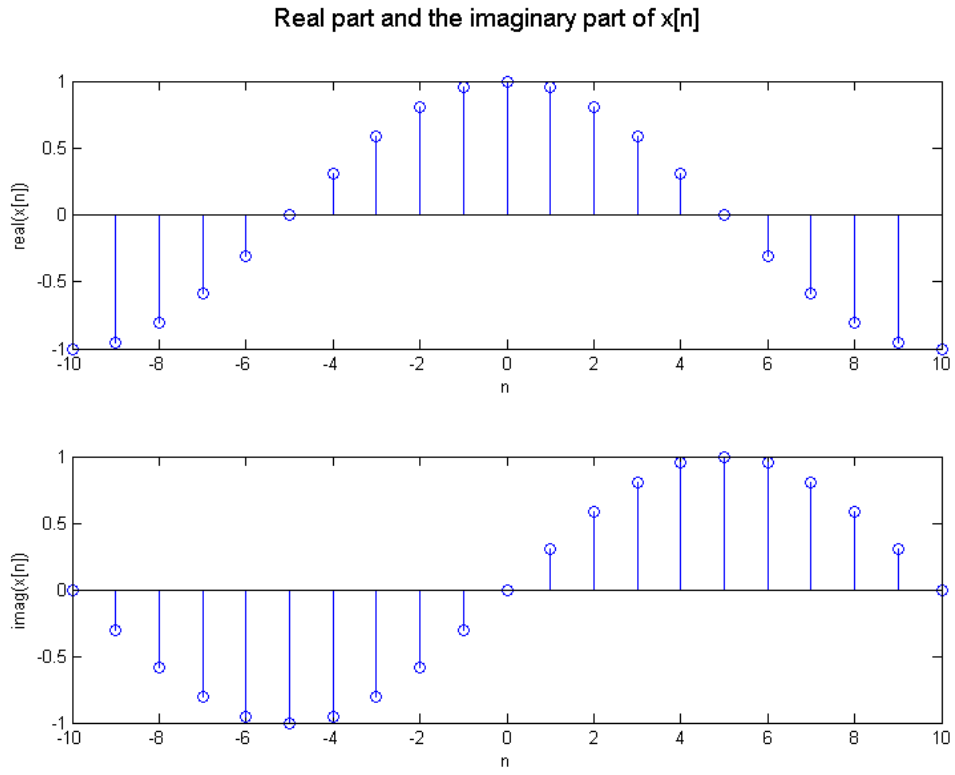
ICE503 DSP-MATLAB#1

(a) & (b)

```
clear
clc

%% (a) Generate the complex-valued signal x[n]
n = -10:1:10;
x = exp(j*1/10*pi*n);   % x[n]

%% (b) Plot the real part and the imaginary part of x[n]
figure(1)               % creat a figure

subplot(2,1,1);         % first subplot
stem(n,real(x));        % use stem fuction to plot the real part of x[n]
xlabel('n');            % define x label
ylabel('real(x[n])');   % define y label

subplot(2,1,2)          % second subplot
stem(n,imag(x));        % use stem fuction to plot the imaginary part of
x[n]
xlabel('n');            % define x label
ylabel('imag(x[n])');   % define y label

% title of the figure(1)
suptitle('The real part and the imaginary part of x[n]')
```



(c) The sequence is conjugate symmetric when $x[n] = x^*[-n]$

$$x[n] = x_{re}[n] + jx_{im}[n]$$
$$x^*[-n] = x_{re}[-n] - jx_{im}[-n]$$

The sequence is conjugate antisymmetric when $x[n] = -x^*[-n]$

$$x[n] = x_{re}[n] + jx_{im}[n]$$
$$-x^*[-n] = -x_{re}[-n] + jx_{im}[-n]$$

Observe the figure, we can see that $x_{re}[n] = x_{re}[-n]$ and $x_{im}[n] = -x_{im}[-n]$, so $x[n]$ is a conjugate symmetric sequence.