

Lab 1

Kevin Le

McMaster University

ELECENG 3TP3

September 20th, 2023

As a future member of the engineering profession, the student is responsible for performing the required work in an honest manner, without plagiarism and cheating. Submitting this work with my name and student number is a statement and understanding that this work is my own and adheres to the Academic Integrity Policy of McMaster University and the Code of Conduct of the Professional Engineers of Ontario. Submitted by [Kevin Le, 400385350]

Q1.

```
f = SimpleFunctions();
n = -10:10;

%Part A
x_a = f.unitstep(n) - 2.*f.unitstep(n-1) + f.unitstep(n-4);
%Part B
x_b = (n+2).*f.unitstep(n+2) - 2.*f.unitstep(n) - n.*f.unitstep(n-4);
%Part C
x_c = f.delta(n+1) - f.delta(n) + f.unitstep(n+1) - f.unitstep(n-2);
%Part D
x_d = exp(0.8.*n).*f.unitstep(n+1) + f.unitstep(n);

%Plot for function A
subplot(2,2,1);
stem(n,x_a,'LineWidth', 2);
axis([-10 10 -2 2]);
text(-8,1.8,'Function A, Kevin Le 400385350','FontSize',12);

%Plot for function B
subplot(2,2,2);
stem(n,x_b,'LineWidth',2);
axis([-10 10 -1 4]);
text(-8,3.8,'Function B, Kevin Le 400385350','FontSize',12);

%Plot for function C
subplot(2,2,3);
stem(n,x_c,'LineWidth',2);
axis([-10 10 -1 3]);
text(-8,2.8,'Function C, Kevin Le 400385350','FontSize',12);

%Plot for function D
subplot(2,2,4);
stem(n,x_d,'LineWidth',2);
text(-8,2900,'Function D, Kevin Le 400385350','FontSize',12);

exportgraphics(gcf,'q1_plots.jpg'); %creates a .jpg file with the 4 plots
```

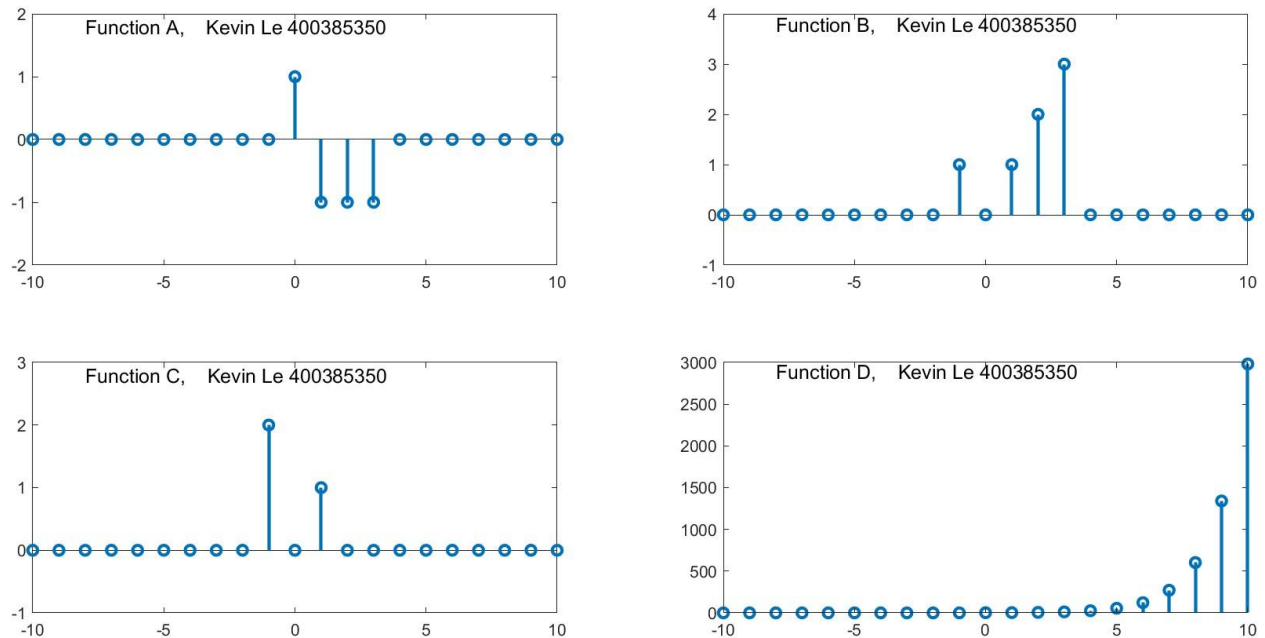


Figure 1: Discrete time signals A, B, C and D as stem plots

Q2.

```
opts = detectImportOptions('course_grades_2023.xlsx');
opts = setvartype(opts, {'ID_Number', 'Name'}, 'string');
table = readtable('course_grades_2023.xlsx', opts);

table_size = size(table); %two element array with number of rows and columns
number_of_rows = table_size(1);

%Part A
highest_lab_mark = {' ', 0}; %element 1: name of student, element 2: mark
for i = 2:number_of_rows
    total_lab_mark = 0;
    for j = 3:6 %lab marks are columns 3 to 6
        total_lab_mark = total_lab_mark + table{i,j};
    end
    if total_lab_mark > highest_lab_mark{2} %finds the higher lab mark
        highest_lab_mark{1} = table{i,1};
        highest_lab_mark{2} = total_lab_mark;
    end
end
disp('Part A: ' + highest_lab_mark{1} + ' ' + highest_lab_mark{2});

%Part B
highest_exam_mark = {' ', 0};
for i = 2:number_of_rows
    total_exam_mark = 0;
    for j = 8:11 %exam marks are columns 8 to 11
        total_exam_mark = total_exam_mark + table{i,j};
    end
end
```

```

end
if total_exam_mark > highest_exam_mark{2} %finds the higher exam mark
    highest_exam_mark{1} = table{i,1};
    highest_exam_mark{2} = total_exam_mark;
end
end
disp('Part B: ' + highest_exam_mark{1} + ' ' + highest_exam_mark{2});

%Part C
highest_final_mark = {' ', 0};
for i = 2:number_of_rows
    total_mark = 0;
    for j = 3:11 %marks are columns 3 to 11
        total_mark = total_mark + table{i,j};
    end
    if total_mark > highest_final_mark{2} %finds the higher total mark
        highest_final_mark{1} = table{i,1};
        highest_final_mark{2} = total_mark;
    end
end
disp('Part C: ' + highest_final_mark{1} + ' ' + highest_final_mark{2});

%Part D
new_student = {'Kevin Le', '400385350', 10, 10, 10, 10, 20, 10, 10, 10, 10};
table = [table; new_student]; %concatenates new student to table
disp(table)

```

Command Window

```

>> q2
Part A: Morgan Bush 32
Part B: Anthony Bernard 37
Part C: Anthony Bernard 79

```

Name	ID_Number	Lab_1	Lab_2	Lab_3	Lab_4	Midterm	Exam_1	Exam_2	Exam_3	Exam_4
"Maximum Mark"	"0"	10	10	10	10	20	10	10	10	10
"Kacie Stephenson"	"1803933"	7	2	9	0	9	4	5	8	10
"Yassin Jordan"	"1884159"	1	2	10	3	8	3	9	5	7
"Lowri Mathews"	"1853847"	2	0	0	2	17	6	10	7	4
"Tiya Sheridan"	"1810192"	7	1	0	6	15	8	7	6	6
"Nikola Forrest"	"1891352"	1	7	0	6	5	0	5	5	10
"Veer Blair"	"1811313"	4	8	5	3	12	7	4	0	2
"Isabelle McGrath"	"1804841"	6	7	4	0	13	8	9	6	4
"Samir Greaves"	"1881925"	9	3	7	1	6	4	6	5	9
"Zander Kendall"	"1877711"	8	10	5	4	17	4	8	10	2
"Shahzaib Buckley"	"1830894"	4	5	7	9	8	5	7	0	6
"Morgan Bush"	"1855191"	9	6	7	10	1	5	7	2	8
"Amaan Robbins"	"1821012"	1	8	4	4	8	0	9	5	8
"Theodore Lawson"	"1844339"	5	7	10	7	14	9	2	2	9
"Ace Branch"	"1898468"	2	1	3	7	11	9	9	3	6
"Anthony Bernard"	"1883633"	4	1	10	8	19	10	9	9	9
"Tobey Bell"	"1808742"	0	10	8	2	10	9	0	8	6
"Jannat Cassidy"	"1863450"	1	2	4	5	10	4	5	9	3
"Imran Marquez"	"1830190"	2	9	1	6	17	10	0	7	5
"Amani Castro"	"1835544"	8	9	5	7	3	7	6	8	4
"Blanka Holt"	"1820930"	6	5	2	0	8	6	0	7	10
"Kevin Le"	"400385350"	10	10	10	10	20	10	10	10	10

f >>

Figure 2: Part A shows student with highest lab marks, part B shows student with highest exam marks, part C shows student with highest total mark, and table with an added student

Q3.

```
img = imread('ee3tp3picture2023.jpg');  
  
img_red = img(:,:,1); %contains only the red component  
img_green = img(:,:,2); %contains only the green component  
img_blue = img(:,:,3); %contains only the blue component  
  
reconstructed_img = cat(3, 6*img_red, 5*img_green, img_blue);  
  
imshow(reconstructed_img);  
imwrite(reconstructed_img, 'my_fixed_image.jpg'); %creates a new .jpg file
```

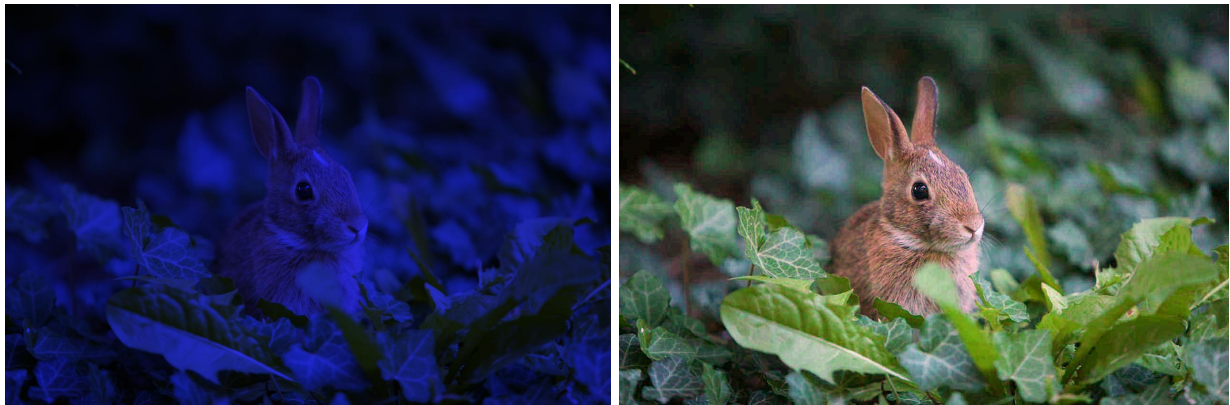


Figure 2: Image on the left is before the reconstruction, image on the right is after scaling the red component by 6 and green component by 5

Files Included:

q1.m : imports *SimpleFunctions.m* for functions like unit step and delta, creates functions for parts A to D, plots each function in a stem plot, and creates a *q1_plots.jpg* file with the 4 plots

q2.m: imports *course_grades_2023.xlsx* and creates a table from the excel data. Using a double for loop to iterate through each student down the rows and iterate through the marks over the columns, part A finds the student with the highest lab mark, part B finds the student with the highest exam mark, and part C finds the student with the highest overall mark. Part D adds a new student 'Kevin Le', his student ID and his marks, and displays the updated table of students.

q3.m: imports *ee3tp3picture2023.jpg*, separates the red, green and blue components, and rescales the red component by 6 and green component by 5. Creates a new *my_fixed_image.jpg* file with the corrected image.

q1_plots.jpg: Four stem plots created by *q1.m*

my_fixed_image.jpg: *ee3tp3picture2023.jpg* with the red and green components rescaled