Signals & Systems - EE 3TP3
Lab #1

-

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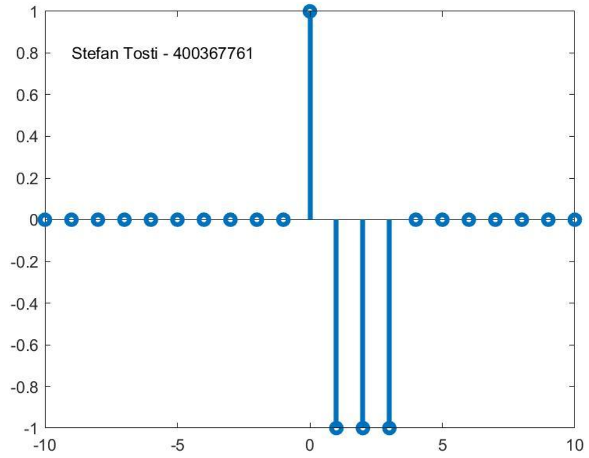
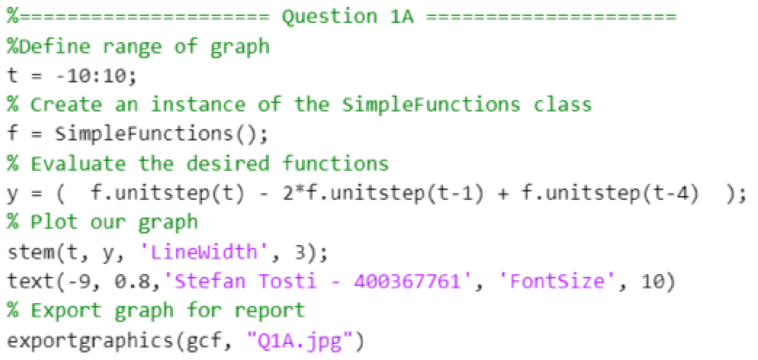
2023 - 09 - 12

Question 1

1A

Below find the code for question 1A and the output graph from running that code

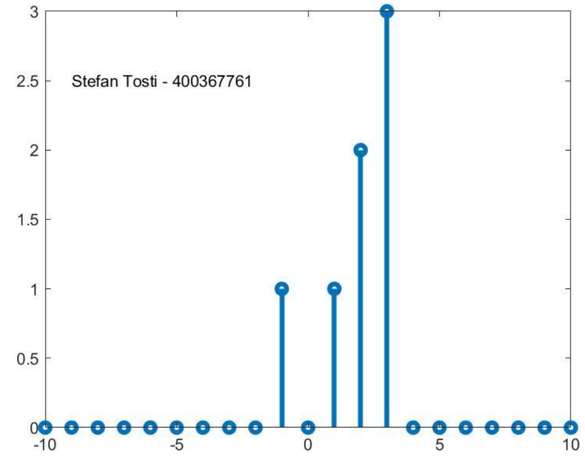


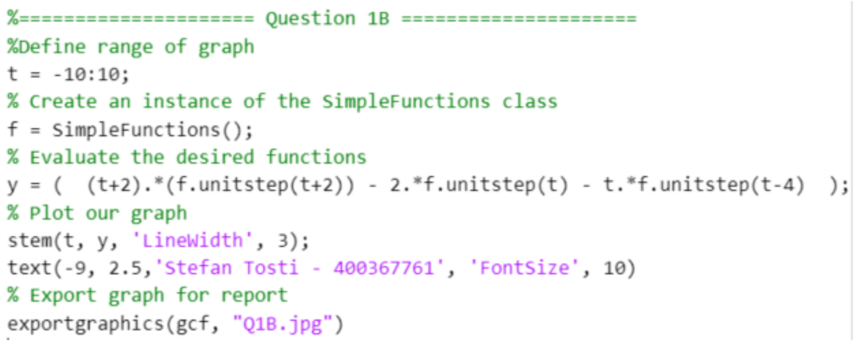


```
%===================== Question 1A =====================
%Define range of graph
t = -10:10;
% Create an instance of the SimpleFunctions class
f = SimpleFunctions();
% Evaluate the desired functions
y = (  f.unitstep(t) - 2*f.unitstep(t-1) + f.unitstep(t-4)  );
% Plot our graph
stem(t, y, 'LineWidth', 3);
text(-9, 0.8,'Stefan Tosti - 400367761', 'FontSize', 10)
% Export graph for report
exportgraphics(gcf, "Q1A.jpg")
```

1B

Below find the code for question 1B and the output graph from running that code

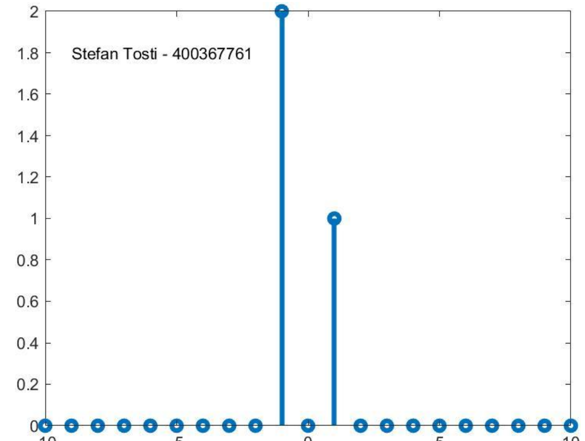


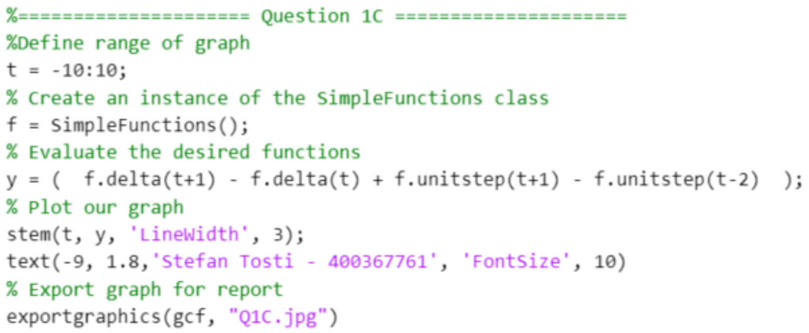


```
%===================== Question 1B =====================
%Define range of graph
t = -10:10;
% Create an instance of the SimpleFunctions class
f = SimpleFunctions();
% Evaluate the desired functions
y = (  (t+2).*(f.unitstep(t+2)) - 2.*f.unitstep(t) - t.*f.unitstep(t-4)  );
% Plot our graph
stem(t, y, 'LineWidth', 3);
text(-9, 2.5,'Stefan Tosti - 400367761', 'FontSize', 10)
% Export graph for report
exportgraphics(gcf, "Q1B.jpg")
```

1C

Below find the code for question 1C and the output graph from running that code

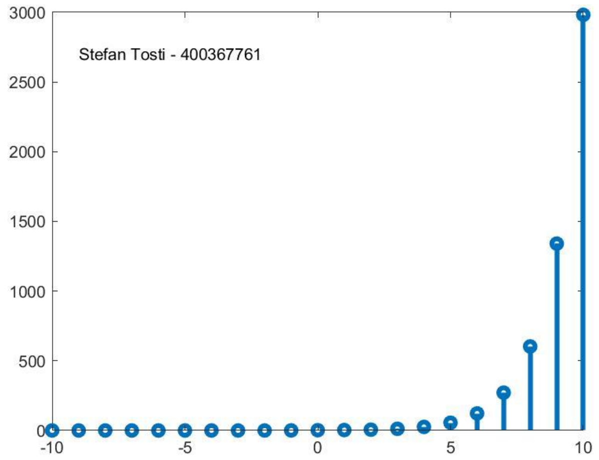


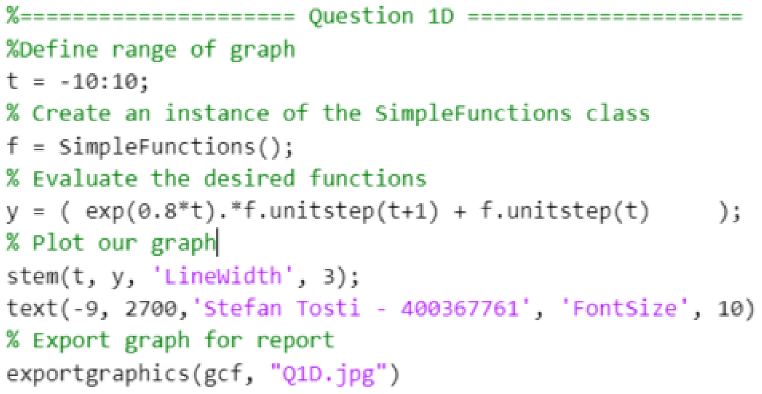


```
%===================== Question 1C =====================
%Define range of graph
t = -10:10;
% Create an instance of the SimpleFunctions class
f = SimpleFunctions();
% Evaluate the desired functions
y = (  f.delta(t+1) - f.delta(t) + f.unitstep(t+1) - f.unitstep(t-2)  );
% Plot our graph
stem(t, y, 'LineWidth', 3);
text(-9, 1.8,'Stefan Tosti - 400367761', 'FontSize', 10)
% Export graph for report
exportgraphics(gcf, "Q1C.jpg")
```

1D

Below find the code for question 1D and the output graph from running that code

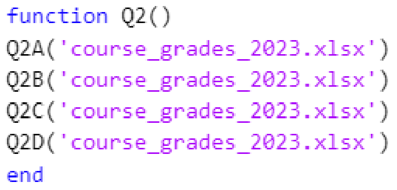




```
%==================== Question 1D =====================
%Define range of graph
t = -10:10;
% Create an instance of the SimpleFunctions class
f = SimpleFunctions();
% Evaluate the desired functions
y = ( exp(0.8*t).*f.unitstep(t+1) + f.unitstep(t)      );
% Plot our graph
stem(t, y, 'LineWidth', 3);
text(-9, 2700,'Stefan Tosti - 400367761', 'FontSize', 10)
% Export graph for report
exportgraphics(gcf, "Q1D.jpg")
```

Question 2

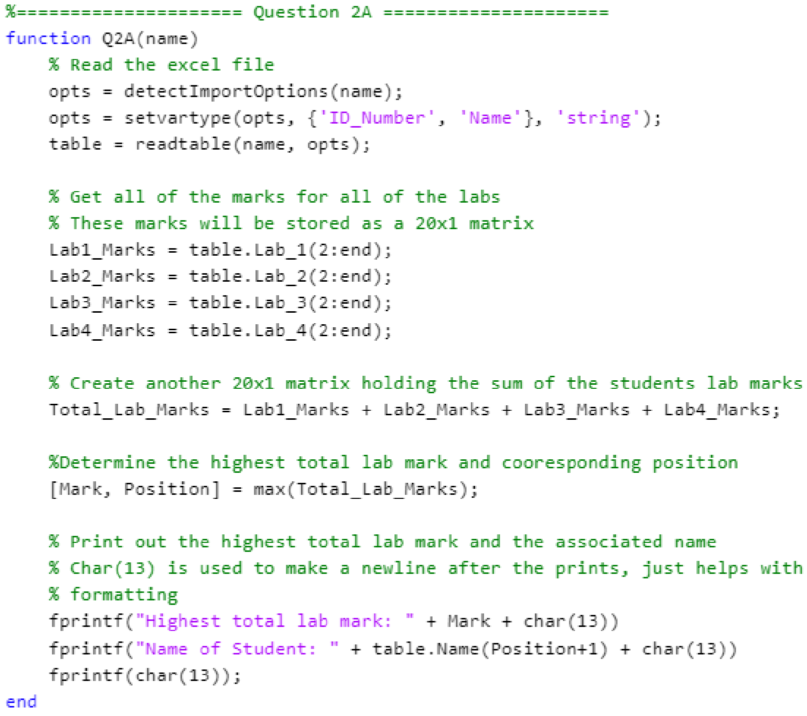
The following main function was used to test the functions written for Question 2A, 2B and 2C



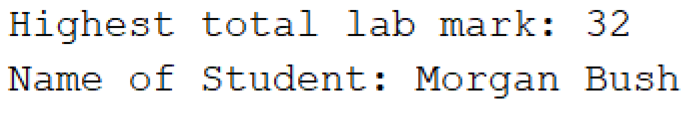
```
function Q2()
Q2A('course_grades_2023.xlsx')
Q2B('course_grades_2023.xlsx')
Q2C('course_grades_2023.xlsx')
Q2D('course_grades_2023.xlsx')
end
```

Question 2A

Below find the function block for question 2A and the output from running that function



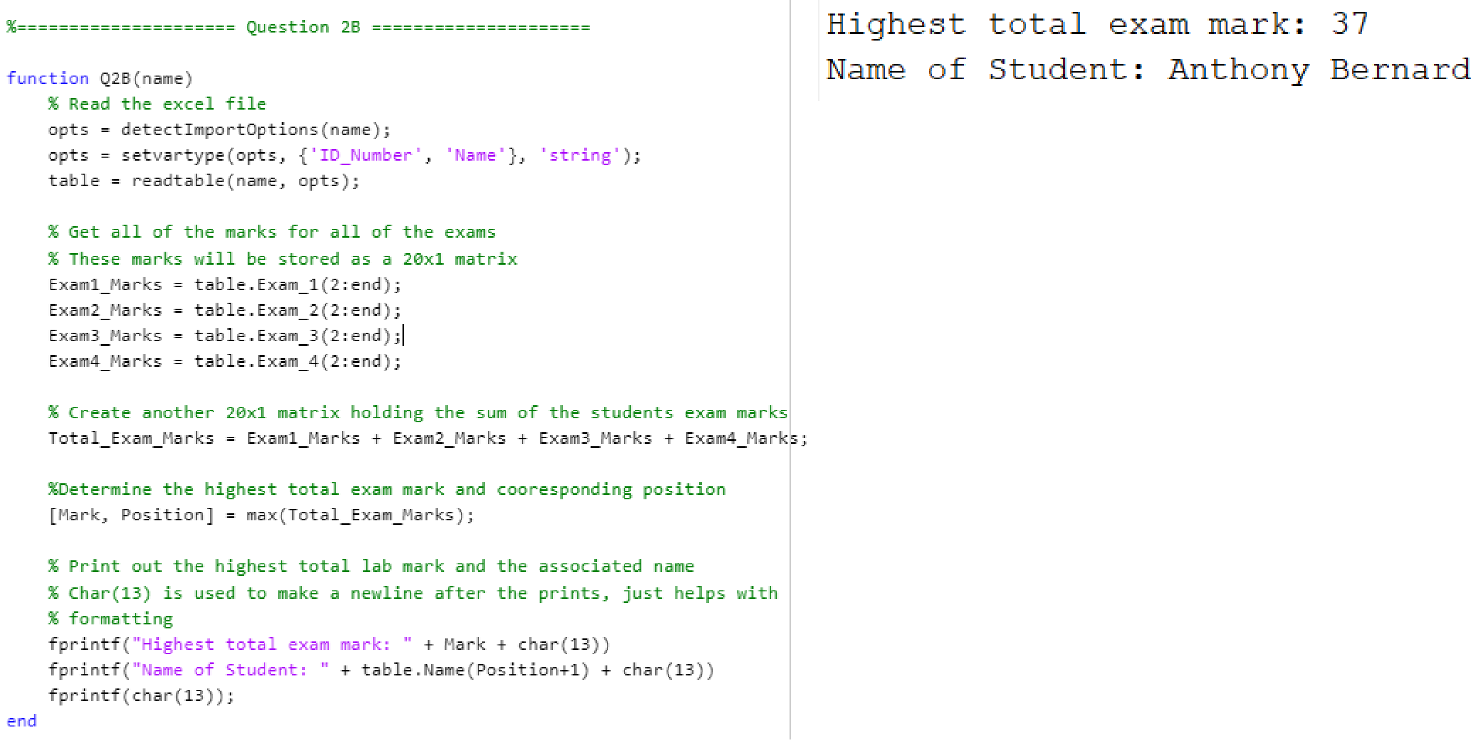
```
%===================== Question 2A =====================
function Q2A(name)
    % Read the excel file
    opts = detectImportOptions(name);
    opts = setvartype(opts, {'ID_Number', 'Name'}, 'string');
    table = readtable(name, opts);

    % Get all of the marks for all of the labs
    % These marks will be stored as a 20x1 matrix
    Lab1_Marks = table.Lab_1(2:end);
    Lab2_Marks = table.Lab_2(2:end);
    Lab3_Marks = table.Lab_3(2:end);
    Lab4_Marks = table.Lab_4(2:end);

    % Create another 20x1 matrix holding the sum of the students lab marks
    Total_Lab_Marks = Lab1_Marks + Lab2_Marks + Lab3_Marks + Lab4_Marks;

    %Determine the highest total lab mark and cooresponding position
    [Mark, Position] = max(Total_Lab_Marks);

    % Print out the highest total lab mark and the associated name
    % Char(13) is used to make a newline after the prints, just helps with
    % formatting
    fprintf("Highest total lab mark: " + Mark + char(13))
    fprintf("Name of Student: " + table.Name(Position+1) + char(13))
    fprintf(char(13));
end
```



```
Highest total lab mark: 32
Name of Student: Morgan Bush
```

Question 2B

Find below the function block for question 2B and the output from running that function

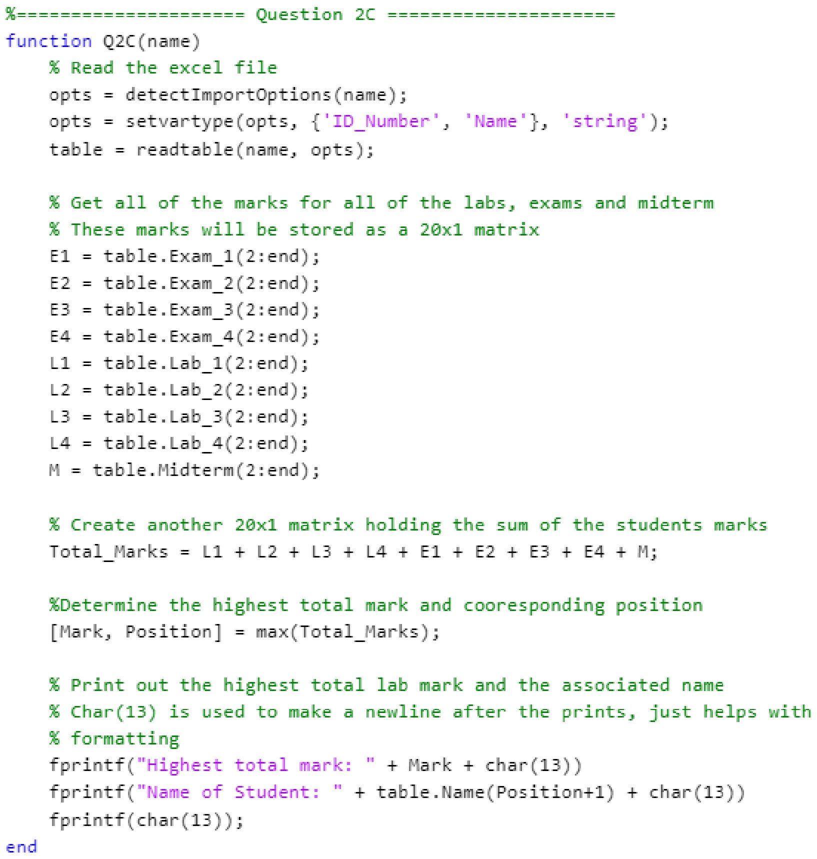


```
%==================== Question 2B ====================

function Q2B(name)
    % Read the excel file
    opts = detectImportOptions(name);
    opts = setvartype(opts, {'ID_Number', 'Name'}, 'string');
    table = readtable(name, opts);

    % Get all of the marks for all of the exams
    % These marks will be stored as a 20x1 matrix
    Exam1_Marks = table.Exam_1(2:end);
    Exam2_Marks = table.Exam_2(2:end);
    Exam3_Marks = table.Exam_3(2:end);
    Exam4_Marks = table.Exam_4(2:end);

    % Create another 20x1 matrix holding the sum of the students exam marks
    Total_Exam_Marks = Exam1_Marks + Exam2_Marks + Exam3_Marks + Exam4_Marks;

    %Determine the highest total exam mark and cooresponding position
    [Mark, Position] = max(Total_Exam_Marks);

    % Print out the highest total lab mark and the associated name
    % Char(13) is used to make a newline after the prints, just helps with
    % formatting
    fprintf("Highest total exam mark: " + Mark + char(13))
    fprintf("Name of Student: " + table.Name(Position+1) + char(13))
    fprintf(char(13));
end
```

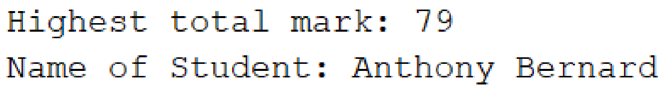
```
Highest total exam mark: 37
Name of Student: Anthony Bernard
```

Question 2C

Find below the functional block for question 2C and the output from running that function



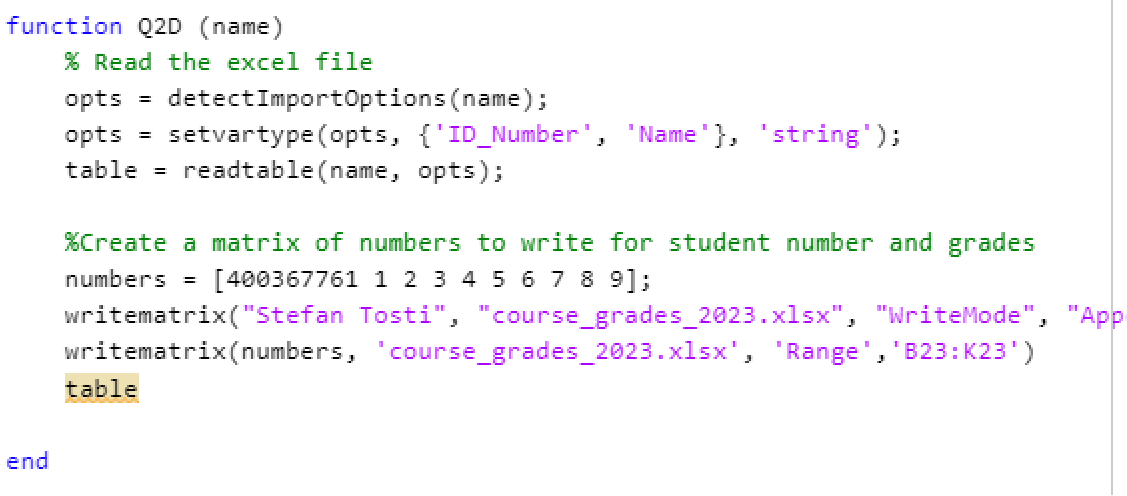
```
%==================== Question 2C ====================
function Q2C(name)
    % Read the excel file
    opts = detectImportOptions(name);
    opts = setvartype(opts, {'ID_Number', 'Name'}, 'string');
    table = readtable(name, opts);

    % Get all of the marks for all of the labs, exams and midterm
    % These marks will be stored as a 20x1 matrix
    E1 = table.Exam_1(2:end);
    E2 = table.Exam_2(2:end);
    E3 = table.Exam_3(2:end);
    E4 = table.Exam_4(2:end);
    L1 = table.Lab_1(2:end);
    L2 = table.Lab_2(2:end);
    L3 = table.Lab_3(2:end);
    L4 = table.Lab_4(2:end);
    M = table.Midterm(2:end);

    % Create another 20x1 matrix holding the sum of the students marks
    Total_Marks = L1 + L2 + L3 + L4 + E1 + E2 + E3 + E4 + M;

    %Determine the highest total mark and cooresponding position
    [Mark, Position] = max(Total_Marks);

    % Print out the highest total lab mark and the associated name
    % Char(13) is used to make a newline after the prints, just helps with
    % formatting
    fprintf("Highest total mark: " + Mark + char(13))
    fprintf("Name of Student: " + table.Name(Position+1) + char(13))
    fprintf(char(13));
end
```



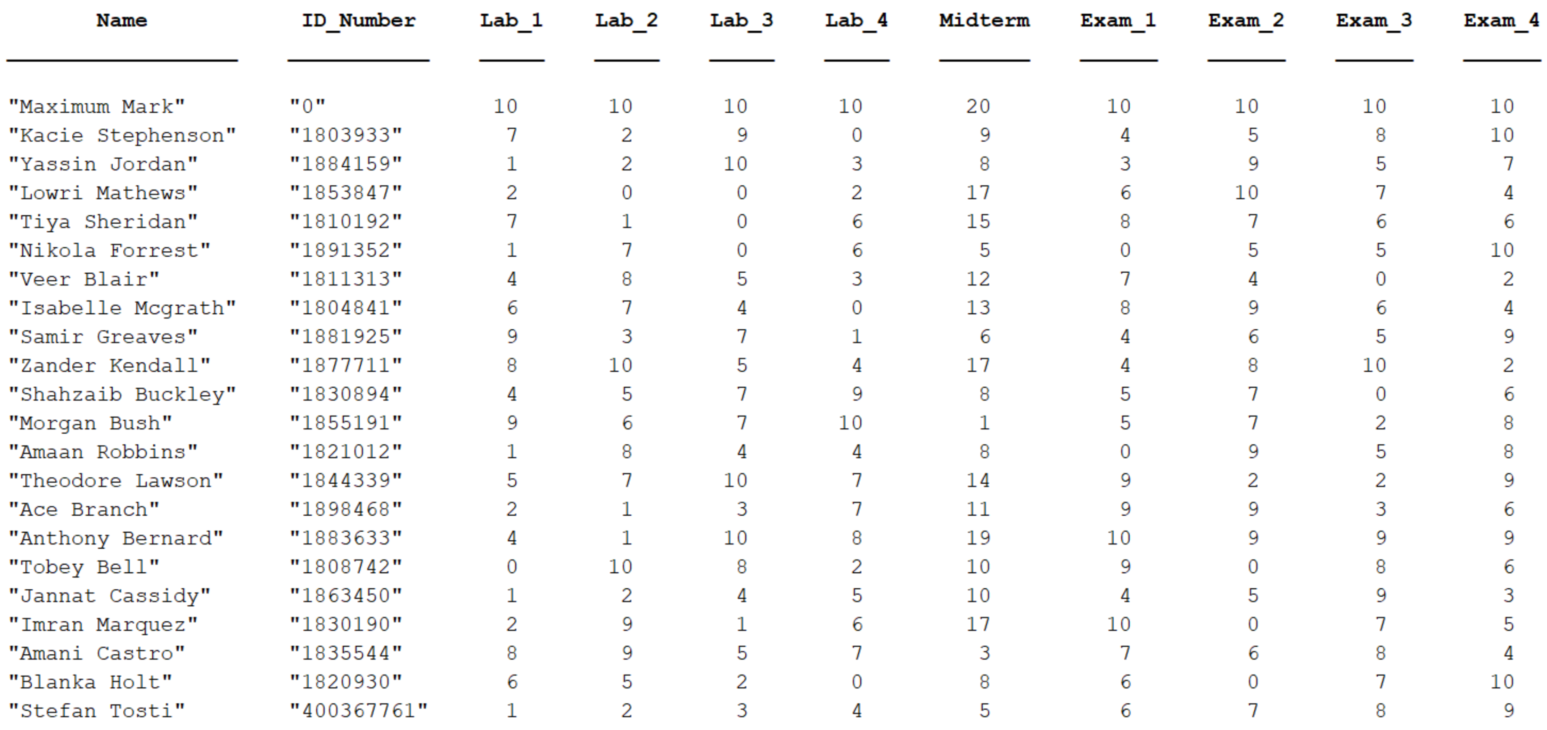
```
Highest total mark: 79
Name of Student: Anthony Bernard
```

Question 2D

Find below the code for question 2D and the output from running that code



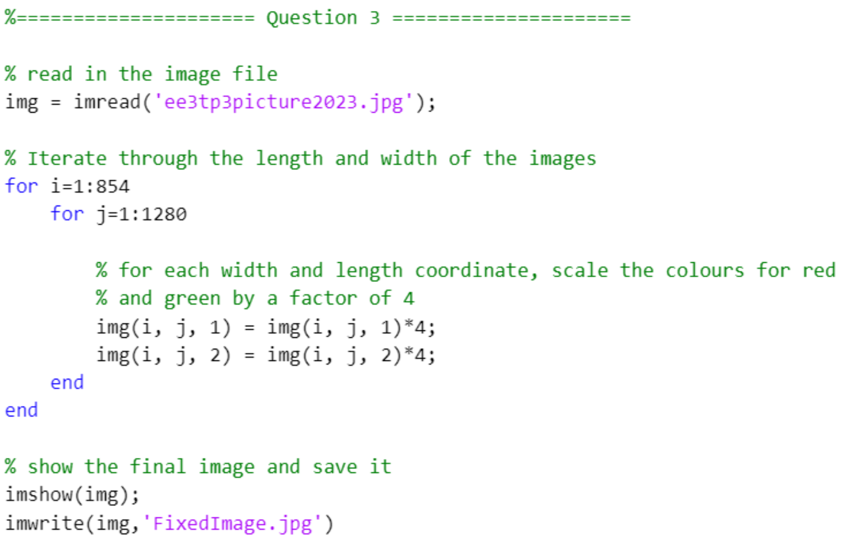
```
function Q2D (name)
    % Read the excel file
    opts = detectImportOptions(name);
    opts = setvartype(opts, {'ID_Number', 'Name'}, 'string');
    table = readtable(name, opts);

    %Create a matrix of numbers to write for student number and grades
    numbers = [400367761 1 2 3 4 5 6 7 8 9];
    writematrix("Stefan Tosti", "course_grades_2023.xlsx", "WriteMode", "Append");
    writematrix(numbers, 'course_grades_2023.xlsx', 'Range','B23:K23')
    table

end
```



```
         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
"Stefan Tosti"        "400367761"      1        2        3        4         5          6         7         8         9
```

Question 3

Find below the code used to correct the image, and the image displayed as a result of that



```
%===================== Question 3 =====================

% read in the image file
img = imread('ee3tp3picture2023.jpg');

% Iterate through the length and width of the images
for i=1:854
    for j=1:1280

        % for each width and length coordinate, scale the colours for red
        % and green by a factor of 4
        img(i, j, 1) = img(i, j, 1)*4;
        img(i, j, 2) = img(i, j, 2)*4;
    end
end

% show the final image and save it
imshow(img);
imwrite(img,'FixedImage.jpg')
```