CpE 3203L – Digital Signal Processing

Lab Exercise 1 : Independent Variable Manipulation

Name: _Dumalagan, Danica Marie A._   ID #: _18103276_   Score: _____

Instructor: _Mr. Luis Cañete_   Schedule: _1:30-4:30 MW_   Date: _February 15, 2023_
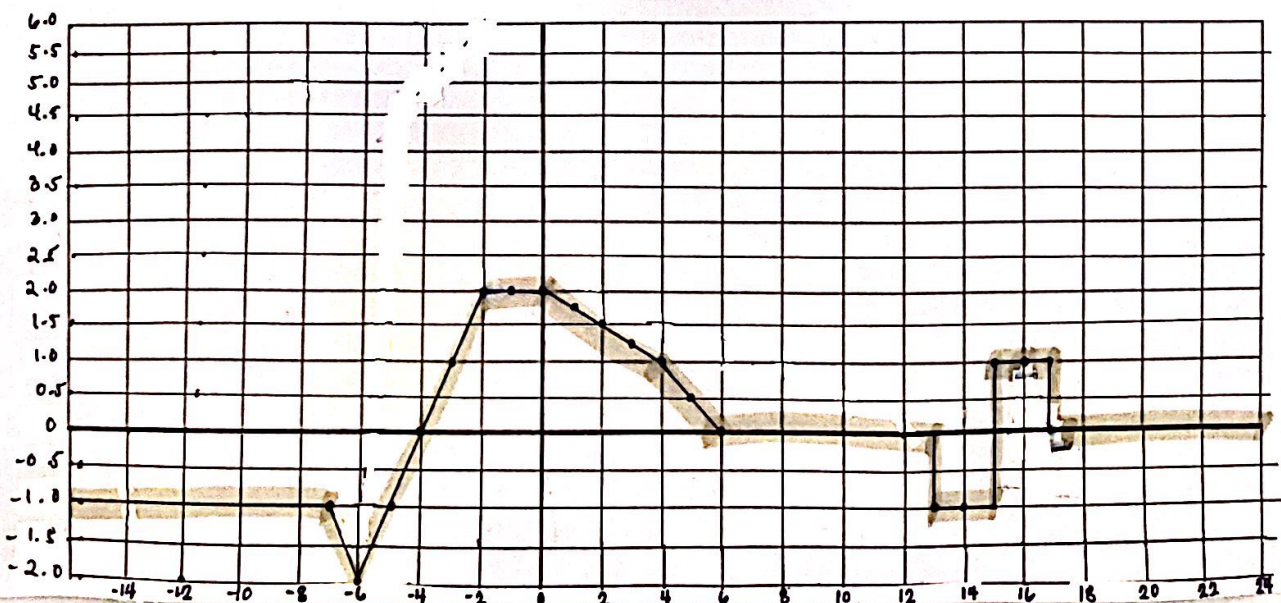
Objectives:
- Solve exercises on independent variable manipulation by hand
- Create MATLAB function that represents a signal

1. Given the signal

a. Find the piece-wise function definition of the signal $f(t)$

$$
f(t) = \begin{cases}
0 & t \leq -5 \\
1 & -5 \leq t \leq -4 \\
-1 & -4 \leq t \leq -3 \\
0 & -3 \leq t \leq 0 \\
t & 0 \leq t \leq 1 \\
0.5t + 0.5 & 1 \leq t \leq 3 \\
2 & 3 \leq t \leq 4 \\
-2t + 10 & 4 \leq t \leq 6 \\
2t - 14 & 6 \leq t \leq 7 \\
0 & 7 \leq t
\end{cases}
$$

sure to write tick labels for the horizontal and vertical axes and adjust the scale as you see fit.

c. Find the piece-wise function definition of the signal graphed in 1b.

$$
g(t) = \begin{cases}
0, & t \leq -8 \\
-t-8, & -8 \leq t \leq -6 \\
t+4, & -6 \leq t \leq -2 \\
2, & -2 \leq t \leq 0 \\
-\frac{1}{4}t+2, & 0 \leq t \leq 4 \\
-\frac{1}{2}t+3, & 4 \leq t \leq 6 \\
0, & 6 \leq t \leq 12 \\
-1, & 12 \leq t \leq 14 \\
1, & 14 \leq t \leq 16 \\
0, & 16 \leq t
\end{cases}
$$

2. Create a MatLab function with the function prototype

$$\text{function y = foo(t)}$$

that represents the function that was determined in 1a. Make sure that the function is able to receive and return vectors such that f([0 0.2 0.4 0.6 0.8 1]) will return a vector of the same size with elements corresponding to $f(t)$.

3. Plot `foo` over the same range as in 1b and determine if your graph is reconstructed in Matlab. (Note: You may have to adjust the vector t to see the discontinuities clearly).