ECE250: Signals and Systems
Practice Sheet 4

Instructions

- Use Matlab or Python to solve these problems.
- For solutions, you have to bring .m file or .ipynb file along with output in the tutorial class

1. Write a program to generate and plot the following signals:
   (a) Continuous time unit step function.
   (b) Discrete time unit step function.
   (c) Continuous time unit step function with time shift.
   (d) Discrete time unit step function with time shift.

2. Write a program to generate and plot the following signals:
   (a) Discrete time cosine function.
   (b) Discrete time cosine function with time shift and scaling.

3. Determine whether the following discrete-time signals are periodic or not and also plot the respective signals.
   (a) $cos\frac{2\pi n}{5} + cos\frac{2\pi n}{7}$

   (b) $sin(\pi + 0.2n)$

4. For the signal $x(t)$ shown in Figure 1, plot $x(1 - t/2)$.

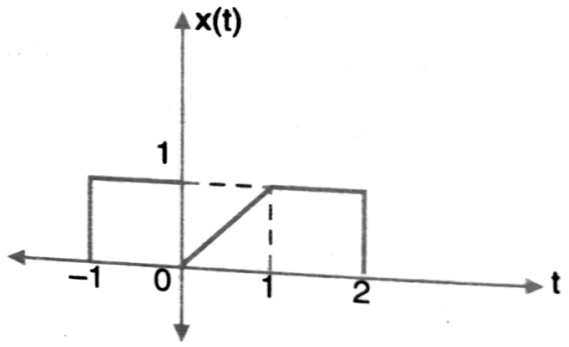

Figure 1: Signal for problem 4

5. Find and sketch the even and odd components of the following signal:
   $x(n) = e^{-(n/4)}u(n)$

6. Plot real and imaginary part of the following signal $x(t)$:
   $x(t) = C.e^{j\theta}.e^{(a+jb)t}$
   where,
   $\theta = \pi/2$
   $C = 2$
   $a = 0.2$
   $b = 3$

7. The impulse response $h(n)$ of a discrete time LTI system is shown in Figure 2(a). Determine and sketch output $y(n)$ of this system to the input $x(n)$ shown in Figure 2(b) using the convolution technique.

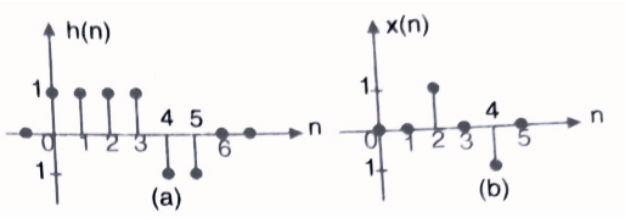

Figure 2: Signals for problem 7