LAB 10 : SAMPLING THEOREM

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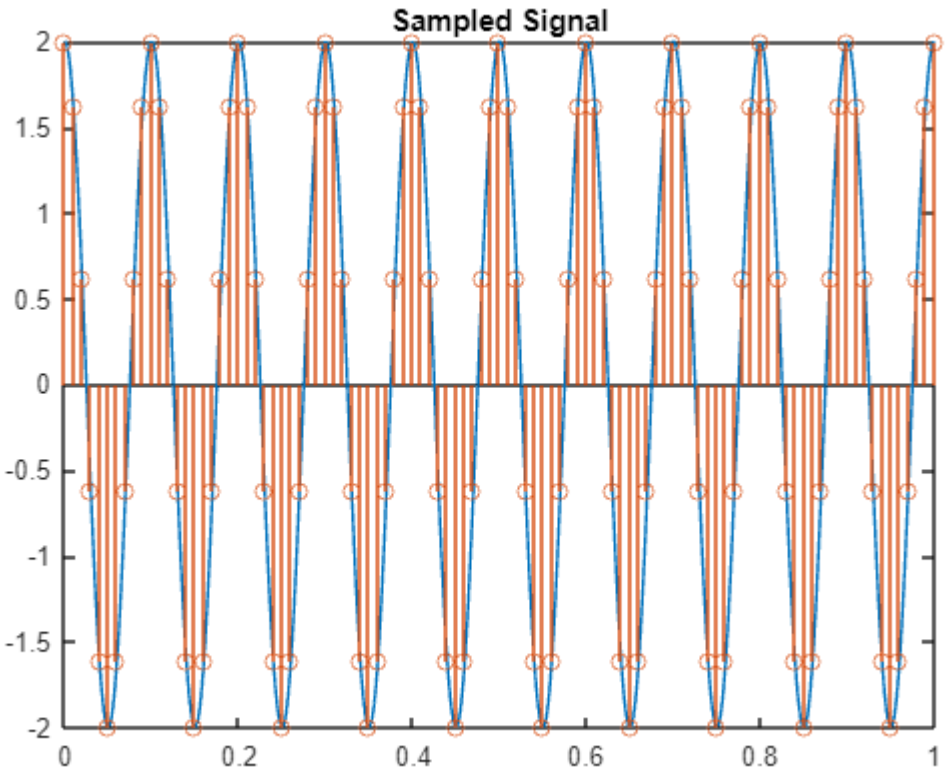
Section 4

Question 1

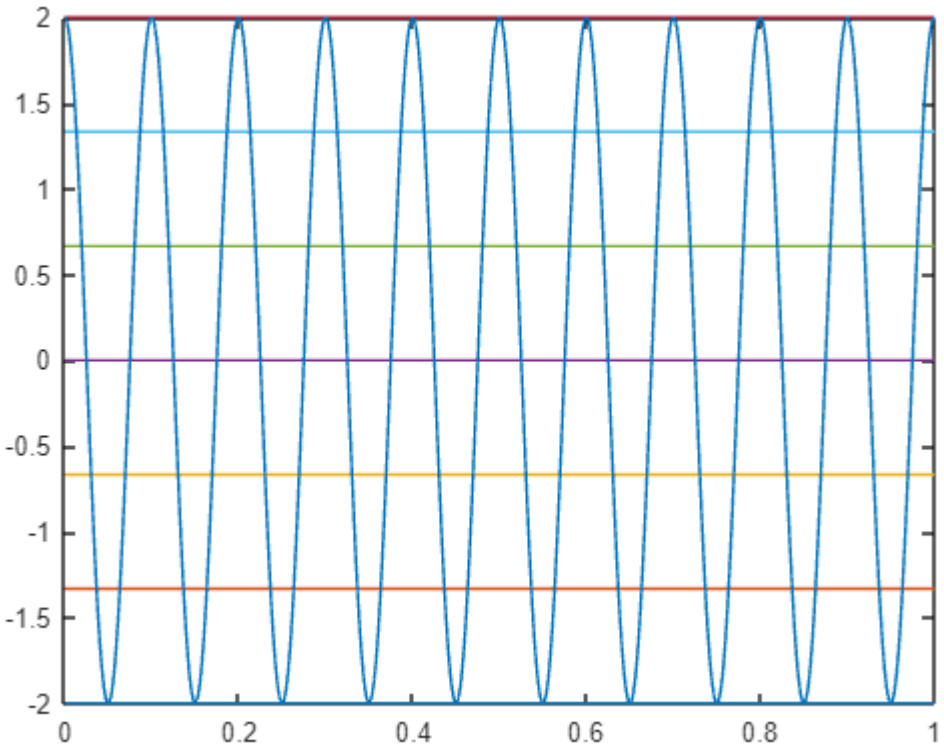
```
t=0:0.001:1;
n=0:0.01:1;
x = 2*cos(20*pi*t);
xn = 2*cos(20*pi*n);
plot(t,x);
hold on;
stem(n,xn);
title('Sampled Signal');
hold off;
```



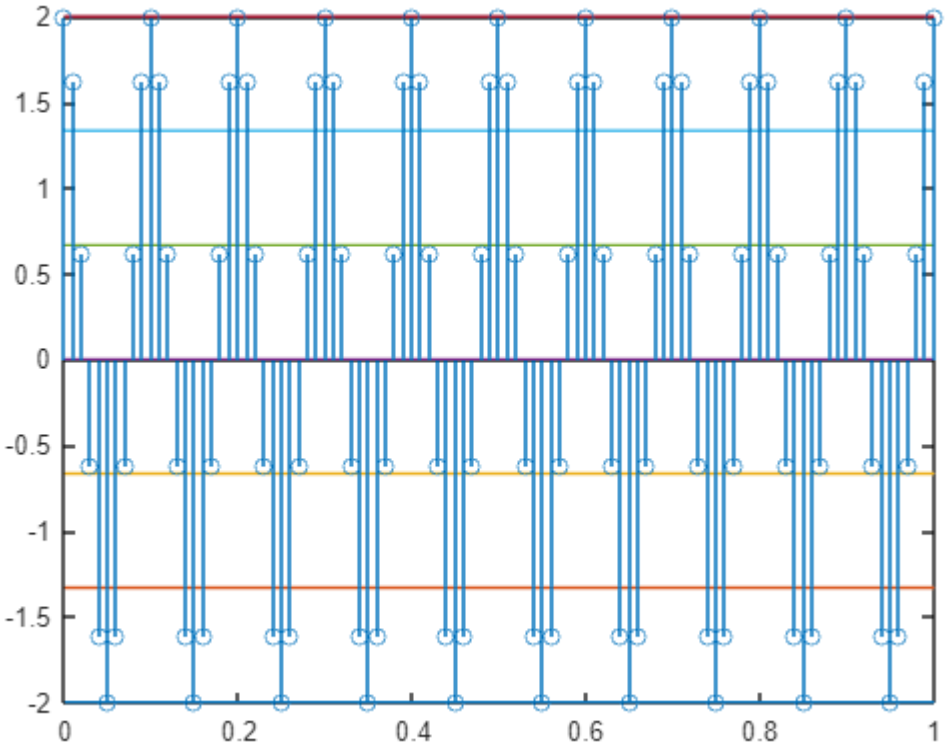

```
L = 7;
delta = (2-(-2))/(L-1);

for i=-2:delta:2
    k = i*ones(size(t));
    plot(t,k);
    hold on;
```

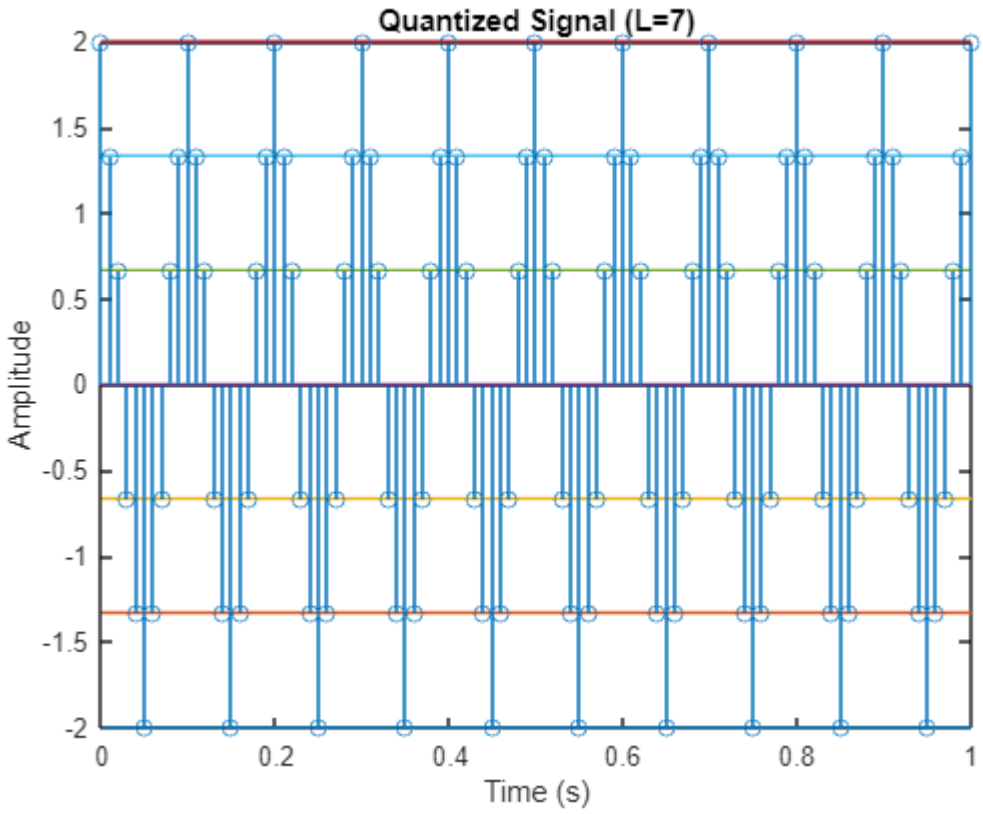
```
end
plot(t,x);
hold off;
```




```
for i=-2:delta:2
    k = i*ones(size(t));
    plot(t,k);
    hold on;
end
stem(n,xn);
hold off;
```

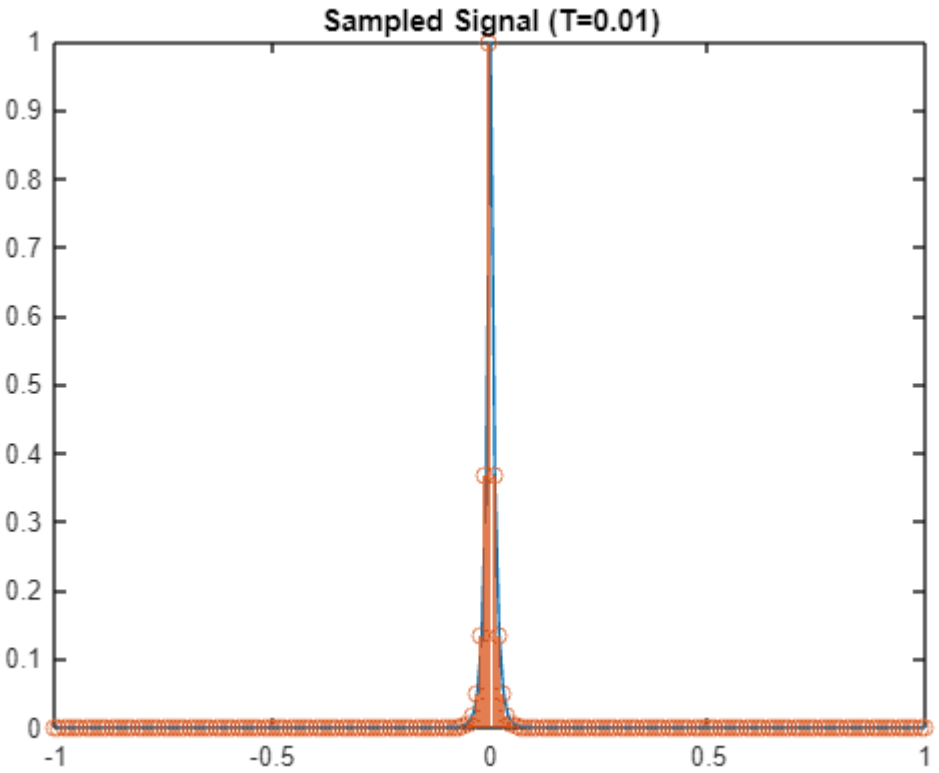



```
x_quantized = zeros(size(xn));
for i = 1:length(xn)
    [~, index] = min(abs(xn(i) - quant_levels));
    x_quantized(i) = quant_levels(index);
end
for i=-2:delta:2
    k = i*ones(size(t));
    plot(t,k);
    hold on;
end
stem(n, x_quantized);
hold off;
title('Quantized Signal (L=7)');
xlabel('Time (s)');
ylabel('Amplitude');
```

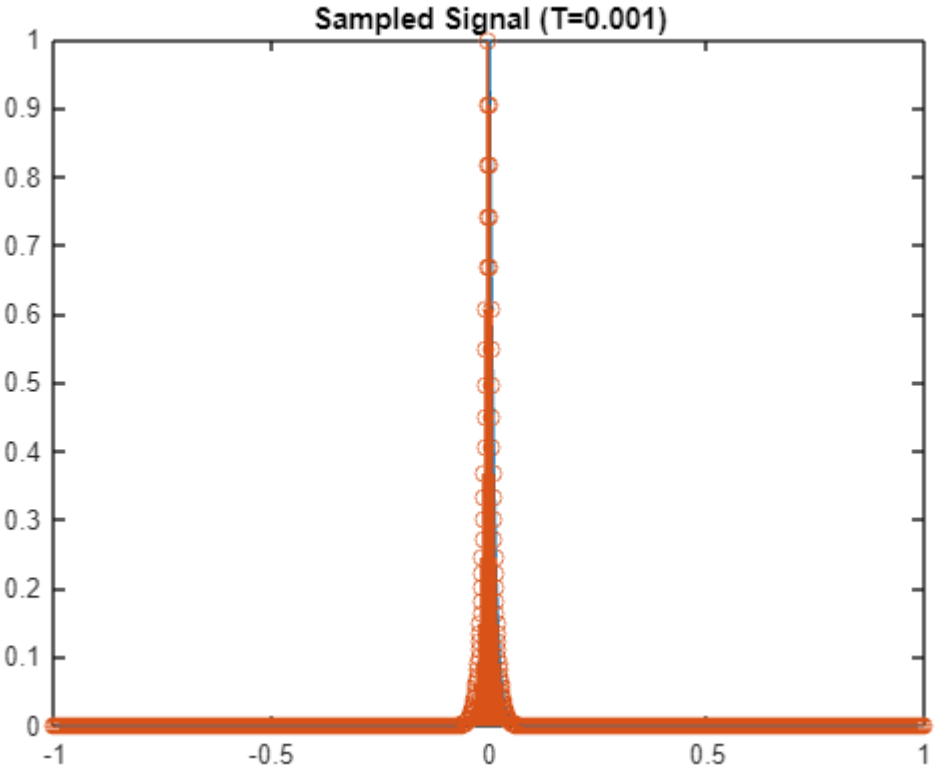


Question 2

```
t=-1:0.01:1;
n=-1:0.01:1;
x = exp(-100*abs(t));
xn = exp(-100*abs(n));
plot(t,x);
hold on;
stem(n,xn);
title('Sampled Signal (T=0.01)');
hold off;
```




```
t=-1:0.001:1;
n=-1:0.001:1;
x = exp(-100*abs(t));
xn = exp(-100*abs(n));
plot(t,x);
hold on;
stem(n,xn);
title('Sampled Signal (T=0.001)');
hold off;
```


Sampled Signal (T=0.001)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-1
-0.5
0
0.5
1