

# PROJECT REPORT

GROUP-03

## *PROJECT: GRAPH PLOTTER*

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### **Graph Plotter :**

This project aims to plot qualitatively and quantitatively the graph of various functions. It includes several extra features like plotting the graph of the graph of the derivative of a function. Finding the area under the curve (INTEGRAL) and the definite integral of the function in a particular range.

#### Parts of the project:

1)

**INPUT:** We have made our own parser which is very much self-sufficient in taking many varieties of user specified functions. User can enter as a string many possible functions. We have implemented this through a graphical interface of Simple CPP. We have made our interface very user friendly which itself can very easily guide him to use the assets that our project provides. We also made lot of efforts in making the mouse-click feature work flawlessly.

2)

**CHECKING OF RANGE:** Since we have given the user the liberty to choose his desired range it is necessary for us to validate the given range. We have written a function to check for the valid ranges of the various functions provided.

It gives a diagnostic display telling user that the range he entered is invalid and he may try again.

3)

**CHECKING OF SYNTAX:** Our project is sufficient at giving an error message when the syntax is violated at any point of time.

4)

**PLOTTING OF THE GRAPH:** The actual plotting of the graph (after getting the choice of function and getting a valid range from the user) consists of plotting the values of 'y' against the values of 'x'. The values of y for corresponding x values are stored in an array which are verified simultaneously. The value of 'x' is slowly incremented by a small amount, and the adjoining points are joined by a line using a 'for' loop. As this process is completed throughout the range, we get a smooth graph for our function.

It also displays the global maximum and global minimum on the plotted graph, apart from the visual display.

5)

**SCALING OF THE GRAPH AND THE CHOICE OF AXES:** A very important feature in our program is the scaling of the graph based on the range provided by the user and also based on the maximum and minimum values of the function in the given range. This is done to ensure that the user gets the most relevant choice of scale for a good sized graph.

The scale is automatically decided and the axes are labelled appropriately. Each of the X-axis and Y-axis are labeled and scaled individually so as to give the best fit for the curve.

### **\*\*\*Extra features\*\*\***

6)

#### **GRAPH OF THE DERIVATIVE OF FUNCTION:**

We have provided the option to the user to plot the graph of the derivative of a given function. This was done using the first principle of differentiation, which gives us the value of the derivative of the function at a particular point. So for this purpose a separate function to return the value of derivative at a point.

The formula used was  $(f(x+h)-f(x))/h$  with h being a very small increment depending on the range provided by the user. It can give a value accurate to about 5-6 decimal places.

7)

#### **DEFINITE INTEGRAL:**

Definite Integral also consists of simply applying Riemann Integral for the given range. This is done by dividing the graph into small strips, finding the algebraic area of each small strip and summing them up. In case of area under the curve, we take the modulus of the acquired algebraic area for each small strip and add them up.

8)

**CURVE LENGTH FINDER:**

Our extra feature is the curve length finder which can calculate the curve length of a given function in a given valid range very accurately.

9)

**USER FRIENDLY:**

Our plotter is too much user friendly as it can validate the range and the point given by the user along with the verification of the syntax in which functions are entered.

**\*\*\*\*\*Limitations of Graph Plotter\*\*\*\*\***

The application "Graph Plotter" has some limitations which the user has to keep in mind before using it.

1. Parametric forms cannot be plotted.
2. The time taken for the plot to be plotted is bit large but overall it's perfectly fine.

**\*\*\*\*FUTURE PROSPECTS\*\*\*\***

- 1) We will try to plot the polar and parametric forms of given function.
- 2) We will try to make our parser fully functional so that it can take any forms of functions as specified by user.

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