UNIVERSITY OF CALOOCAN CITY
COMPUTER ENGINEERING DEPARTMENT

Data Structure and Algorithm

Laboratory Activity No. 2

Algorithm Analysis and Flowchart

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I. Objectives

Introduction

Data structure is a systematic way of organizing and accessing data, and an algorithm is a step-by-step procedure for performing some tasks in a finite amount of time. These concepts are central to computing, but to be able to classify some data structures and algorithms as "good," we must have precise ways of analyzing them.

This laboratory activity aims to implement the principles and techniques in:

- Writing a well-structured procedure in programming
- Writing algorithm that best suits solving computing problems to improve the efficiency of computers
- Convert algorithms into flowcharting symbols

II. Methods

A. Explain algorithm and flowchart

B. Write an algorithm to find the result of equation: $f(x) = \begin{cases} -x, & x<0 \\ x, & x \geq 0 \end{cases}$ and draw its flowchart

C. Write a short recursive Python function that finds the minimum and maximum values in a sequence without using any loops

III. Results

A.

ALGORITHM

The word Algorithm means "A set of finite rules or instructions to be followed in calculations or other problem-solving operations" Or "A procedure for solving a mathematical problem in a finite number of steps that frequently involves recursive operations". Therefore, algorithm refers to a sequence of finite steps to solve a particular problem. (GeeksforGeeks, 2025)

FLOWCHART

A flow chart is a visual representation of a process that uses standardized symbols to illustrate steps, decisions, and the flow of tasks. It's like a roadmap for any procedure, helping teams understand how a process works immediately. (Croft, 2025)

B. $f(x) = \begin{cases} -x, & x<0 \\ x, & x \geq 0 \end{cases}$

ALGORITHM

1. Start
2. Input value of x
3. Check if $x < 0$
   - If Yes, then $f(x) = -x$
   - If No, then $f(x) = x$
4. Output $f(x)$
5. End

FLOWCHART

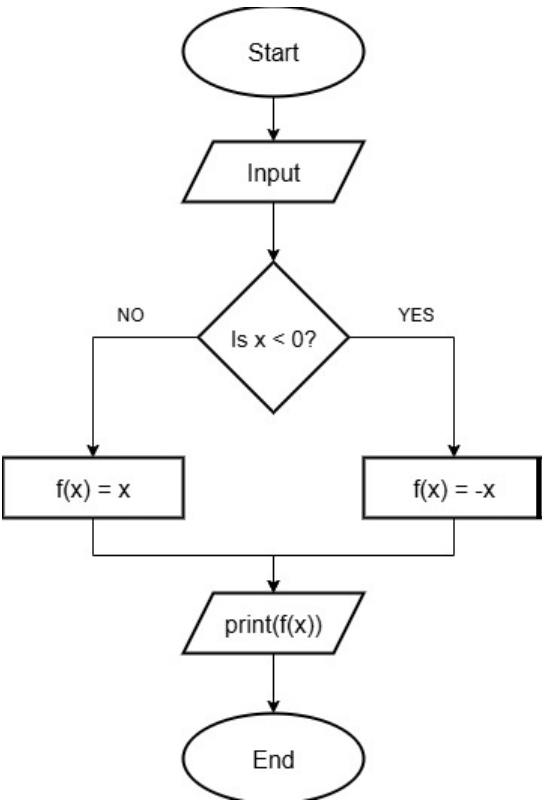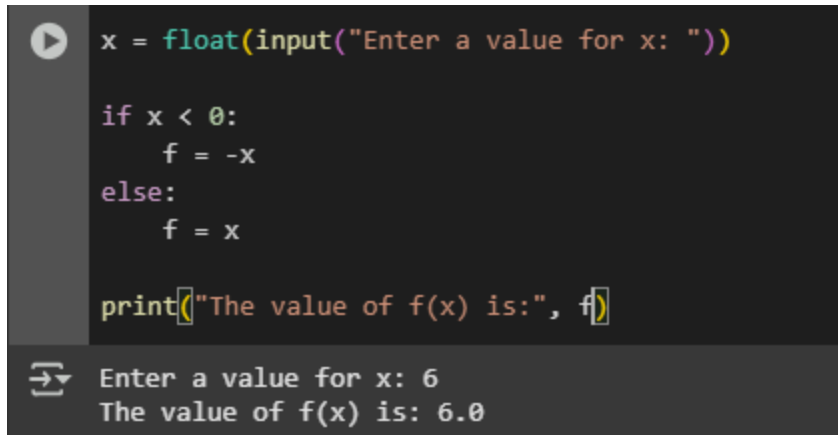
Figure 1: Screenshot of Flowchart

The flowchart visually represents the algorithm above. It shows the step-by-step process on choosing between -x and x based on the value of x (user enters the input value of x).

B.   PROGRAM

```
x = float(input("Enter a value for x: "))

if x < 0:
    f = -x
else:
    f = x

print("The value of f(x) is:", f)
```
```
Enter a value for x: 6
The value of f(x) is: 6.0
```

Figure 2: Program

Please refer to this link: DSA_Lab2.ipynb - Colab

IV. Conclusion

An algorithm is a series of steps that must be followed to accomplish a particular goal, whereas a flowchart is a graphical representation of that algorithm utilizing various figures and arrows to show the movement of the process. Both are very important in programming and solving problems, as they make the logic very clear and understandable. In the example given above, the algorithm and flowchart are employed to solve a straightforward piecewise function which returns the absolute value of a number x. The steps include taking an input, deciding if the number is smaller than zero, and then doing the operation that agrees with the condition. This is a good example of how these two tools can be combined to illustrate if-then statements and lead the path of the program from input to output.

References

[1] Co Arthur O.. "University of Caloocan City Computer Engineering Department Honor Code," UCC-CpE Departmental Policies, 2020.

[2] GeeksforGeeks. (2025, July 11). *What is an Algorithm | Introduction to Algorithms*. GeeksforGeeks. https://www.geeksforgeeks.org/dsa/introduction-to-algorithms/

[3] Croft, D. (2025, March 18). What is a flow chart - 5 examples. *Learn Lean 6 Sigma*. https://www.learnleansigma.com/process-mapping/what-is-a-flow-chart/