

ANGRY CUCUMBER

USER MANUAL

Hello! I'm Angry Cucumber

Introduction

Welcome to the Angry Cucumber application!

This software is designed to help users to solve calculus problems such as **limits**, **derivatives**, **extrema**, and **integration**.

This user manual will provide step-by-step instructions on how to use the software.

Getting started

To get started, you need to enter the mathematical expression in the entry field provided. You can use the keyboard to enter the expression. If you enter the wrong input, the software will alert you with a message.

Selecting the Problem Type

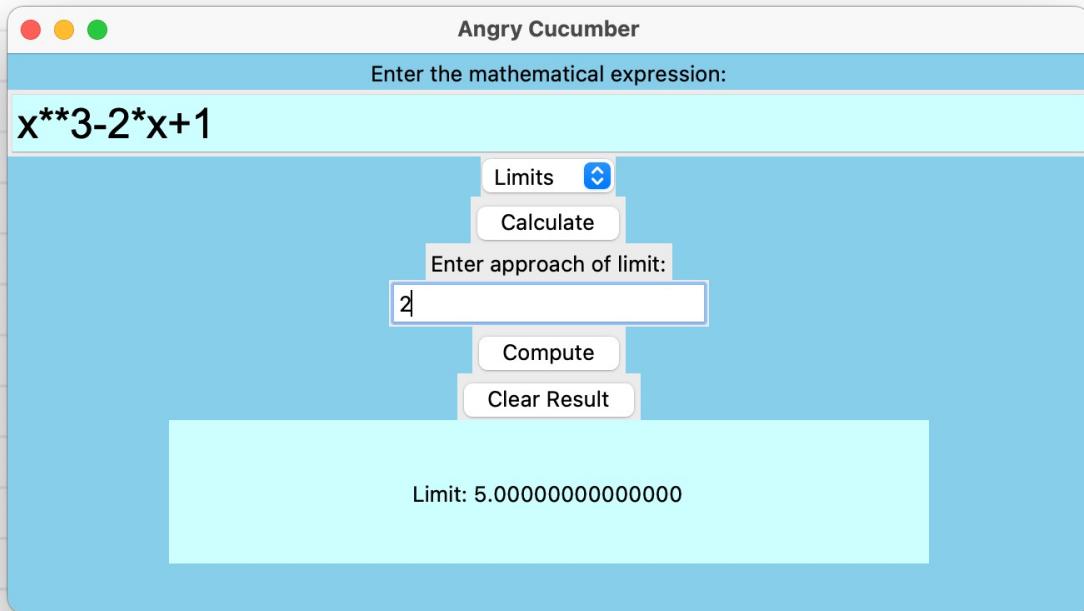
Once you have entered the expression, select the type of problem you want to solve from the drop-down menu. The problem types available are Limits, Derivatives, Gradient Descent, Extrema, Integration, and Definite Integration.

Solving the Problem

After selecting the problem type, click on the 'Compute' button to solve the problem. The output will be displayed in a label widget below the input field. The output text size is bigger and easier to read.

1 LIMITS

If the problem type is Limits, you will need to enter the approach of limit to compute the result.



For example, if you want to find the limit of the functions when x approaches 2, then type '2' and click 'Compute'.



Angry Cucumber

Enter the mathematical expression:

x**3-2*x+1

Limits ↕

Calculate

Enter approach of limit:

oo

Compute

Clear Result

Limit: oo

If you want to find the limit of the functions when x approaches infinity, then type 'oo' ('-oo' for negative infinity) and click 'Compute'.

2 DERIVATIVES

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Enter the mathematical expression:

x**3-2*x+1

Derivatives ↕

Calculate

Result:

3*x**2 - 2

Clear Result

x	y = 3x ² - 2
-1.00	1.00
-0.75	0.375
-0.50	-0.25
-0.25	-1.25
0.00	-2.00
0.25	-1.25
0.50	-0.25
0.75	0.375

If the problem type is derivatives, there will be a graph of the function displayed in a separate window.

3 GRADIENT DESCENT

If the problem type is Gradient Descent, you will need to enter learning rate-alpha, the initial guess, range of n (where start index is 0 and stop index is your input), and step size.

The screenshot shows the 'Angry Cucumber' application window. At the top, there's a title bar with three colored circles (red, yellow, green) and the text 'Angry Cucumber'. Below the title bar is a light blue header bar with the text 'Enter the mathematical expression:' followed by a text input field containing the mathematical expression $x^{**3}-2*x+1$. The main area of the window is a light blue panel containing several input fields and buttons:

- A dropdown menu labeled 'Gradient Descent' with a downward arrow icon.
- A button labeled 'Calculate'.
- An input field labeled 'Enter learning rate - alpha:' with the value '0.01'.
- An input field labeled 'Enter initial guess:' with the value '10'.
- An input field labeled 'Enter range:' with the value '20'.
- An input field labeled 'Enter step:' with the value '2'.
- A button labeled 'Compute'.
- A button labeled 'Clear Result'.

At the bottom of the window, there is a white text area displaying the results of the gradient descent calculation:

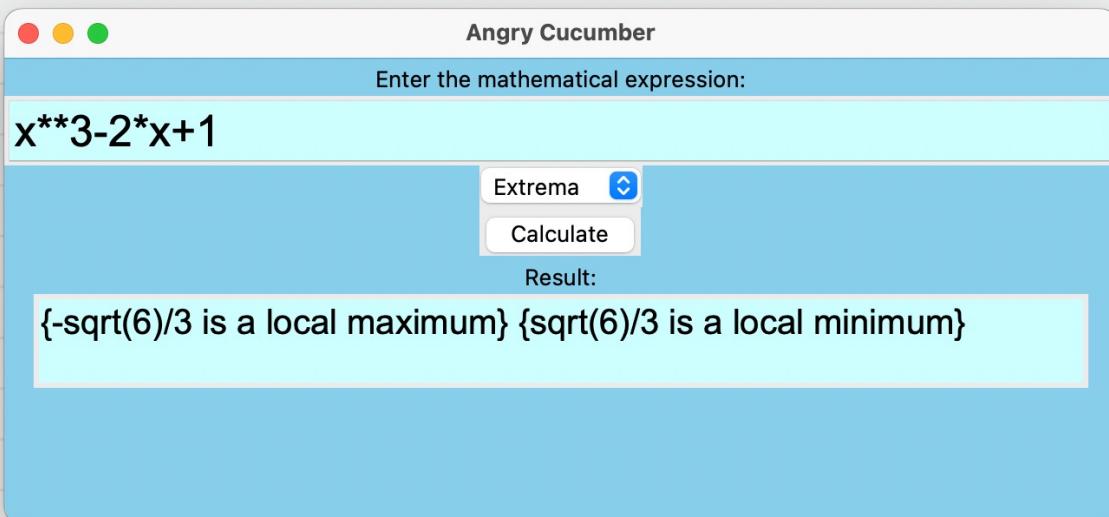
```
Gradient_descent:  
n      xn      f(xn)  
0  10.0000  981.0000  
2  5.5616  161.9038  
4  4.0240  58.1089  
6  3.1984  27.3212  
8  2.6772  14.8338  
10  2.3173  8.8094  
12  2.0541  5.5592  
14  1.8538  3.6629  
16  1.6966  2.4905  
18  1.5705  1.7328
```

For example, with $\alpha = 0.01$, initial guess $x_0 = 10$, range = 20 and step = 2, we will get a Gradient descent table with 3 columns, including n , x_n and $f(x_n)$.

4

EXTREMA

If the problem type is Extrema, the critical points, and whether they are maximum or minimum will be displayed.

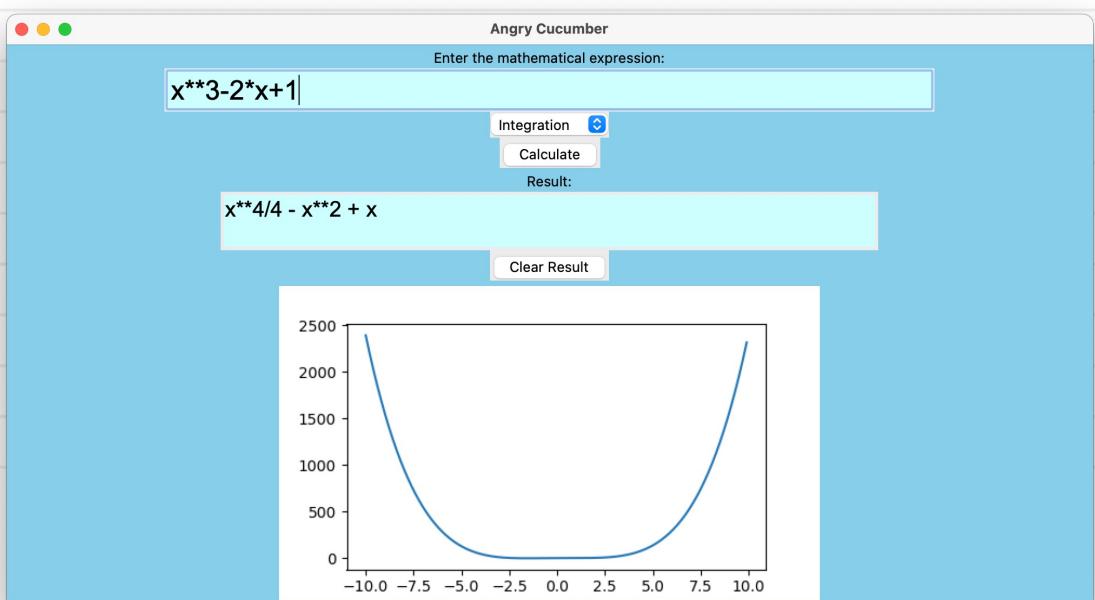


For example, the local maximum and local minimum of the function $f(x) = x^3 - 2x + 1$ which are $-\frac{\sqrt{6}}{3}$ and $\frac{\sqrt{6}}{3}$, respectively, will be shown as above.

5

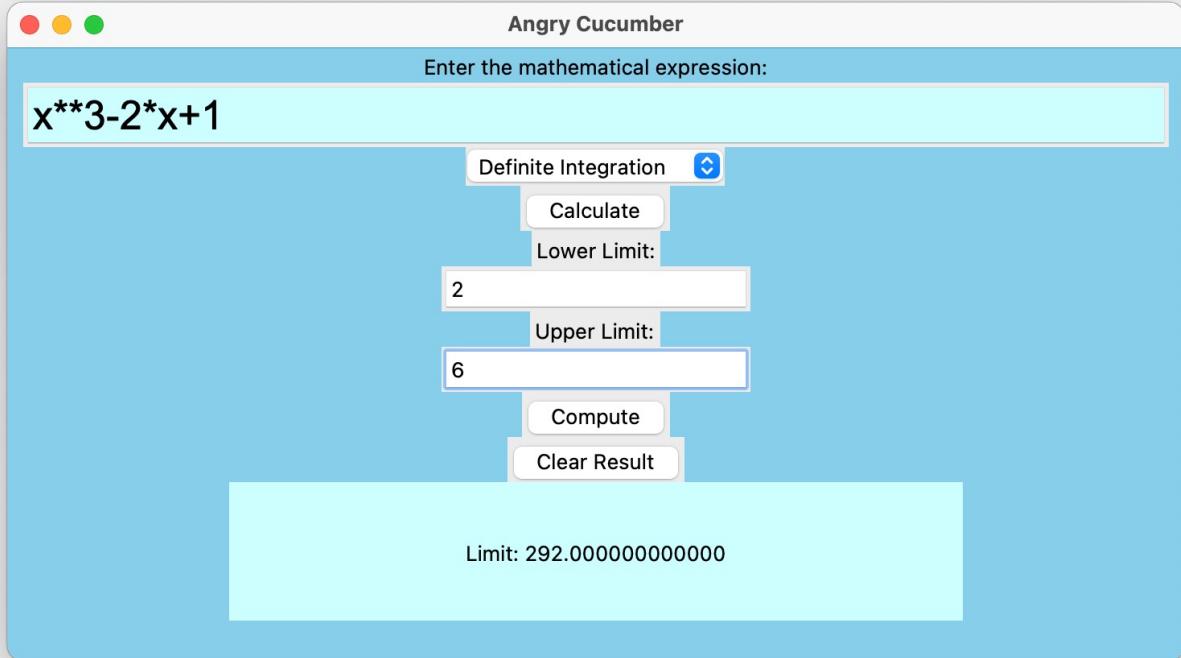
INTEGRATION

If the problem type is integration, the software will provide you with the answer together with a graph of it.



6 DEFINITE INTEGRATION

And for Definite integration, you will simply enter the lower limit and upper limit after entering your function and click "Compute", then you will get your result.



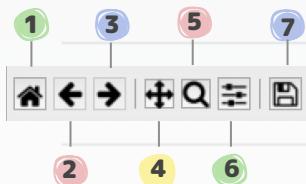
For example, the result you'll get for $\int_2^6 (x^3 - 2x + 1) dx$ is 292.

Clearing the Result

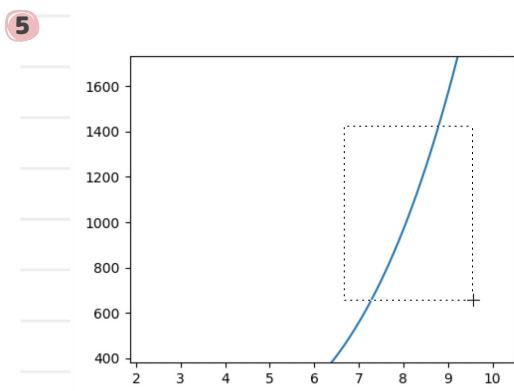
If you want to clear the result, click on the 'Clear result' button. It will remove the output label, graph, and any other widgets created during the computation.

Special Features

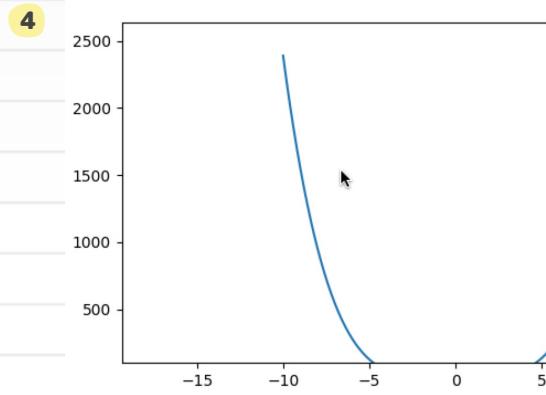
TOOLBAR



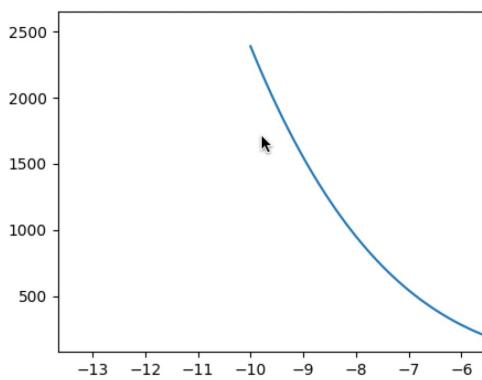
- 1 Reset original view
- 2 Back to previous view
- 3 Forward to next view
- 4 Left buttons pans,
Right buttons zoom
 x/y fixes axis, $CTRL$
fixes aspect
- 5 Zoom to rectangle x/y
fixes axis
- 6 Configure subplots
- 7 Save the figure
- 8 Coordinates of the
cursor on the graph



Right click, hold and drag to select the area which will zoom in and fit the graph to that region

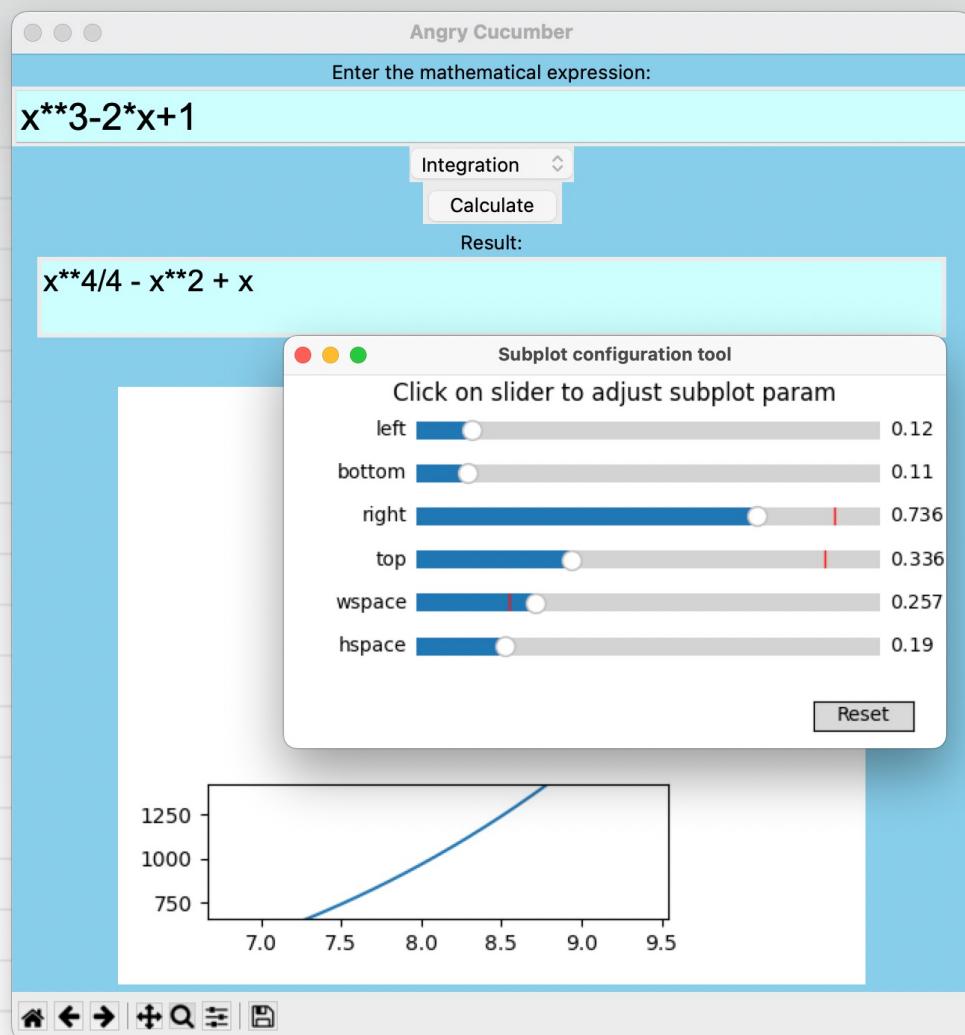


Right click, hold and drag to move the graph



Left click, hold and drag to zoom the graph in/out following your direction

6



Click on the sliders and drag to resize the plot

There are also other features in the software where when computing for the graph you have options where you can save the figure, configure subplots, zoom in for a better understanding of the diagram, zoom in on different places. You can go forward to the next view or go back to the previous view and finally reset back to the original view.

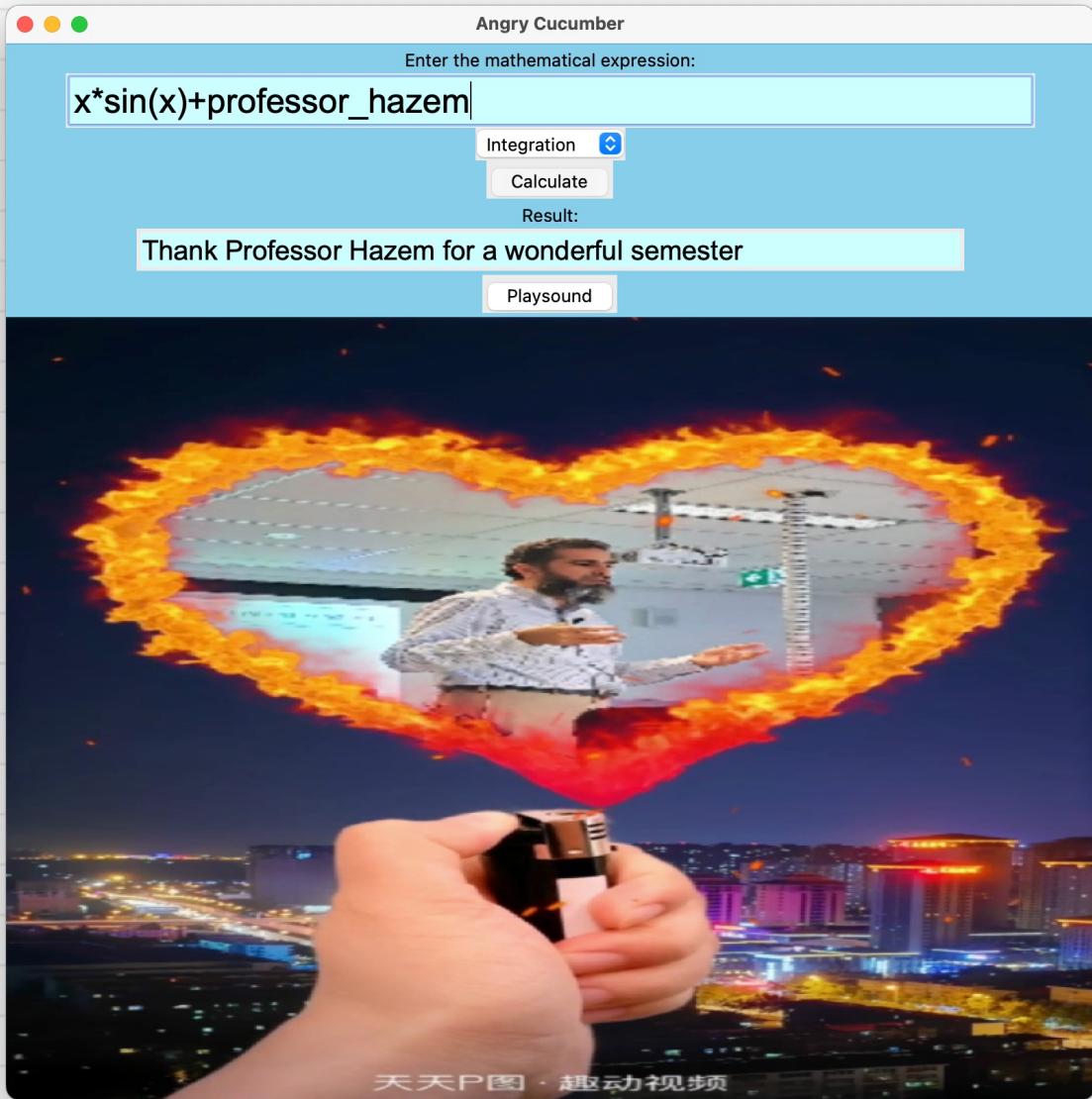
ERROR!

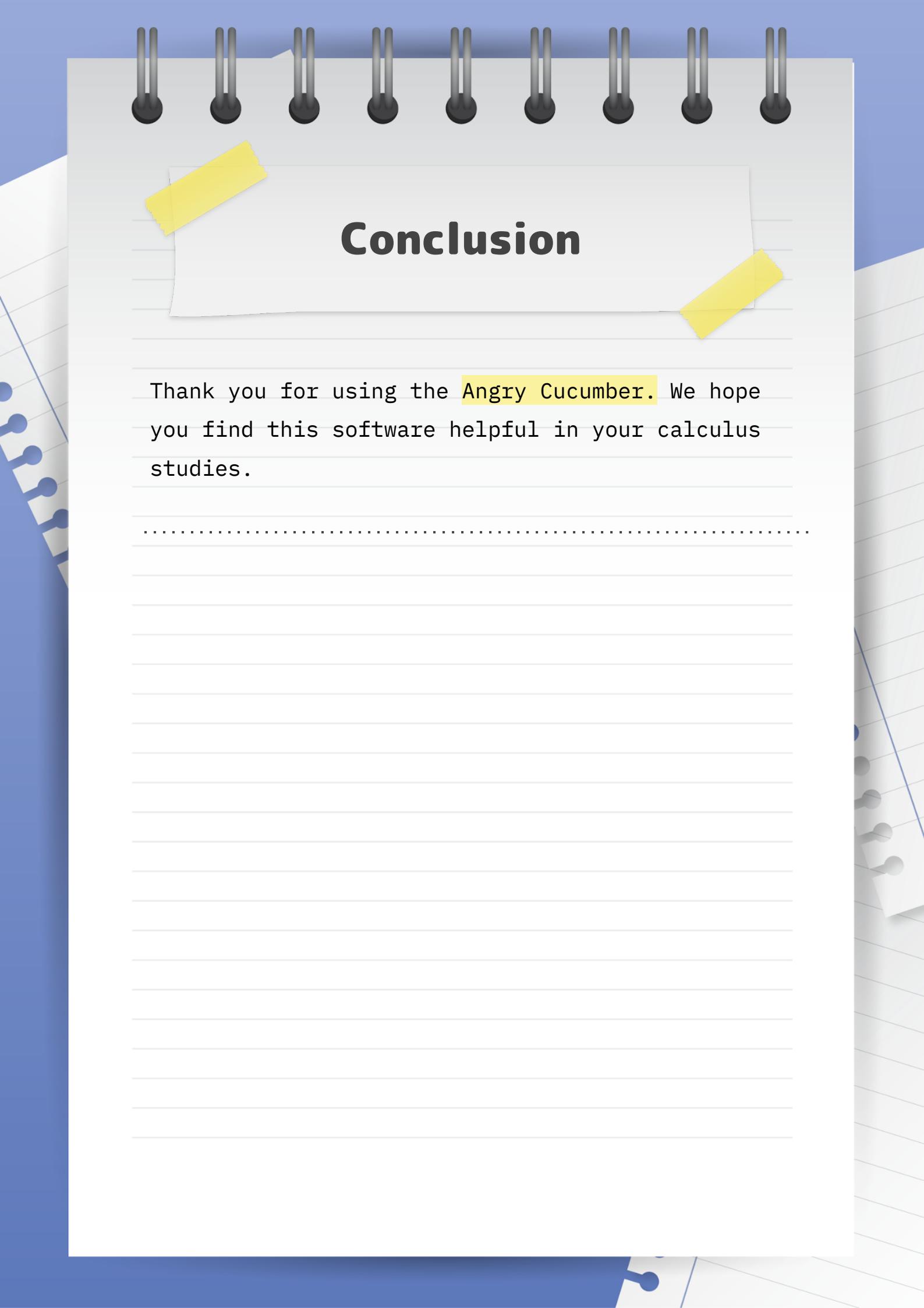
You will receive a message when you enter wrong functions or when there is no result for your function.



SPECIAL FUNCTION

If you enter the function `x*sin(x)+professor_hazem` and compute Integration, a special video will appear.





Conclusion

Thank you for using the **Angry Cucumber**. We hope you find this software helpful in your calculus studies.

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