

ARMY PUBLIC SCHOOL PUNE



ACADEMIC YEAR: 2021-22

PROJECT REPORT ON
DERIVATIVE CALCULATOR

ROLL NO:

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CLASS: XII - D

SUBJECT: INFORMATICS PRACTICES

SUB CODE: 065

PROJECT GUIDE: Mrs Veena Sapre

PGT (IP)

ARMY PUBLIC SCHOOL PUNE

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CERTIFICATE

This is to certify that Student **ISHAAN BHIMWAL** Roll No: _____ has successfully completed the project work entitled **DERIVATIVE CALCULATOR** in the subject Information Practices (065) laid down in the regulations of CBSE for the purpose of Practical Examination in Class XII to be held in Army Public School Pune _____.

(Mrs Veena Sapre)

PGT IP

Examiner:

Name: _____

Signature:

TABLE OF CONTENTS

<u>SR NO</u>	<u>DESCRIPTION</u>	<u>PAGE NO</u>
1	ACKNOWLEDGEMENT	4
2	INTRODUCTION	6
3	OBJECTIVES OF THE PROJECT	7
4	PROPOSED SYSTEM	8
5	FLOW CHART	9
6	SOURCE CODE	10
7	WORKING	11
8	HARDWARE AND SOFTWARE REQUIREMENTS	13
9	BIBLIOGRAPHY	13

ACKNOWLEDGEMENT

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I express deep sense of gratitude to almighty God for giving me strength for the successful completion of the project.

I express my heartfelt gratitude to my parents for constant encouragement while carrying out this project.

I gratefully acknowledge the contribution of the individuals who contributed in bringing this project up to this level, who continues to look after me despite my flaws,

I express my deep sense of gratitude to the luminary The Principal, Army Public School Pune who has been continuously motivating and extending their helping hand to us.

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The guidance and support received from all the members who contributed and who are contributing to this project, was vital for the success of the project. I am grateful for their constant support and help.

DERIVATIVE CALCULATOR

Web-App: <https://ishaanbhimwal.github.io/derivative-calculator>

Derivative Calculator by Ishaan Bhimwal

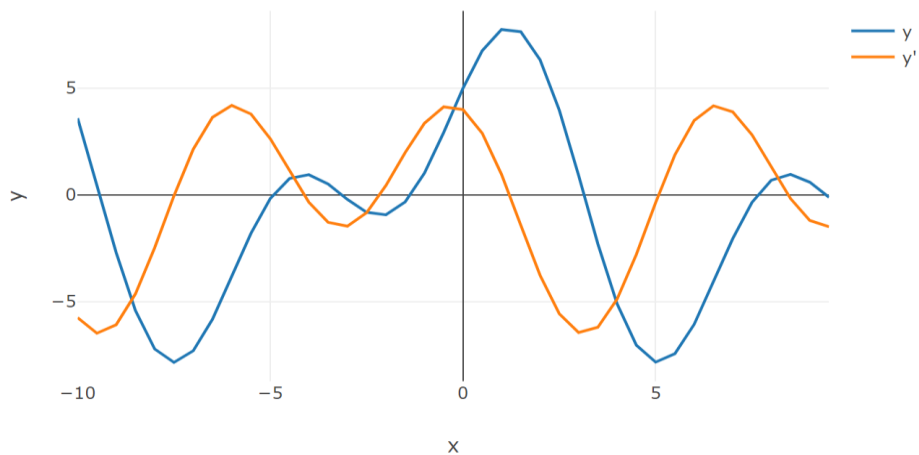
Published: 08/2/2021, Last updated: 08/8/2021

y =

Derivative:

$$y' = 4 \cdot \cos(x) + \sin\left(\frac{x}{2}\right) \cdot -\frac{5}{2}$$

Plot:



Instructions for the web version

Use standard mathematical operators and functions for entering the expression.

About Derivative Calculator

Derivative Calculator is a web app written using JavaScript. It uses libraries like math.js and Plotly.js for computing the derivative of the expression and plotting the graphs. Source code of the project is available in my [GitHub repo](#). If you have any questions or ideas for improvements to the Derivative Calculator, don't hesitate to [write me an e-mail](#).

(Screenshot of the project)

INTRODUCTION

Derivative Calculator is a web app written using JavaScript. It uses libraries like math.js and Plotly.js for computing the derivative of the expression and plotting the graphs.

The following functions and operators are currently supported

functions:

log, ln, exp, sqrt, sin, cos, tan, cot, sec, csc, asin, acos, atan, acot, asec, acsc.

operators: unary and binary + and − , * (exponential), * (multiplication), / (division)

All arguments to functions should be enclosed in parenthesis.

for example: $\sin(x + 1)$, $\sqrt{x^2}$

OPERATOR PRECEDANCE

1. *log, ln, exp, sqrt, sin, cos, tan, cot, sec, csc, asin, acos, atan, acot, asec, acsc.*
2. ^
3. unary + and −
4. * and /
5. d/dx
6. binary + and −

So, $\frac{d}{dx} a * b$ means $\frac{d}{dx} (a * b)$, but $\frac{d}{dx} a + b$ means $\left(\frac{d}{dx} a\right) + b$. also $\sin(x)^3$

means $(\sin(x))^3$ and not $\sin(x^3)$.

OPERATOR ASSOCIATIVITY

1. left associative: +, −, *, /
2. right associative: ^
3. So, $a * \frac{b}{c} / d$ means $\frac{(a*b)}{c} / d$ and a^b^c means $a^{(b^c)}$.
4. In case of power of trigonometric functions, input should be provided like $(\sin(x))^3$, $\sin^3(x)$ will not work.

OBJECTIVES OF THE PROJECT

The objective of this project is to let the students apply the programming knowledge into a real-world situation/problem and exposed the students how programming skills helps in developing a good software.

- Write programs utilizing modern software tools.
- Apply object-oriented programming principles effectively when developing small to medium sized projects.
- Write effective procedural code to solve small to medium sized problems.
- Students will demonstrate a breadth of knowledge in information practices, as exemplified in the areas of systems, theory and software development.
- Students will demonstrate ability to conduct research or applied Information practices project, requiring writing and presentation skills which exemplify scholarly style in information practices.

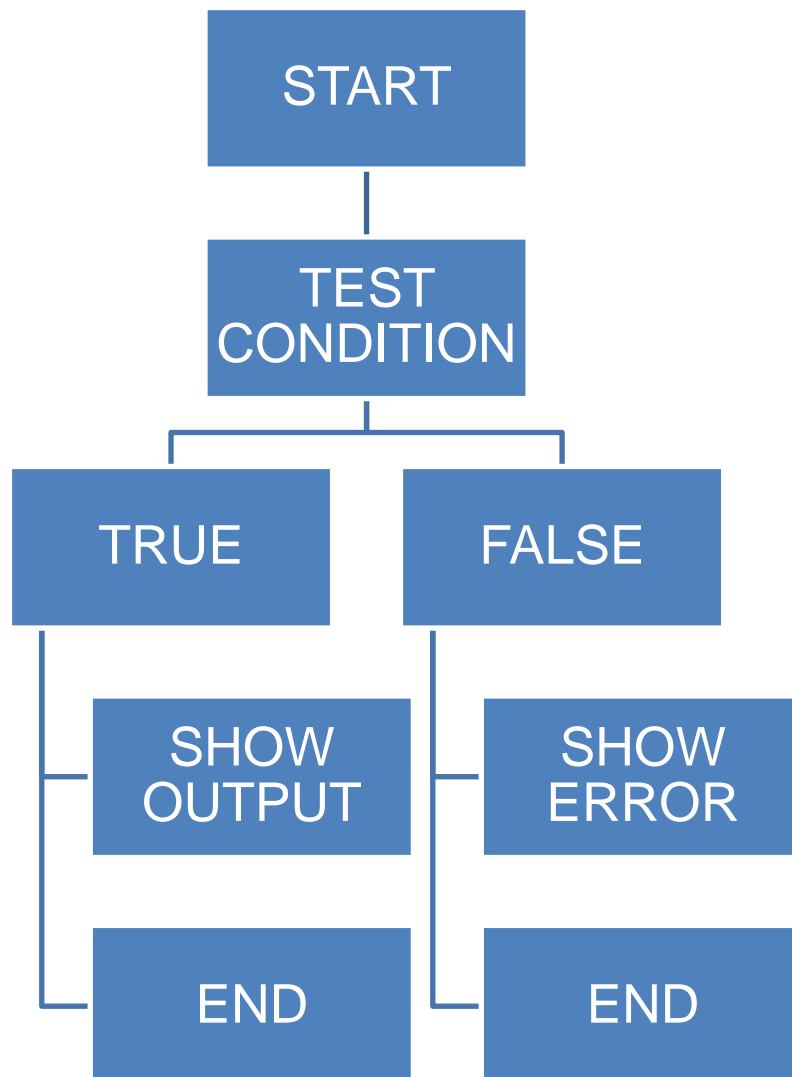
PROPOSED SYSTEM

Today one cannot afford to rely on the fallible human beings of be really wants to stand against today's merciless competition where not to wise saying "**to err is human**" no longer valid, it's outdated to rationalize your mistake. So, to keep pace with time, to bring about the best result without malfunctioning and greater efficiency so to replace the unending heaps of files with a sophisticated hard disk of the computer.

One has to use the mathematical software. Software has been an ascent in atomization various organisations. Many software products working are now in markets, which have helped in making the organizations work easier and efficiently. Use of mathematical software in these organizations has made their work faster and easier. Now only this software has to be loaded on the computer and work can be done.

This prevents a lot of time and money. The work becomes fully automated and any information regarding the organization can be obtained by clicking the button. Moreover, now it's an age of computers of and automating such an organization gives the better look.

FLOW CHART



(Working of a typical java-script backend)


SOURCE CODE

[GitHub](#)

WORKING

Derivative Calculator automatically loads a random input when first loaded. Purpose of this feature is to help users understand the standards for entering a correct input and also how the calculator works. The input is an ascii math notation.

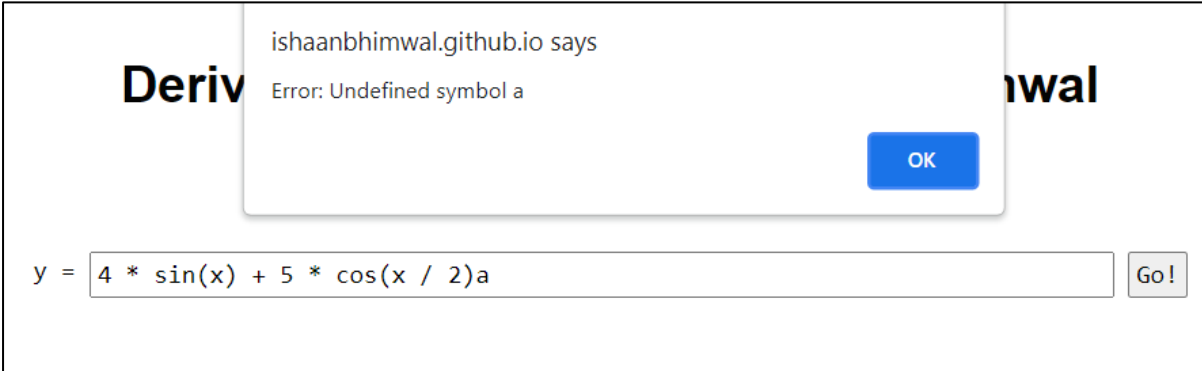
Say, random input (generated by backend) = $y = 4 * \sin(x) + 5 * \cos(x / 2)$



y =

(Random input loaded)

Next, [math.js](#) uses this function y to calculate the first-order derivative. If there are no errors in this step then the derivative is given as an input to [Plotly](#). It uses both function (input) and derivative (output) to make a dynamic multi-line plot. If there were errors in the first step while calculating the derivative then this step is not carried out and the user is given an alert (because of wrong input).



Deriv ishaanbhimwal.github.io says
Error: Undefined symbol a **OK** **awal**

y =

(Alert to the user due to error in input (undefined symbol 'a' in the end))

Finally, when both derivative and plot are ready [MathJax](#) converts the output to [LaTeX](#) in the browser for easier readability.

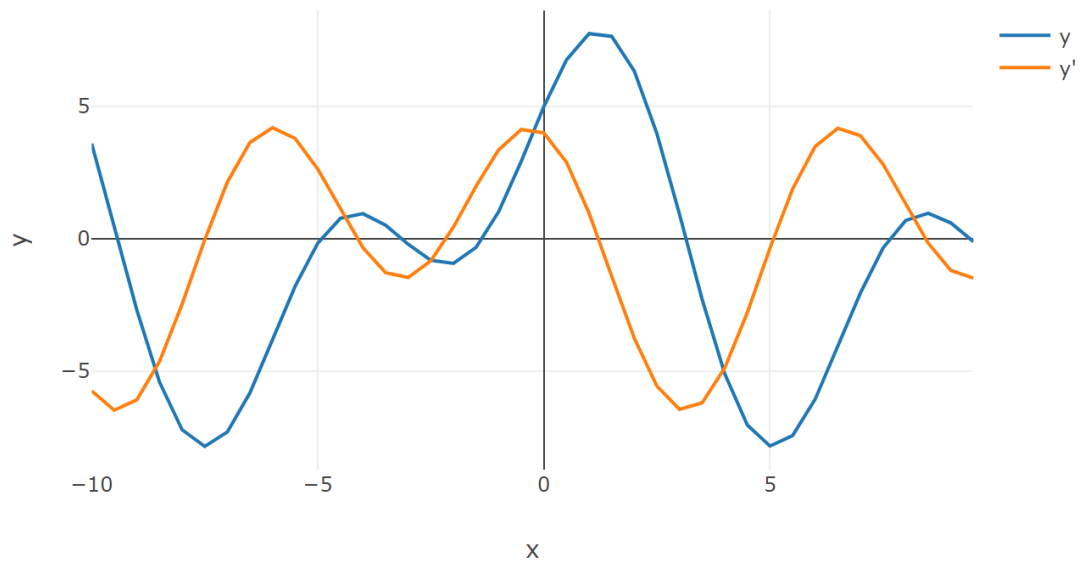
Derivative:

$$y' = 4 \cdot \cos(x) + \sin\left(\frac{x}{2}\right) \cdot -\frac{5}{2}$$

(Derivative of the function $y = 4 * \sin(x) + 5 * \cos(x / 2)$)

The plot is displayed in canvas element. The plot is dynamic i.e., the users can interact with it. There many pre-configured functions in the plot like download, zoom, pan etc.

Plot:



(Dynamic multi-line plot of the function $y = 4 * \sin(x) + 5 * \cos(x / 2)$)

HARDWARE AND SOFTWARE REQUIREMENTS

HARDWARE REQUIREMENTS:

- Device supporting > 3g network technology.

SOFTWARE REQUIREMENTS:

- Browser (any)

BIBLIOGRAPHY

- **Books:** [Informatics Practices: A Text Book For Class 12 by Sumita Arora](#)
- **YouTube:** [CodeWithHarry](#), [freeCodeCamp.org](#)
- **Website:** [Stack Overflow](#), [W3Schools.com](#)
