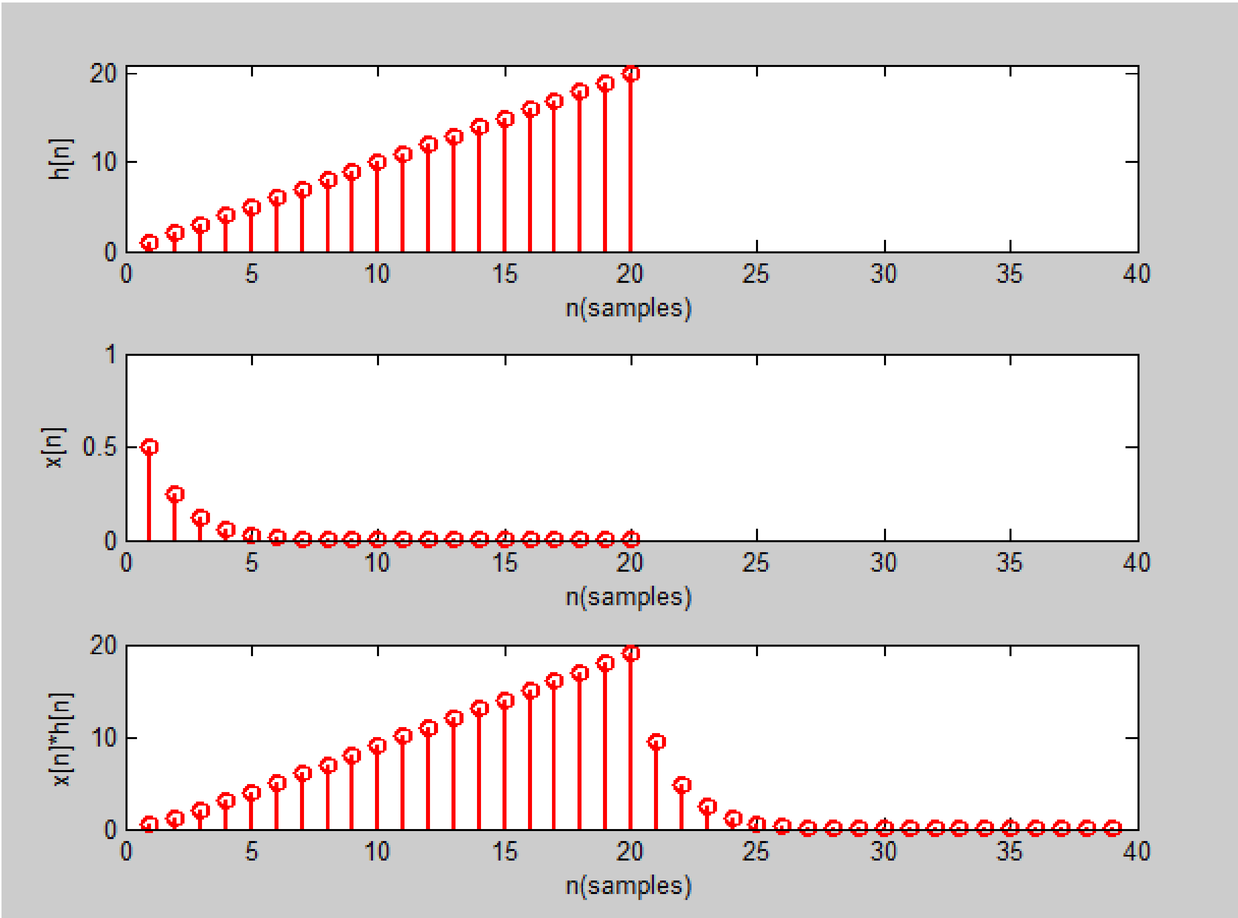

Figure 06

c) Convolve the following signals using the MATLAB conv( ) inbuilt function and above written function. See the result in Figure 07

- x[n] = [1 1 1 1 1 0 0 0 0 0 0 0 0 0 0 0]
- h[n] = [2 4 8 16 32 64 0 0 0 0 0 0 0 0 0 0]

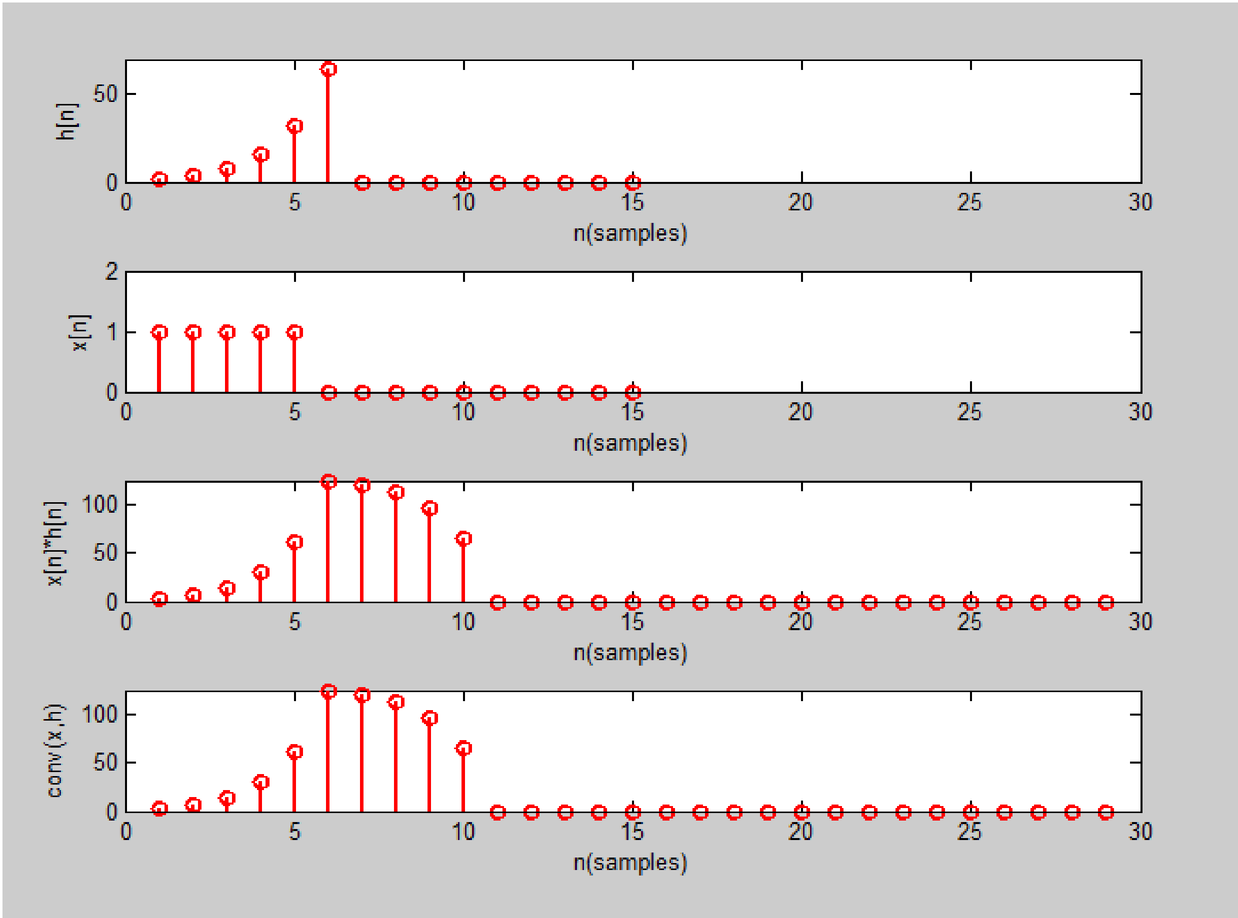

Figure 07

PART 1: LTI systems

In part a- system 1 gives a IIR system because it has recursive output and system 2 gives a FIR system