SCHOOL OF COMPUTING
Faculty of Engineering

SECI1113

COMPUTATIONAL MATHEMATICS

SEMESTER 2019/2020 – 2

REPORT PROJECT

Lecturer : P.M. Dr. Roselina Sallehuddin

Group members:

Name	Matric Number
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Introduction

As for Computational Mathematics course, we have been assigned to do a programming project for our final project for semester 2. In this case, we are needed to do a program that will solve the three questions given by our lecturer which include the determinant of matrix, LU factorization and lastly interpolation using least square technique.

Member Responsibilities

In completing the program of this project, each member of our group has been given responsibilities on certain aspects.

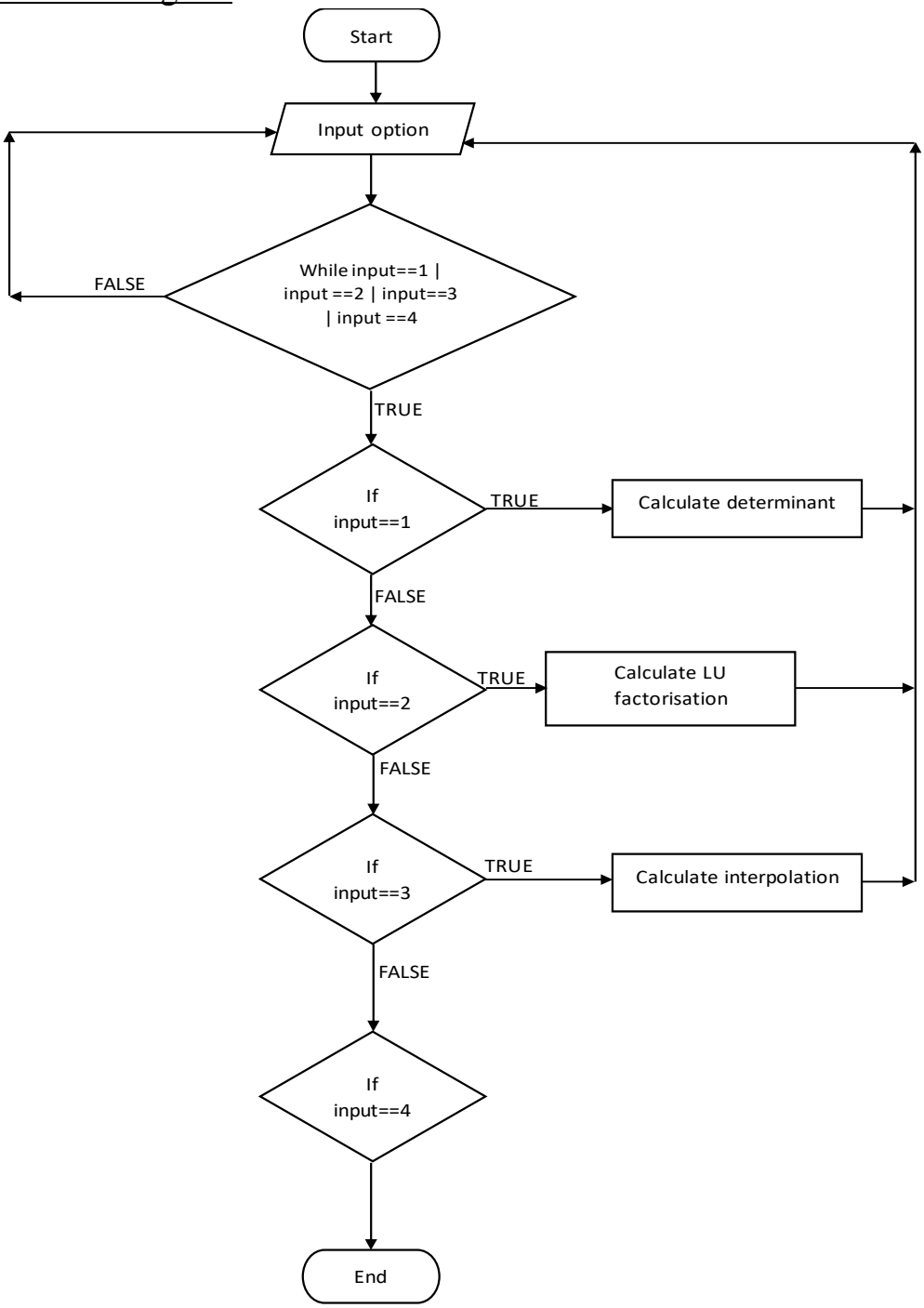
Task role for each group member:

STUDENT	RESPOSIBILITIES AND DUTIES
Nur Adilah Syaza binti Mohamad Najib	✓ Leader ✓ Divide the task ✓ Held and assist meeting ✓ Does the report ✓ Do the codes for program ✓ Assist in editing the presentation video ✓ Explain the coding for presentation video ✓ Finding sources and references
Yasmeen binti Abu Bakar	✓ Help others member in doing task ✓ Does the report ✓ Assist in doing the codes for program ✓ Edits the presentation video ✓ Explain the coding for video demo ✓ Gather information regarding the project ✓ Do the codes for program
Nadiah binti Mohd Hanim	✓ Does the report ✓ Assist in editing video ✓ Do the codes for program ✓ Explain the coding for the video demo ✓ Finding sources and references ✓ Gather information regarding the project

Software and Programming Language Used.

In completing our program for the project, we have used the software of Dev C++ and thus using C++ programming language.

Flowchart of Program



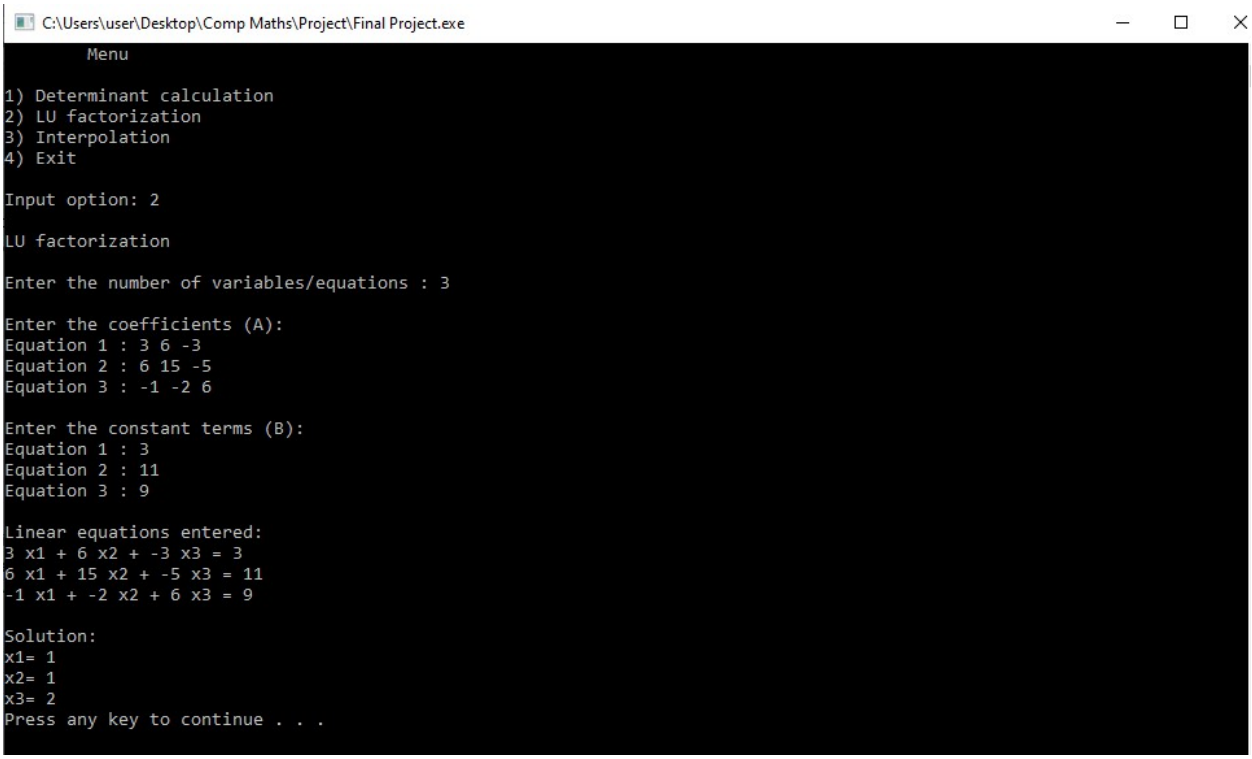
Discussion

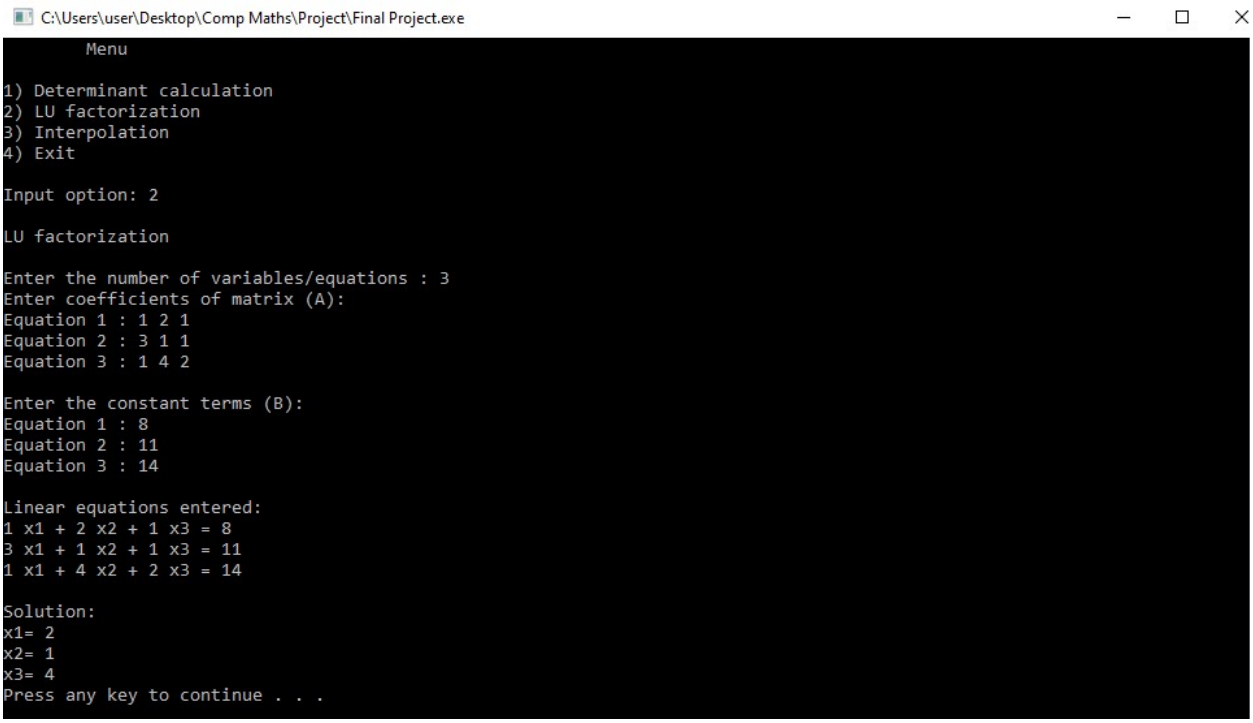
Program Screenshots

These are the few examples of input and output for our program.

Question 1:

Question 2:


C:\Users\user\Desktop\Comp Maths\Project\Final Project.exe
Menu
1) Determinant calculation
2) LU factorization
3) Interpolation
4) Exit
Input option: 2
LU factorization
Enter the number of variables/equations : 3
Enter the coefficients (A):
Equation 1 : 3 6 -3
Equation 2 : 6 15 -5
Equation 3 : -1 -2 6
Enter the constant terms (B):
Equation 1 : 3
Equation 2 : 11
Equation 3 : 9
Linear equations entered:
3 x1 + 6 x2 + -3 x3 = 3
6 x1 + 15 x2 + -5 x3 = 11
-1 x1 + -2 x2 + 6 x3 = 9
Solution:
x1= 1
x2= 1
x3= 2
Press any key to continue . . .


C:\Users\user\Desktop\Comp Maths\Project\Final Project.exe
Menu
1) Determinant calculation
2) LU factorization
3) Interpolation
4) Exit
Input option: 2
LU factorization
Enter the number of variables/equations : 3
Enter coefficients of matrix (A):
Equation 1 : 1 2 1
Equation 2 : 3 1 1
Equation 3 : 1 4 2
Enter the constant terms (B):
Equation 1 : 8
Equation 2 : 11
Equation 3 : 14
Linear equations entered:
1 x1 + 2 x2 + 1 x3 = 8
3 x1 + 1 x2 + 1 x3 = 11
1 x1 + 4 x2 + 2 x3 = 14
Solution:
x1= 2
x2= 1
x3= 4
Press any key to continue . . .

Question 3:

```
C:\Users\user\Desktop\PROJECT COMP MATH\Final Project.exe
       Menu

1) Determinant calculation
2) LU factorization
3) Interpolation
4) Exit

Input option: 3

Enter the no. of data pairs to be entered : 5
Enter the x-axis values : 1 3 4 5 8
Enter the y-axis values : 5 9 11 13 19
Enter the degree of polynomial : 2
Enter the value of Xi : 4.5

The Normal(Augmented Matrix) is as follows :

           5.0           21.0          115.0           57.0
          21.0          115.0          729.0          293.0
         115.0          729.0         5059.0         1803.0

The values of the coefficients are as follows:
x^0=3.0
x^1=2.0
x^2=0.0

Hence the polynomial is given by:
p(x)= + (3.0)x^0 + (2.0)x^1 + (0.0)x^2
p(4.5) = 12.0

Press any key to continue . . .
```

```
C:\Users\user\Desktop\PROJECT COMP MATH\Final Project.exe
       Menu

1) Determinant calculation
2) LU factorization
3) Interpolation
4) Exit

Input option: 3

Enter the no. of data pairs to be entered : 5
Enter the x-axis values : 1 2 3 4 5
Enter the y-axis values : 0.5 1.4 2 2.5 3.1
Enter the degree of polynomial : 1
Enter the value of Xi : 2.3

The Normal(Augmented Matrix) is as follows :

           5.0           15.0            9.5
          15.0           55.0           34.8

The values of the coefficients are as follows:
x^0=0.0
x^1=0.6

Hence the polynomial is given by:
p(x)= + (0.0)x^0 + (0.6)x^1
p(2.3) = 1.5

Press any key to continue . . .
```

Conclusion

The program project has a purpose similar to a calculator for the three questions where the users can simply key in their desired matrix or equations and the result will be portrayed depending on what question the user refers to. Moreover, the program was done using C++ language as all of the group members are most familiar with this programming language.

Throughout completing the program, there were a lot of trial and error especially when there were a lot of implementations like arrays and iterations due to the main focus being matrix. Nevertheless, the project was a huge success because all the questions were solved and all the implementations were used wisely. The most important part was that regardless of the group members' difference in coding, the solution was found without much complication. Hence, each member contributed their work which was eventually compiled to get the final source code. The questions provided by the lecturer itself not only give a better understanding on how to convert the mathematical problems into an efficient code, but it also helped in understanding the syllabus better for the upcoming exam. Thus, it can be concluded that the program was a success as it is easily readable and understandable as well as a memory efficient code.