Weekly Exercise 2: **Submission Deadline: 25-08-2020**

Ex.1) Generate the complex-valued signal $x(n)= \exp^{(-0.1+j0.7)n}$, $-15 \leq n \leq 15$

and plot its magnitude, phase, the real part, and the imaginary part in four separate subplots.

Ex.2) Record 10 seconds of your speech with a microphone with different sampling rate (atleast 3) and plot the signal as a function of time.

Ex 3). a. plot the discrete-time signal x[n] = sin (ω0n) for the following values of ω0: $-29\pi /8$, $-3\pi /8$, $-\pi /8$, $\pi /. 8$, $3\pi /8$, $5\pi /8$, $7\pi /8$, $9\pi /8$, $13\pi/ 8$, $15\pi /8$, $33\pi /8$, and $21\pi/ 8$.

1. Plot each signal for $0 \leq n \leq 63$.
2. Label each graph with the frequency.
3. Use the subplot function to plot four graphs per figure.

b. Plot Discrete-time signal x[n] = cos(0.09n) for $0 \leq n \leq 120$.

For your plot, turn the grid on and scale the axes using the python statements grid;

c. Is this signal periodic? Explain.

Ex. 4). Consider an input x[n] and a unit impulse response h[n] given by

x[n] = (1/2)n-2 u[n-2]; h[n] = u[n+2]

Determine and plot the output y[n] = x[n] * h[n]

Ex. 5). a. Consider the following discrete-time signals with a fundamental period of 6

$$x[n] = 1 - \cos(\frac{2\pi}{6}n)$$

Determine the Fourier series coefficients. Plot the magnitude and phase of each coefficients

Ex. 6) a. Find the autocorrelation of x[n] = [1, -1, 1, -1, 1, -1]. Plot the output.

b. Find the cross correlation between two sequences x[n] and h[n]

x[n] = [1, 0, 2, 1]; h[n] = [1, 1, 2, 1]

Note:

1) All exercises must be implemented using Jupyter Notebook.(Language:python)

2) Please do all sub questions in a single Jupyter notebook only.

2) Install and import all necessary packages based on the task given.

3) Indicate all steps clearly with explanation.

4) After execution download .pdf and .ipynb file which includes code, explanation as well as output.