

Computer Assignment - 01 - Monsoon 2018

IEC 240, DSAA
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I. 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

II. 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 $x(t)$

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

Answer the following:

- Derive the signal $x(t)$ in terms of the basic signals.
- Plot the following
 - * $x(t - 1)$
 - * $x(t + 1)$
 - * $x(2t - 3)$
 - * $x(1 - 2t)$
- Given the discrete signal,

$$x[n] = \underset{\uparrow}{[1, 2, 3, 8, 9]} \quad (1)$$

plot the following transformations

- $x[n - 1]$
- $x[n + 2]$
- $x[2 - n]$
- $x[1 - 2n]$
- $x[2n + 3]$

III. SIGNAL GENERATION

Consider the signal

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

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 plotted.

IV. INSTRUCTIONS AND GRADING SCHEME

Merge all the sections into a single pdf file and upload.

- Section 1: Matlab code and results (Max Grade: 3 points)
- Section 2: Matlab code and results for signal transformations (Max Grade: 4 points)
- Section 3: Matlab code and plots (Max Grade: 3 points)