# Lab Assignment - 01 - Spring 2019

Signal & Systems
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## 1 Signals Fundamentals

- Take a picture of yourself (passport size is enough) and answer/do the following
  - Save the image as a jpeg file and include in the report
  - What is the number of independent variables
  - What is the number of components
  - Display the individual components of the image
  - determine the minimum, mean and maximum of each component
  - Determine the size of the image
- Record your voice for a duration of 5 seconds and answer/do the following
  - Read the signal in matlab and plot all the channels of the signal on separate figures
  - How many channels are present in the signal
  - Is this signal digital or analog?
  - What is number of the values in the sequence
  - What is the energy of the signal in each channel

## 2 Signal Transformations

- Given $u(t)$ the unit step signal, plot the following
  - $u(t-5) - u(t-10)$
  - $u(2-t) - u(6-t)$
  - $u(7-t)$

- Given $r(t)$ the ramp signal, plot the following
  - $r(t-3)$
  - $r(7-t)$
  - $r(1-3t)$
- Given the signal $sin(\Omega_0 t)$, plot the following: Assume the unknown values
  - $sin(\Omega_0(t-t_0))$
  - $sin(\Omega_0(t+t_0)$
- Given the signal $x(t)$

$$x(t) = \begin{array}{ll} 0 & t < 0 \\ t & 0 \leq t < 1 \\ 2-t & 1 \leq t < 3 \\ t-4 & 3 \leq t < 5 \\ 1 & 5 \leq t \end{array}$$

  Answer the following:
  - Plot the following
    * $x(t-1)$
    * $x(t+1)$
    * $x(2t-3)$
    * $x(1-2t)$

# 3 Signal Generation

Consider the signal

$$x(t) = \begin{array}{ll} 1+t & -1 < t < 0 \\ 1-t & 0 < t < 1 \\ 0 & otherwise \end{array}$$

Answer/do the following

- Plot $x(t)$
- Define $y(t)$ as a periodic signal equal to $x(t)$ in the fundamental period $T = 2$.

  Plot $y(t)$. Assume the number of pulses to be plotted.

# 4 Instructions

Please get your results verified by a TA.