

**Report:**

Part 1 (14th September 2020)

**1. Problem Statement**

A task has been given to the MMU's ERU by the higher officials of MMU which is they need to know the progress of students in some specific subjects which the students were enrolled in. In order to know the progress of them, ERU has to make an analysis of the scores achieved by the students in the specific subjects. However, ERU has to manually execute the analysis. By performing such complications, it would be very troublesome. In other words, the processes are neither effective nor efficient as time has been wasted in performing the compilation. An example is when the scores of the students for the specific subjects is stored in Excel file format. The calculations can be very hard if the records are stored in an Excel spreadsheet. Thus, it will cause a lot of trouble in producing an analysis report. We can say that it is not efficient as calculating data one by one might cause duplication of data due to human error. This duplication eventually leads to data redundancy and this is caused by no checking of data during calculation.

To answer the question of "How to replace this manual method?", it can be done by using the basic data analysis application that has been built by our team. This app has the ability to read from the Excel file format and do the mathematical calculations by using the data in the file. Not only that, the output of this app will be shown in the tabular form which will be located in the excel file that has been read by the app. This app still can do the analysis even if we change the inputs of the data. The main feature of this app is it can generate statistical reports based on the given data and store it in a text file.

## 2. Functional requirements

Function ID	Function Name	Function Explanation
1	Main_Menu()	Display the main menu layout
1.1	Load_CSV_File	Loads the {name}.CSV file
2	Get_Input()	Responds to any wrong choice input by the user with an error message
3	SubMenu_Statistics()	Display a sub-menu that computes 6 statistic data(mean,median,variance,standard deviation, minimum and maximum)
4	Statistics_Results_Storage	Store the 6 statistic data in a txt file
5.1	Minimum()	Compute minimum for the subject quiz
5.2	Maximum()	Compute maximum for the subject quiz
5.3	MedianSort(const vector<int>& subject_name)	Compute the median for the subject quiz
5.4	Mean(const vector<int>& subject_name)	Compute the mean for the subject quiz
5.5	Variance(const vector<int>& subject_name)	Compute the variance for the subject quiz
5.6	Standard_Deviation(const vector<int>& subject_name)	Compute the standard deviation for the subject quiz
6	Calculate_Distinct_Frequency()	Calculate the distinct frequency of the subject quiz in table form

TCP1101 Assignment Part 1

Trimester 1, 2020/2021

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7	Plot_Histogram()	Plot the histogram for the subject quiz
8.1	Two_Table_Above_Mean_Below_Mean()	Display two tables above and below mean
8.2	Two_Table_Below_Mean_Above_Mean()	Display two tables below and above mean
9	Correlation()	Compute the correlation of two subjects
10	Linear_Regression_Line	Compute the linear regression line
11.1	Sorted_Ascending_Table_Column()	Display sorted data in ascending order of the selected table column
11.2	Sorted_descending_Table_Column()	Display sorted data in descending order of the selected table column
12	Statistical_Report_Txt()	Generate all six statistical data formatted in txt file
13	Statistical_Report_HTML()	Generate all six statistical data formatted in html file

### 3. The menu system: design and motivation

```
*****  
||BASIC DATA ANALYSIS||  
||      APPLICATION      ||  
*****  
  
Main Menu  
-----  
1. Load Data  
2. Print Data  
3. Compute Stats  
4. Exit  
Enter choice(1...4) :
```

**3.1** This is our main menu system where the user will have ( Load Data, Print Data, Compute Stats and Exit) these 4 options. Let's see what happens when the user selects option 3 which is Compute Stats.

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<pre>*****   BASIC DATA ANALYSIS      APPLICATION    *****  Main Menu ----- 1. Load Data 2. Print Data 3. Compute Stats 4. Exit Enter choice(1...4): 7 Invalid number! Please choose the given options. Press any key to continue . . .</pre>	<pre>*****   BASIC DATA ANALYSIS      APPLICATION    *****  Main Menu ----- 1. Load Data 2. Print Data 3. Compute Stats 4. Exit Enter choice(1...4): -1 Invalid number! Please choose the given options. Press any key to continue . . .</pre>
---	--

**3.1.1** Error message will be displayed when the user enters any wrong choice input. The user cannot move to the other page until entering the valid choice input.

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-----  
DATA

	ID	11920100	11920111	11920112	11920113
	AGE	19	20	21	22
	MATH	93	76	77	78
	SCIENCE	92	87	88	89
	MALAY	87	75	76	77

Select The Subject  
-----

1. Mathematics
2. Science
3. Bahasa Melayu
4. Exit

Enter choice(1...4) :

**3.2** When the user press option number 3, the user will be able to see 3 subjects and the student data as in the figure above. They may choose the subject they prefer by entering the subject's respective number.

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DATA

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	AGE	19	20	21	22
	MATH	93	76	77	78
	SCIENCE	92	87	88	89
	MALAY	87	75	76	77

Mathematics Stats Menu

- 
1. Minimum
  2. Max
  3. Median
  4. Mean
  5. Variance
  6. Standard Deviation
  7. Frequency
  8. Histogram
  9. Table below mean & Table above mean
  10. Pearson's Correlation
  11. Linear regression Line
  12. Sort by ascending or sort by descending
  13. Back
  14. Exit

Enter choice(1...11) : <7>

**3.3** Now the user can select their preferred calculation by entering the option's number which is 7.

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MATH	76	77	78	93
FREQUENCY	1	1	1	1

Mathematics Stats Menu

- 
- 1. Minimum
- 2. Max
- 3. Median
- 4. Mean
- 5. Variance
- 6. Standard Deviation
- 7. Frequency
- 8. Histogram
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- 11. Linear regression Line
- 12. Sort by ascending or sort by descending
- 13. Back
- 14. Exit

Enter choice(1...11) : <13>

**3.3.i)** When the user selects option 7, this frequency table will appear.

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DATA

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	AGE	19	20	21	22
	MATH	93	76	77	78
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Mathematics Stats Menu

- 
1. Minimum
  2. Max
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  4. Mean
  5. Variance
  6. Standard Deviation
  7. Frequency
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  9. Table below mean & Table above mean
  10. Pearson's Correlation
  11. Linear regression Line
  12. Sort by ascending or sort by descending
  13. Back
  14. Exit

Enter choice(1...7): 1

minimum: 76

Press any key to continue . . .

**3.3.ii)** Here is the result of the calculation if the user has selected the first option(minimum) for Mathematics subject.

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|| THE END ||

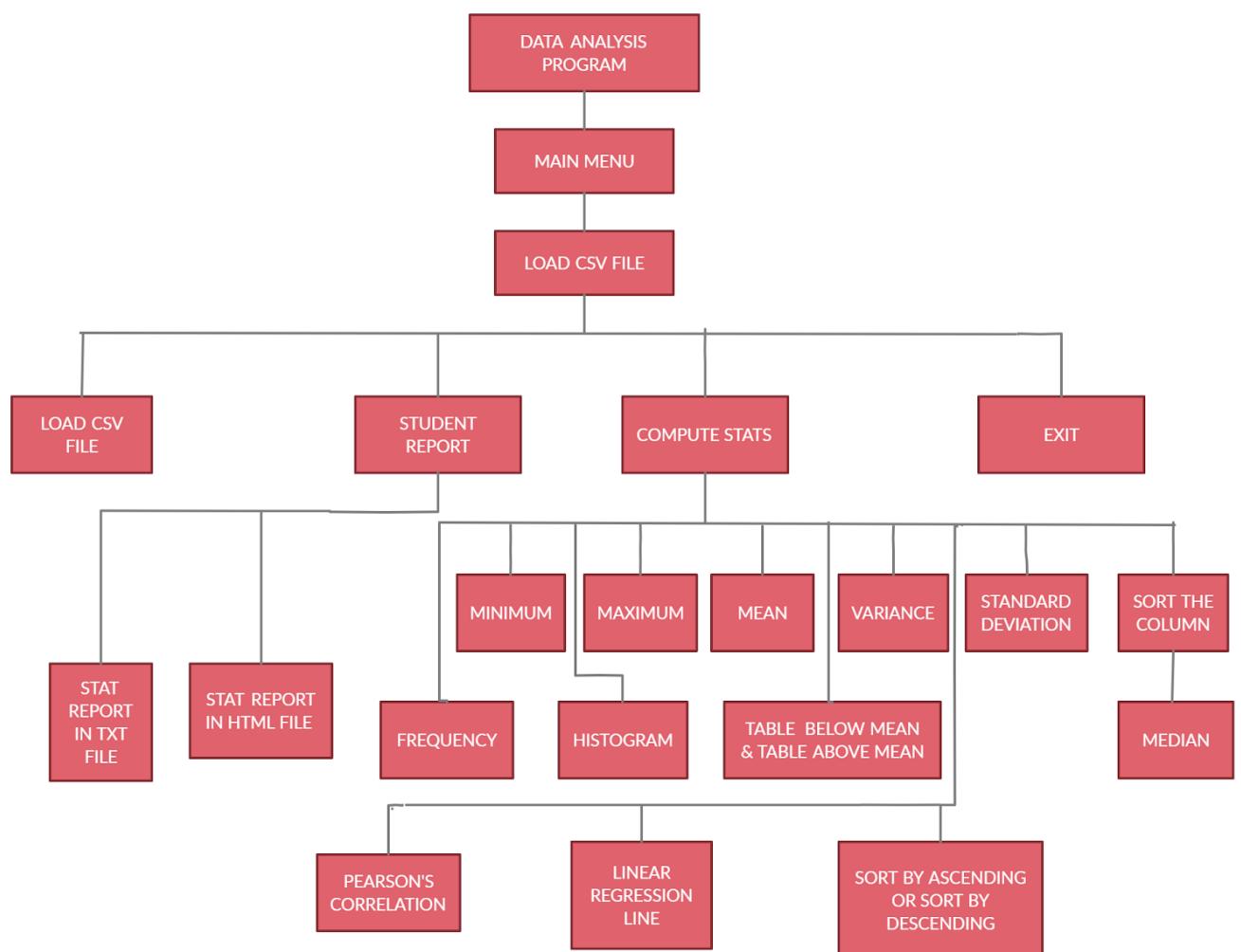
|| THANK YOU FOR USING ||

|| THIS APPLICATION ||

\*\*\*\*\*

**3.4** If the user decides to exit by selecting option number 14, this is what will be displayed.

#### 4. Structured chart for the system subcomponents:



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## 5. Algorithms (flowcharts and pseudocode) and proper explanation for the computations used.

1) Minimum	2) Maximum
<pre> graph TD     Start([Start/in array, out returnValue]) --&gt; arraySize[arraySize == length_of(array)]     arraySize --&gt; countInit[count == 2]     countInit --&gt; returnValueInit[returnValue == array[1]]     returnValueInit --&gt; Loop((Loop))     Loop --&gt; countGtSize{count &gt; arraySize}     countGtSize -- No --&gt; arrayCltReturnValue{array[count] &lt; returnValue}     arrayCltReturnValue -- Yes --&gt; returnValueUpdate[returnValue == array[count]]     returnValueUpdate --&gt; countInc[count == count + 1]     countInc --&gt; Loop     countGtSize -- Yes --&gt; End([End]) </pre>	<pre> graph TD     Start([Start/in array, out returnValue]) --&gt; arraySize[arraySize == length_of(array)]     arraySize --&gt; countInit[count == 2]     countInit --&gt; returnValueInit[returnValue == array[1]]     returnValueInit --&gt; Loop((Loop))     Loop --&gt; countGtSize{count &gt; arraySize}     countGtSize -- No --&gt; arrayCgtReturnValue{array[count] &gt; returnValue}     arrayCgtReturnValue -- Yes --&gt; returnValueUpdate[returnValue == array[count]]     returnValueUpdate --&gt; countInc[count == count + 1]     countInc --&gt; Loop     countGtSize -- Yes --&gt; End([End]) </pre>

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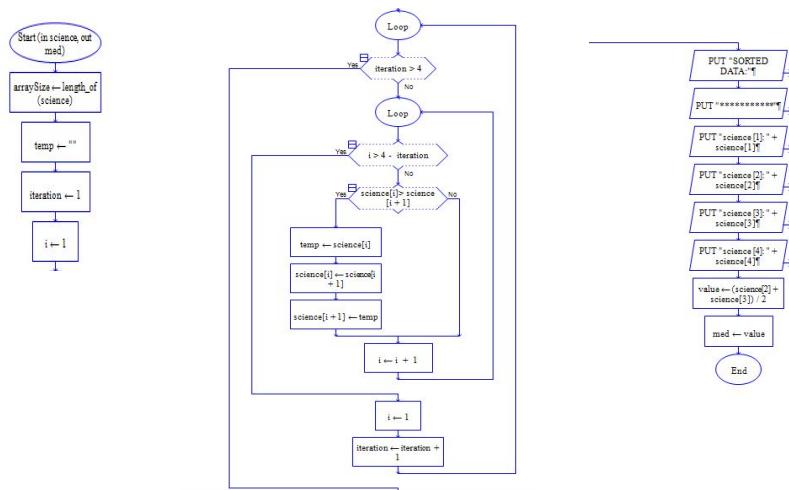
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## 3) Median\_Sort



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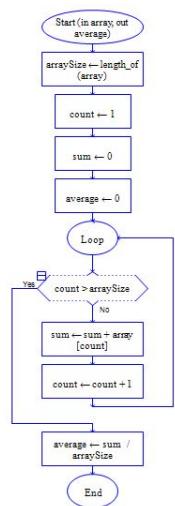
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## 4) Mean



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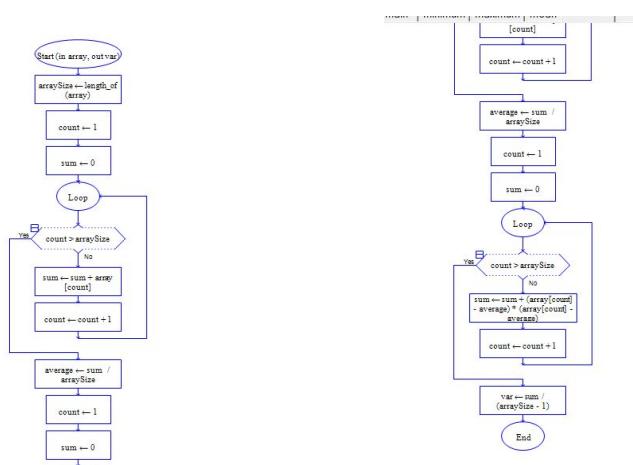
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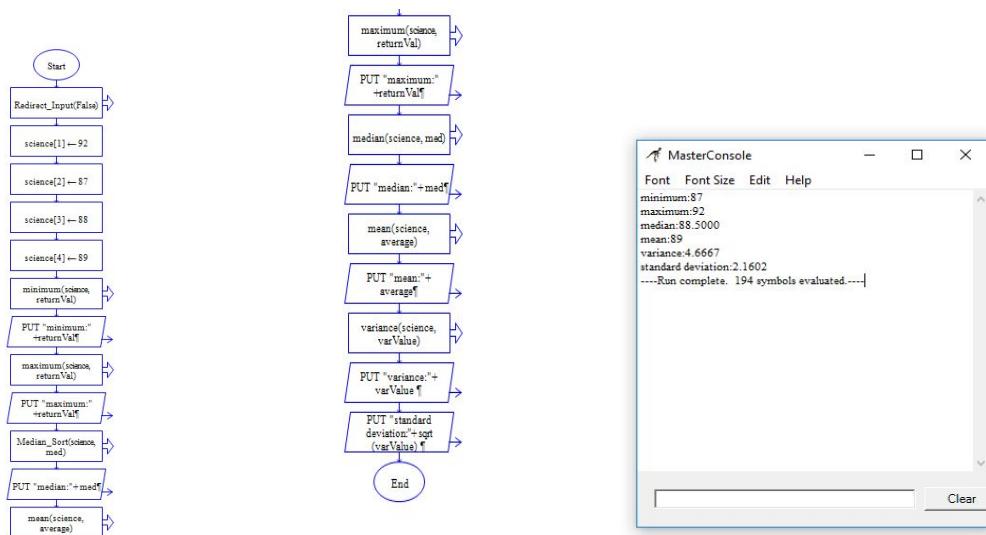
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## 5) Variance



## 6) MainMenu & 7) Standard\_Deviation



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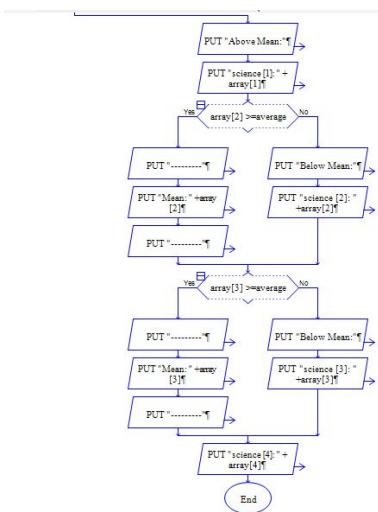
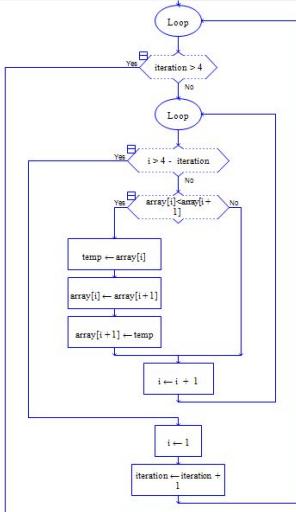
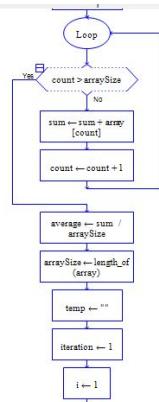
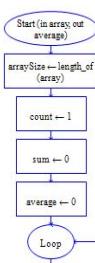
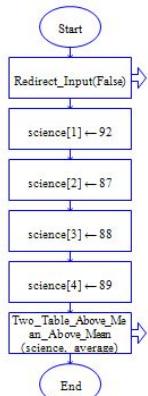
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#### 8) Table\_Above\_Mean\_Table\_Below\_Mean



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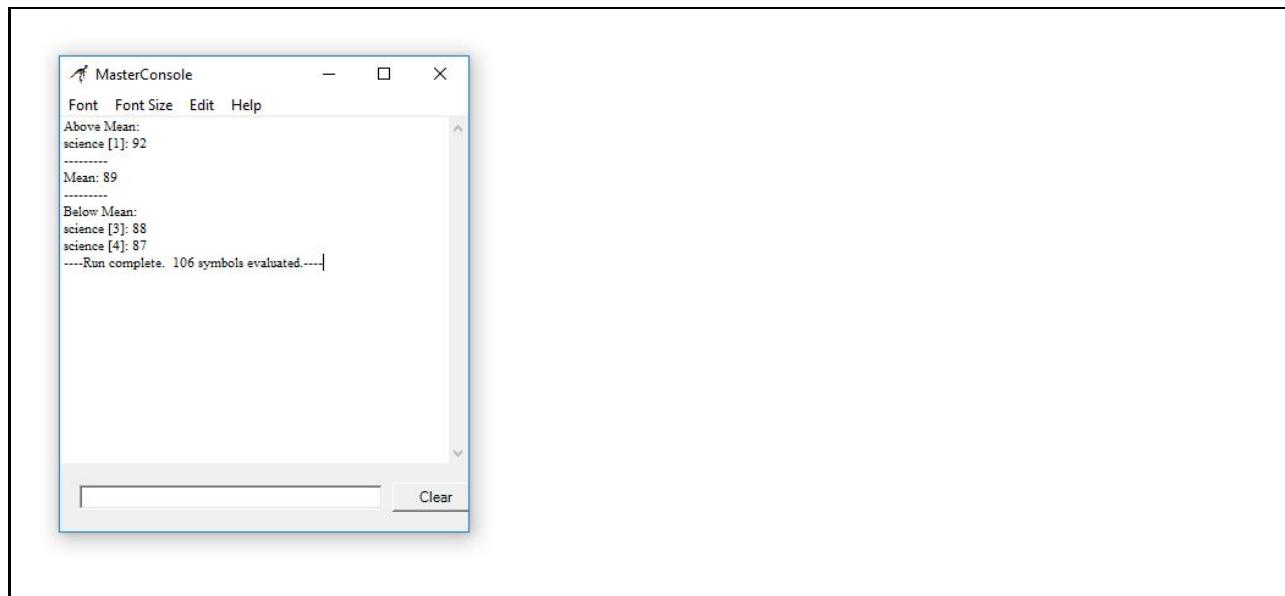
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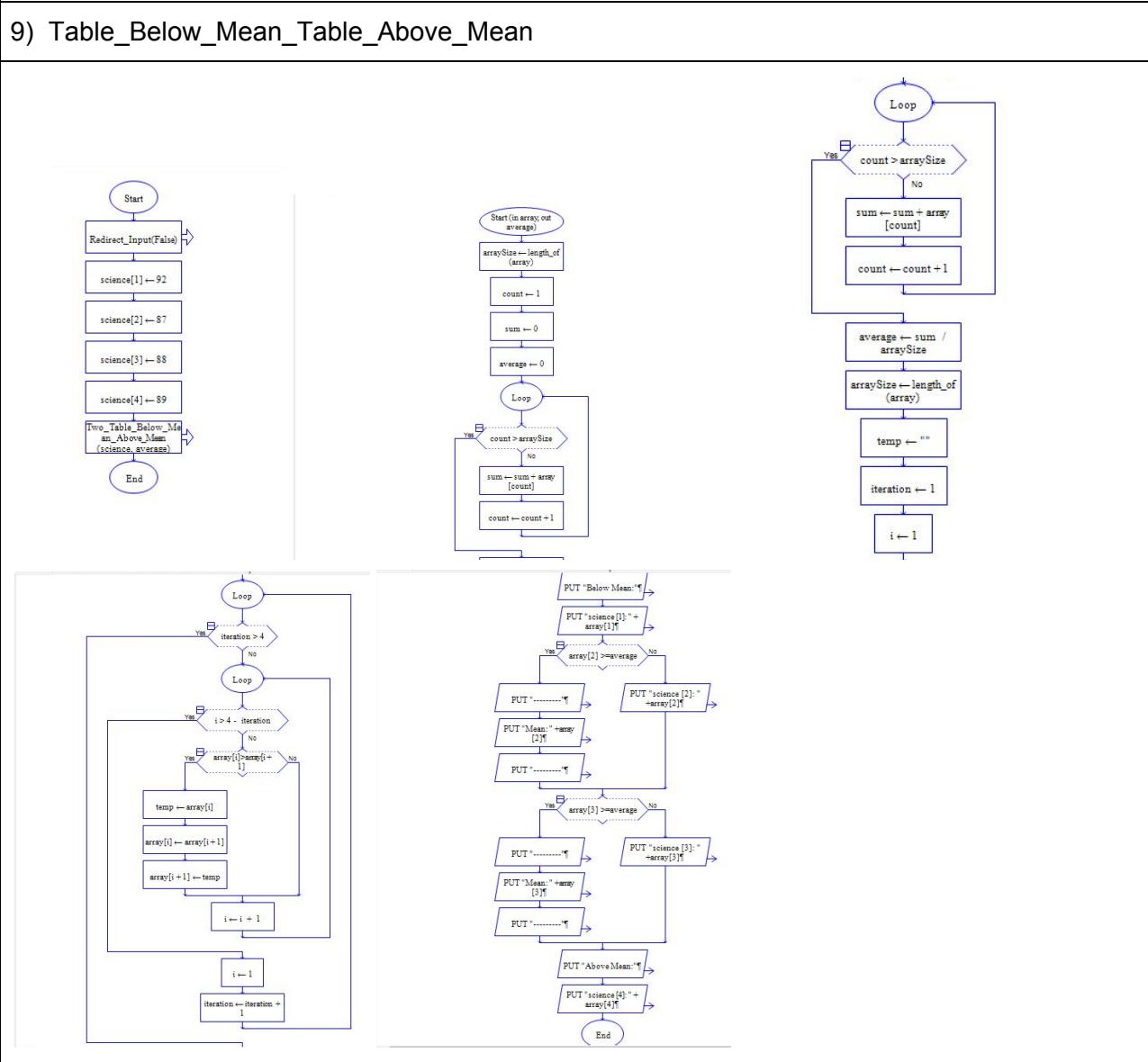
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## 9) Table\_Below\_Mean\_Table\_Above\_Mean



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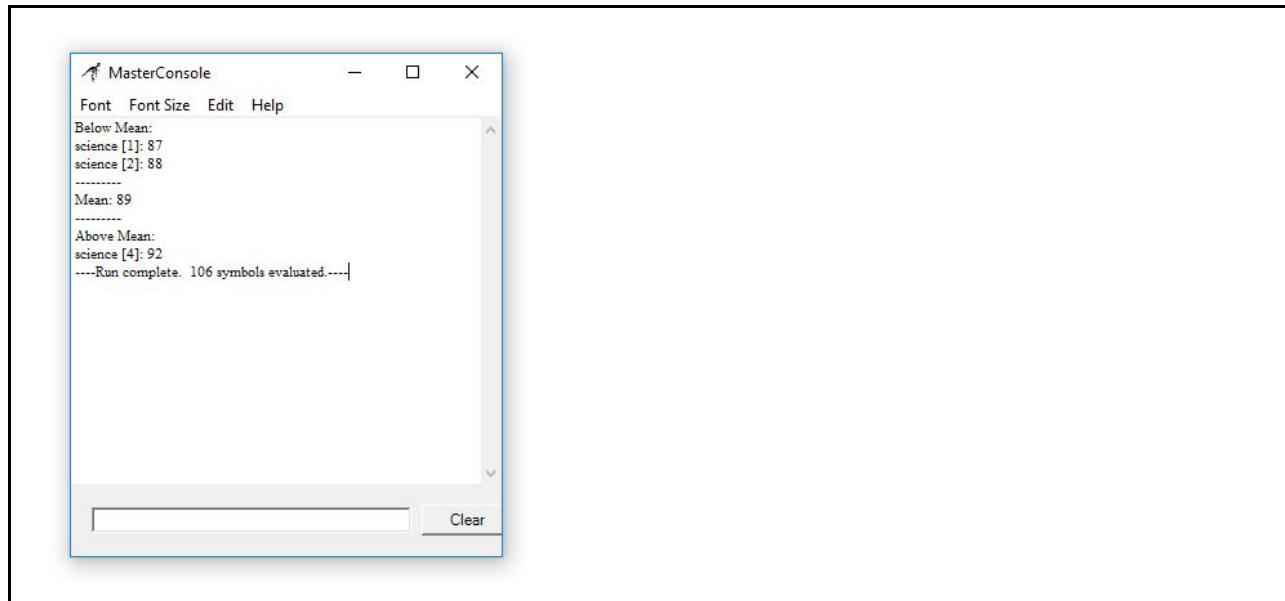
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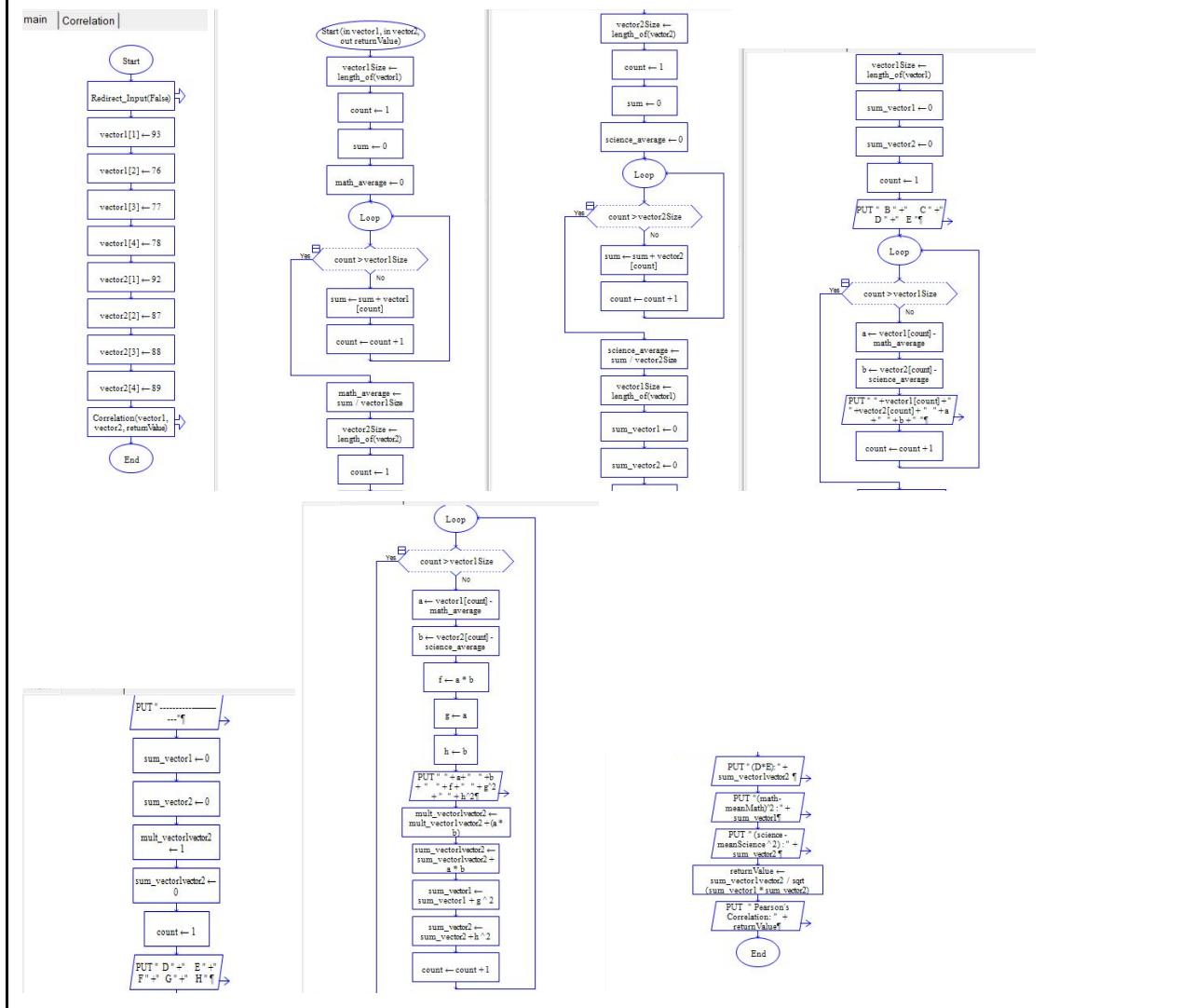
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## 10) Pearson's Correlation



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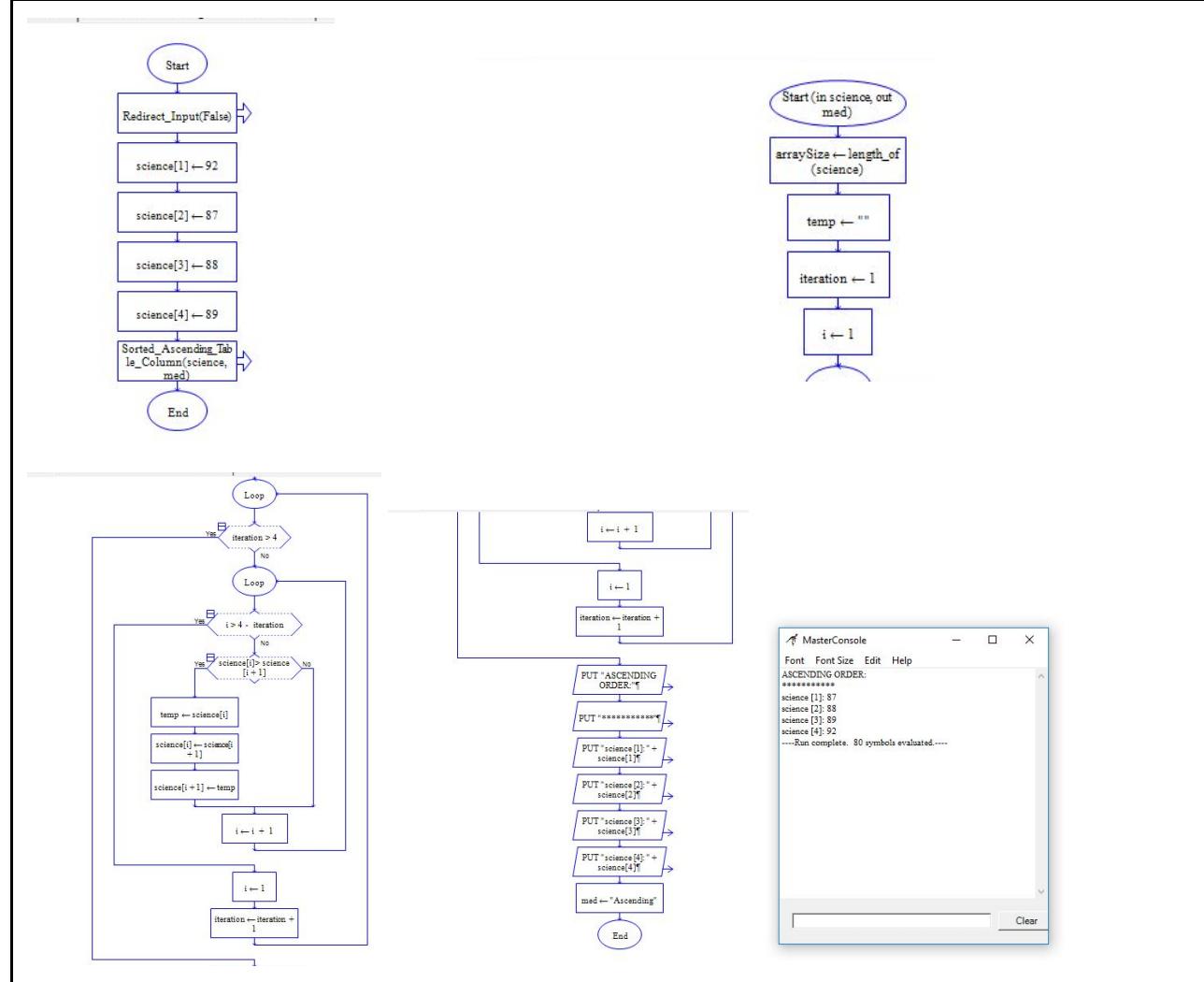
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## 11) Sorted\_Ascending\_Table\_Column



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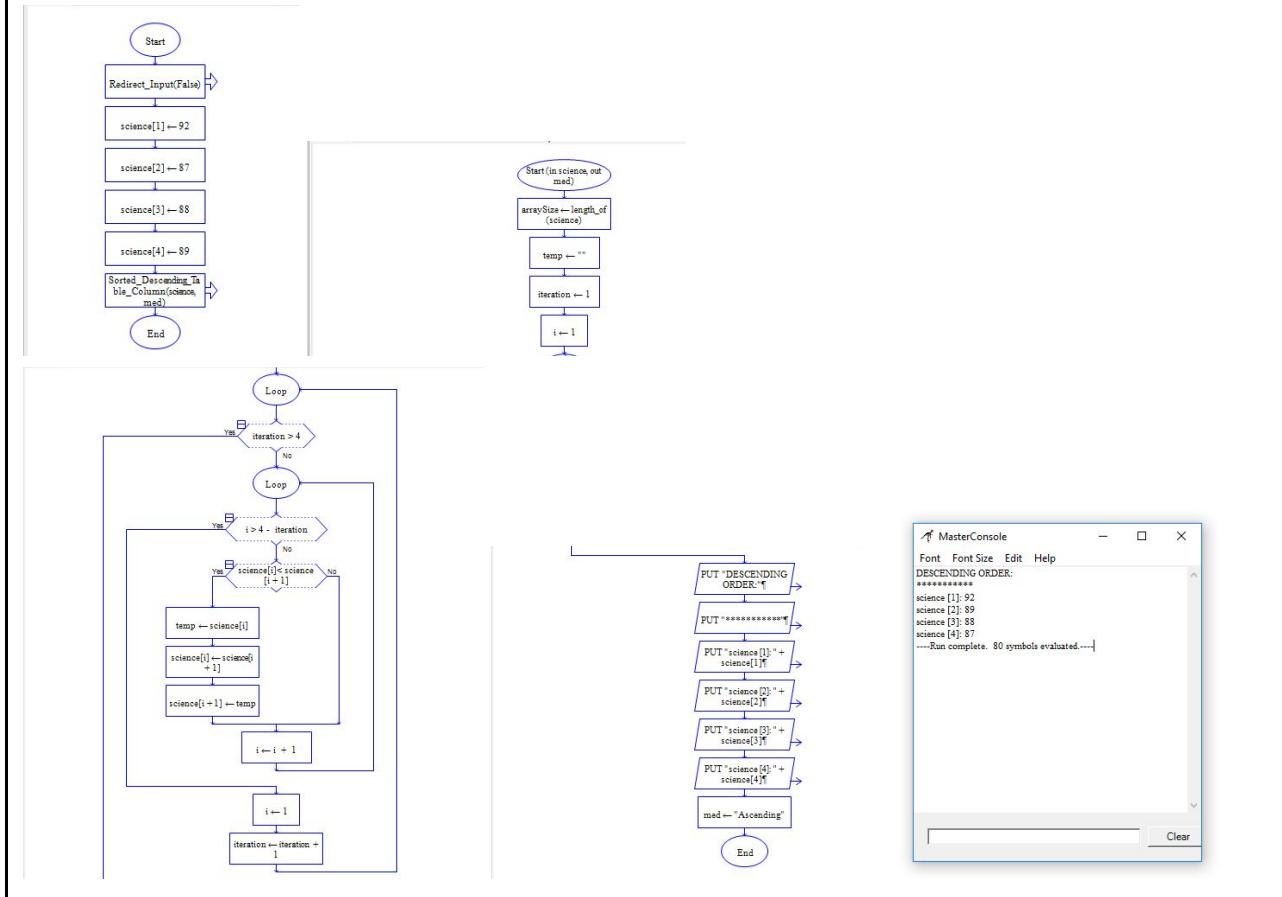
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## 12) Sorted\_Descending\_Table\_Column



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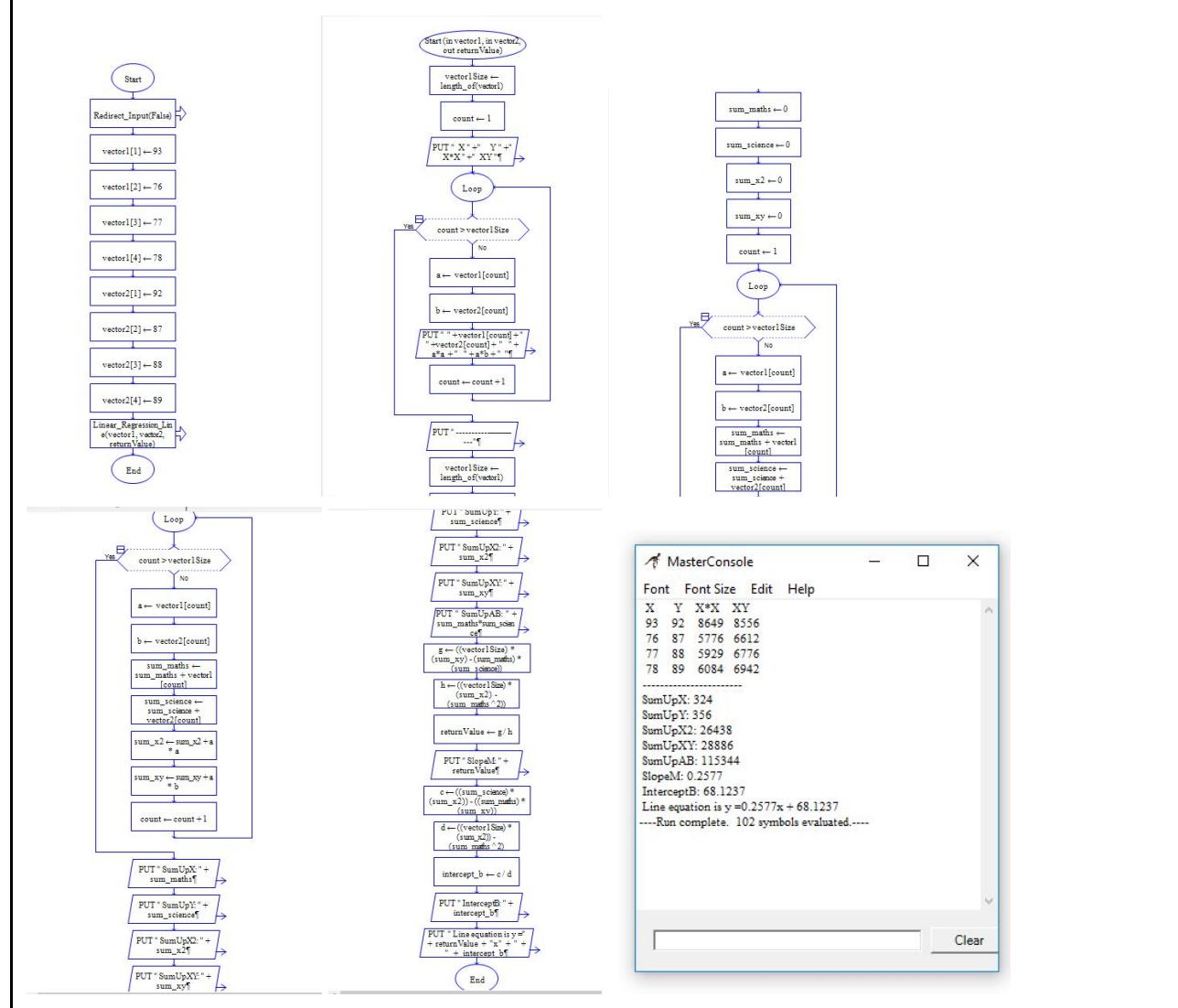
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### 13) Linear\_Regression\_Line



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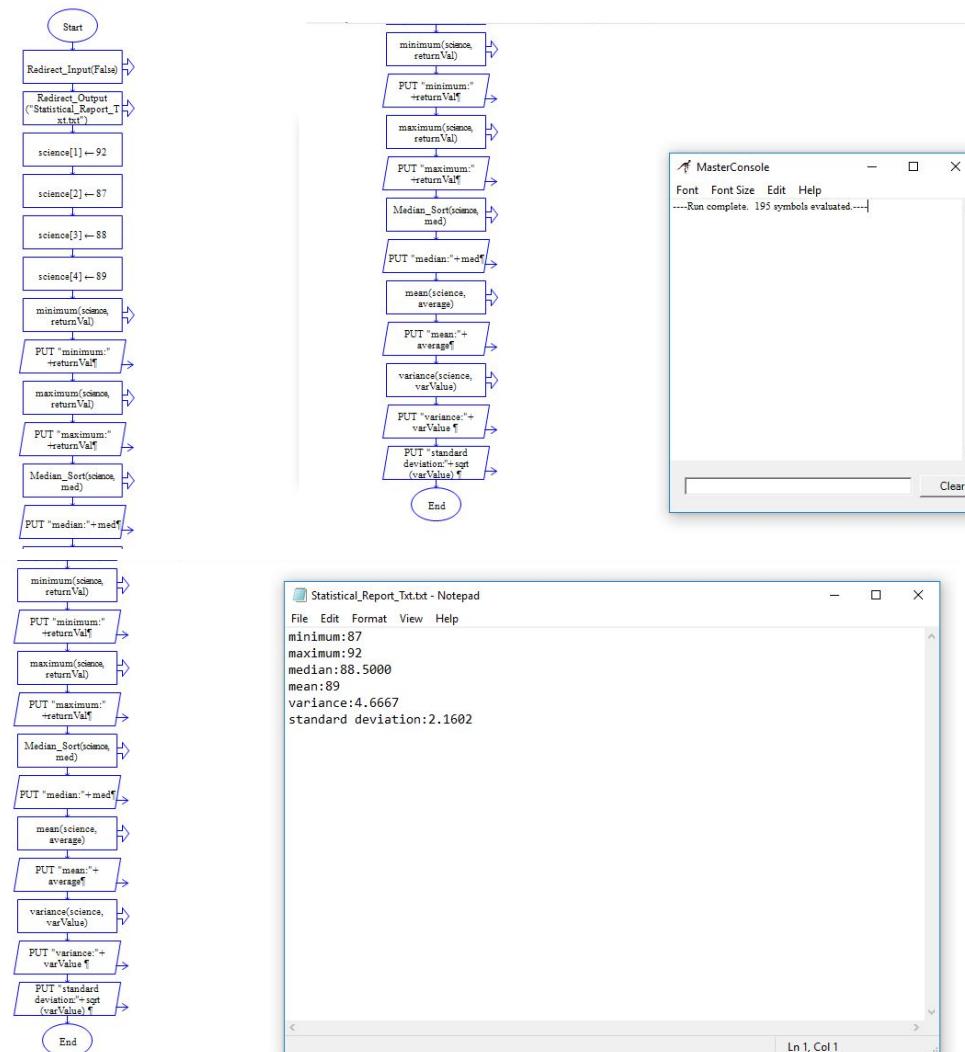
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## 14) Statistical\_Report\_Txt



# TCP1101 Assignment Part 1

Trimester 1, 2020/2021

by << Satishnair A/L Krishnan >>

Team Leader: Satishnair A/L Krishnan, 019-7814961, 1181103485@student.mmu.edu.my

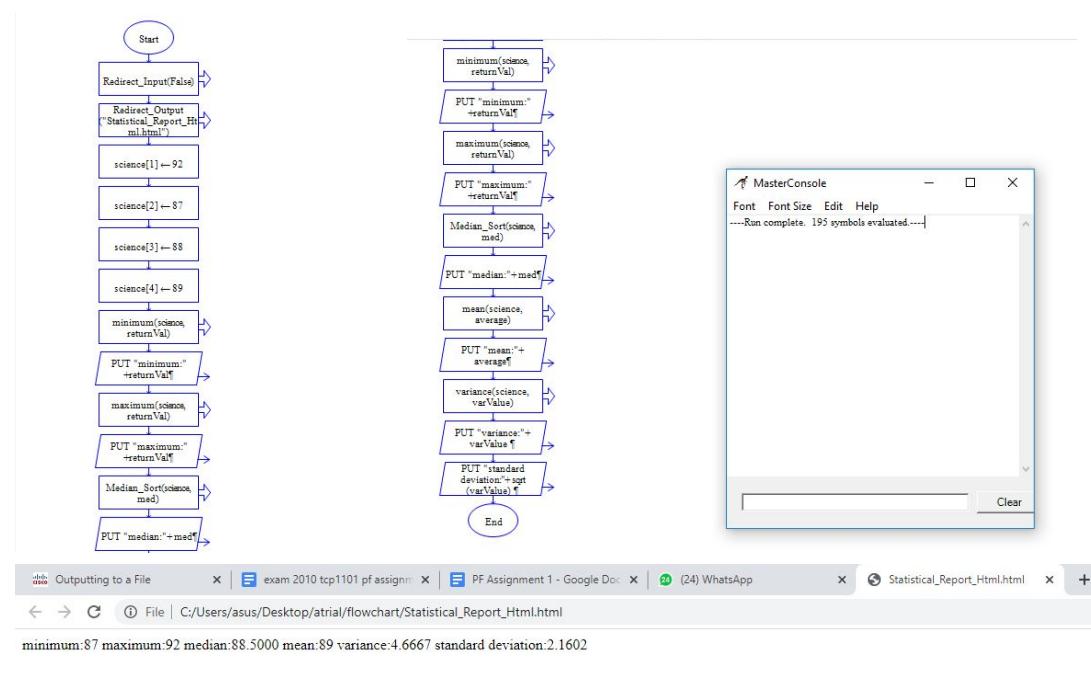
Team members:

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Ahmad Luqman bin Ahmad Lutpi, 019-3868897, [1191101434@student.mmu.edu.my](mailto:1191101434@student.mmu.edu.my)

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## 15) Statistical\_Report\_HTML()



# TCP1101 Assignment Part 1

Trimester 1, 2020/2021

by << Sathishnair A/L Krishnan >>

Team Leader: Sathishnair A/L Krishnan, 019-7814961, 1181103485@student.mmu.edu.my

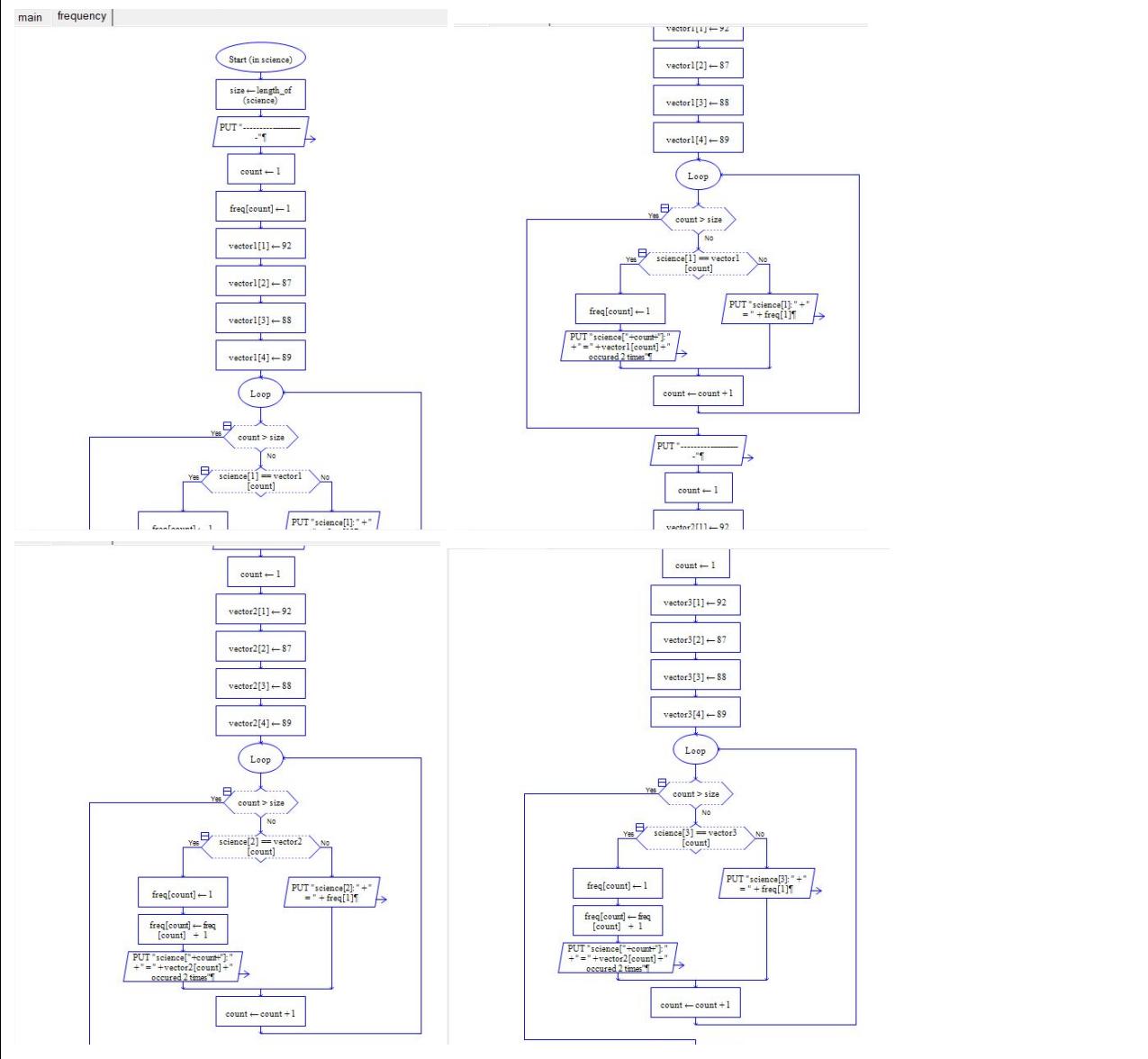
Team members:

Avinash Imanuel a/l Gana Raj Imanuel, 016-3759349, 1181103370@student.mmu.edu.my

Ahmad Luqman bin Ahmad Lutpi, 019-3868897, [1191101434@student.mmu.edu.my](mailto:1191101434@student.mmu.edu.my)

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## 16) Calculate\_Distinct\_Frequency



# TCP1101 Assignment Part 1

Trimester 1, 2020/2021

by << Satishnair A/L Krishnan >>

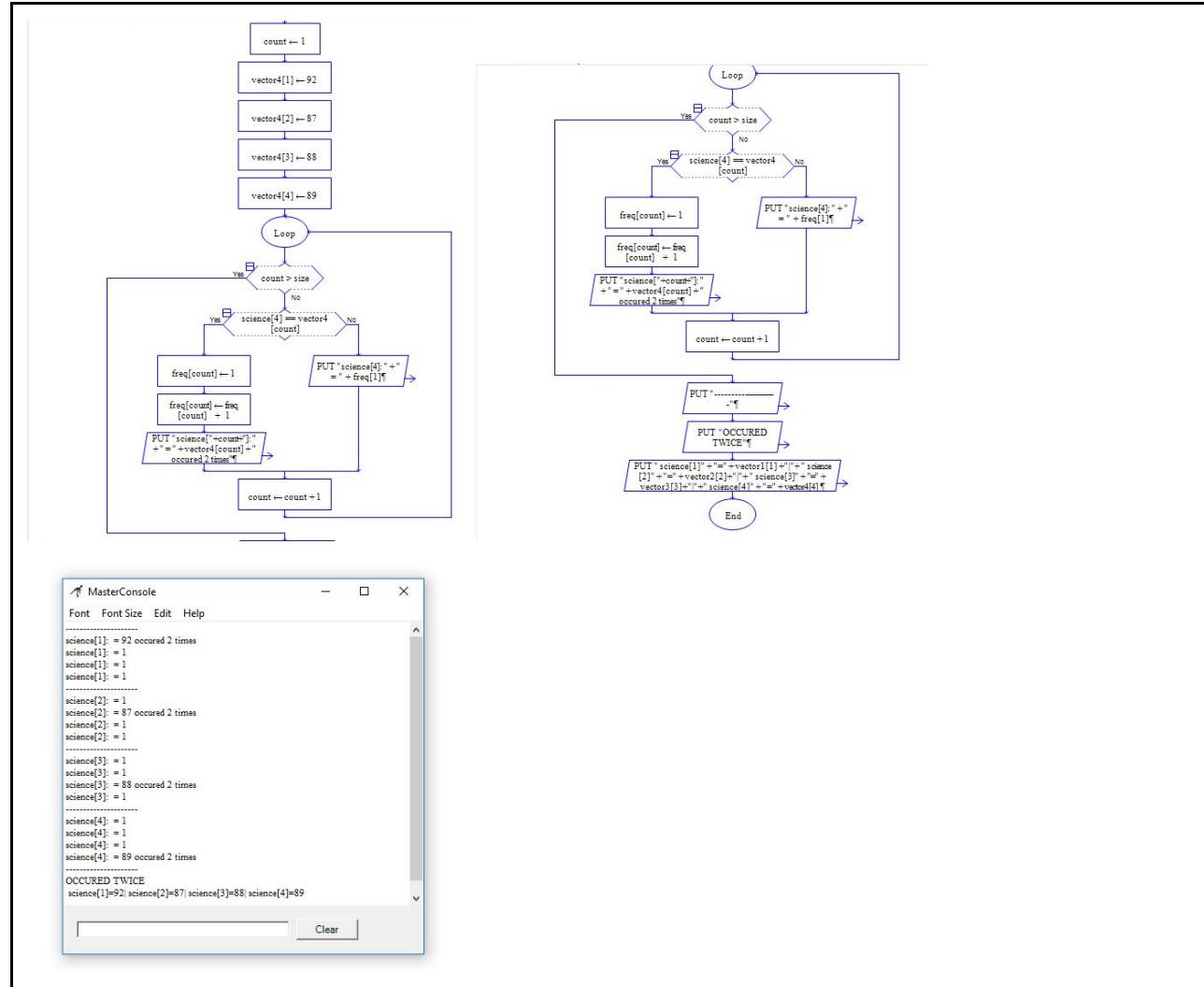
Team Leader: Satishnair A/L Krishnan, 019-7814961, 1181103485@student.mmu.edu.my

Team members:

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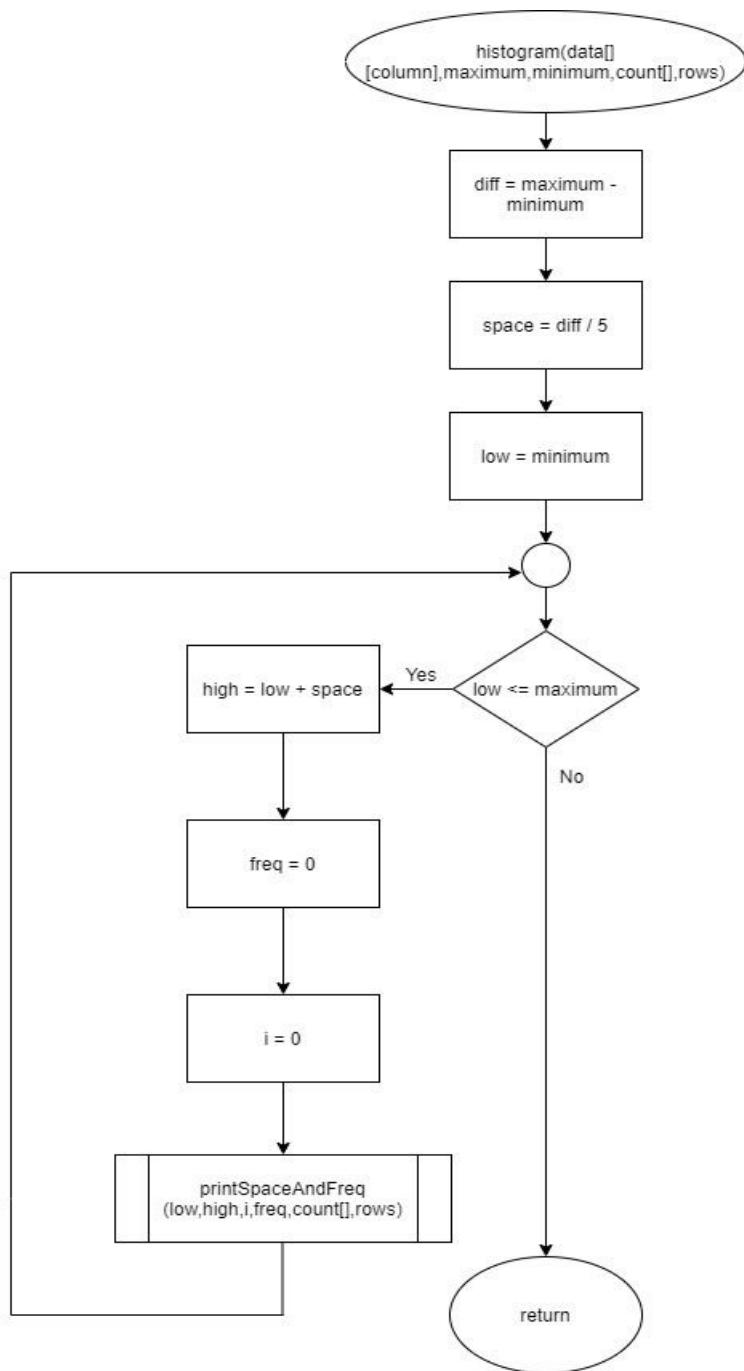
Team members:

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17) Plot\_Histogram()



TCP1101 Assignment Part 1

Trimester 1, 2020/2021

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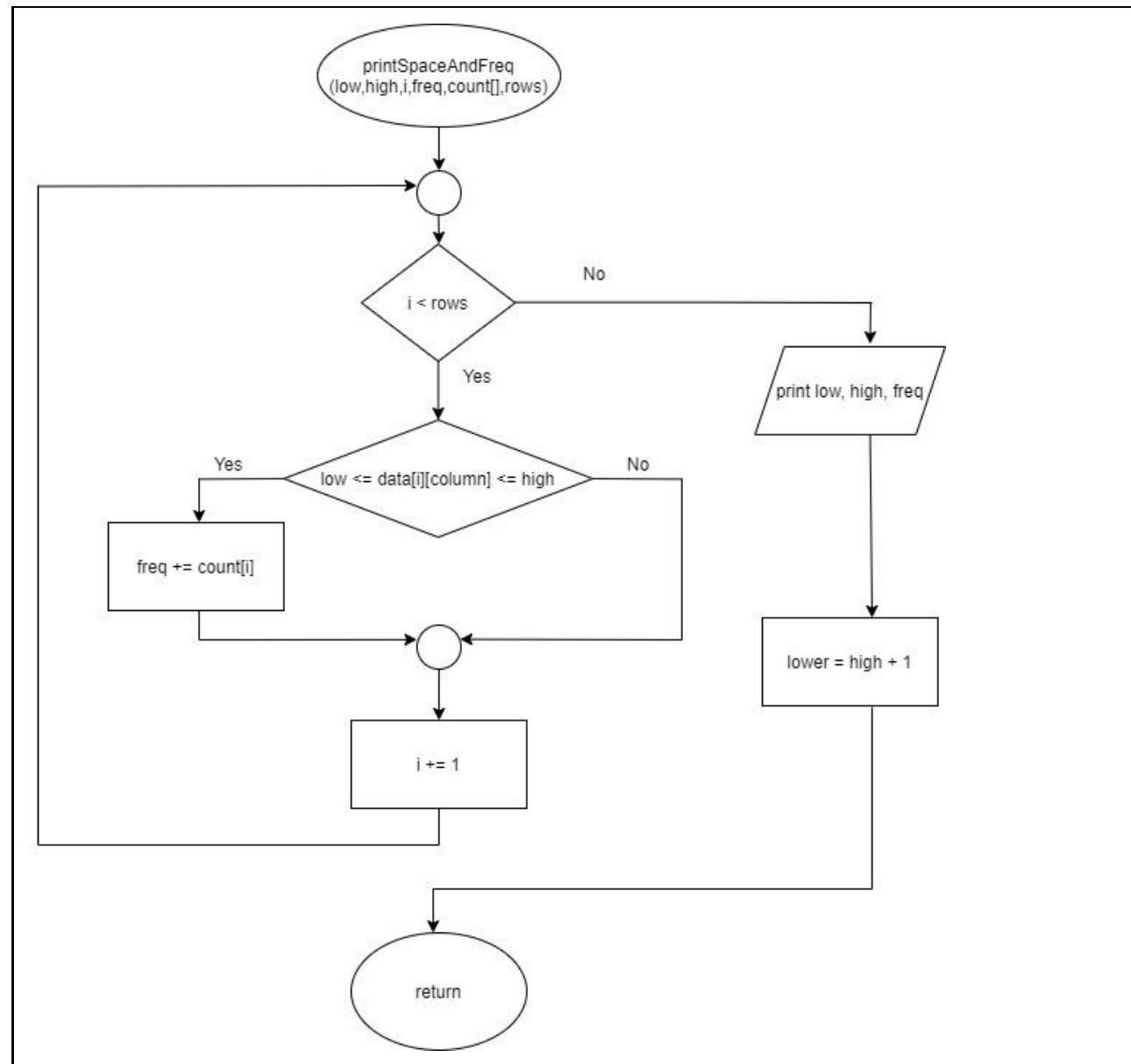
Team Leader: Satishnair A/L Krishnan, 019-7814961, 1181103485@student.mmu.edu.my

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Assignment Checklist for Student to fill in

Total Marks: 160, to be scaled down to 40%, subject to change

Coding [40] part 1

Put only one [X] for each item in the checklist below

	Good Var Names	Good Func Names	Good Indentation	Good Spacing	Function count
0	>= 9 violations <input type="checkbox"/>	<= 2 <input type="checkbox"/>			
1	7 - 8 violations <input type="checkbox"/>	3 – 4 <input type="checkbox"/>			
2	5 - 6 violations <input type="checkbox"/>	5 – 6 <input type="checkbox"/>			
3	3 - 4 violations <input type="checkbox"/>	7 – 8 <input type="checkbox"/>			
4	<= 2 violations <input type="checkbox"/>	>= 9 <input type="checkbox"/>			

Comments with proofs

TCP1101 Assignment Part 1

Trimester 1, 2020/2021

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Coding [40] part 2

Put only one [X] for each item in the checklist below

	Func. (single purpose, not generalized)	Comments were used appropriately	Self-Documenting	Code Efficiency & Strategy (weight x 2)
0	>= 5 violations <input type="checkbox"/>	0 comments <input type="checkbox"/>	Very hard for others to figure out <input type="checkbox"/>	[0] Not working at all <input type="checkbox"/>
1	4 violations <input type="checkbox"/>	Very little useful comments <input type="checkbox"/>	Can figure out only a little bit <input type="checkbox"/>	[2] A lot of redundant code <input type="checkbox"/>
2	3 violations <input type="checkbox"/>	Have useful comments but can be better <input type="checkbox"/>	Moderately clear <input type="checkbox"/>	[4] Some redundant code but not serious <input type="checkbox"/>
3	2 violations <input type="checkbox"/>	Excessive comments <input type="checkbox"/>	Almost perfect, can improve a bit <input type="checkbox"/>	[6] Almost perfect, can improve a bit <input type="checkbox"/>
4	0 – 1 violation <input type="checkbox"/>	Very appropriate (Not too little, nor too much) <input type="checkbox"/>	Code is very clear and easy to understand <input type="checkbox"/>	[8] Very well done <input type="checkbox"/>

Comments with proofs

--

TCP1101 Assignment Part 1

Trimester 1, 2020/2021

by << Sathishnair A/L Krishnan >>

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Team members:

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Program Features of 14 functions [56] part 1, 40+56=96

Put only one [X] for each item in the checklist below

Put only one student full name for each function

		Min	Max	Mean	Median	Var	S.D.	Occ/Freq
0	>=2 errors	<input type="checkbox"/>						
2	1 error	<input type="checkbox"/>						
4	no error	<input type="checkbox"/>						
	Put only one student full name for each function	Sathish Nair	Sathish Nair	Avinash	Luqman	Kishen	Sathish Nair	Luqman

Comments with proofs

--

TCP1101 Assignment Part 1

Trimester 1, 2020/2021

by << Satishnair A/L Krishnan >>

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Program Features of 14 functions [56] part 2, 40+56=96

Put only one [X] for each item in the checklist below

Put only one student full name for each function

		Histogram	Table below mean & above mean	Pearson's correl.	Linear regr. line	Sorting (Ascend & Descend)	Stat. TXT Report	Stat. HTML Report
0	>=2 errors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	1 error	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	no error	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Put only one student full name for each function	Luqma n	Satish Nair	Kishen	Kishen	Satish Nair	Avinash	Avinash

Comments with proofs

--

TCP1101 Assignment Part 1

Trimester 1, 2020/2021

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Error Handling, User Interface, Report [8 + 8 + 48] part 1, 96 + 8 + 8 + 48 = 160

Put only one [X] for each item in the checklist below

Error Handling [8]			User Interface [8]		
	Robust Input	Run-Time-Error		User Experience	Consistency
0	None □	>= 4 sources of RTE □	0	Frustrated to use □	Not consistent at all □
1	Can handle only numeric input errors □	3 sources of RTE □	1	Confusing, non-intuitive □	Need many (>=3) improvements □
2	Can handle only char input errors □	2 sources of RTE □	2	Usable, clear, but boring □	Need some (2) improvements □
3	Can handle only string input errors □	1 source of RTE □	3	Nice and interesting □	Need a little (1) improvement □
4	Can handle all kinds of input errors □	None □	4	A joy to use □	Very consistent □

Comments with proofs

--

TCP1101 Assignment Part 1

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Error Handling, User Interface, Report [8 + 8 + 48] part 2, 96 + 8 + 8 + 48 = 160

Put only one [X] for each item in the checklist below

	Report [48]			
	Struct. Chart AP1	Flowcharts >= 14 functions (weight x 3) AP1	Documentation AP1 (0-4) & AP2(0-4)	Video
0 =>7 errors	<input type="checkbox"/>	0 <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2 4-6 errors	<input type="checkbox"/>	6 <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4 3-4 errors	<input type="checkbox"/>	12 <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6 1-2 errors	<input type="checkbox"/>	18 <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8 0 errors	<input type="checkbox"/>	24 <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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Comments with proofs