

File Edit Format Run Options Window Help

```
from tkinter import *
```

```
def btnnClick(numbers):  
    global operator  
    operator = operator + str(numbers)  
    text_input.set(operator)
```

```
def btnnClear():  
    global operator  
    operator = ""  
    text_input.set("")
```

```
def btnnEquals():  
    global operator  
    sumup = str(eval(operator))  
    text_input.set(sumup)  
    operator = ""
```

```
calc = Tk()  
calc.title("Calculator")  
operator = ""  
text_input = StringVar()
```

```
textDisplay = Entry(calc, font = ('arial', 20, 'bold'),
```

```
#=====FIRST  
button_7 = Button(calc, padx = 16, pady = 16, bd = 8,
```

```
button_8 = Button(calc, padx = 16, pady = 16, bd = 8,
```

```
button_9 = Button(calc, padx = 16, pady = 16, bd = 8,
```



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1. Introduction

Calculator, an electronic device to perform calculation from basic arithmetic to complex functions. There are many development in the calculator from abacus to the scientific calculator. A scientific calculator is capable of doing advanced function calculation in addition to basic operations. The first ever scientific calculator was programmable Hewlett-Packard released in 1968. The basic scientific calculator contain these operations and functions.

- Arithmetic operators.
- Logarithmic functions, using both base 10 and base e.
- Trigonometric functions.
- Exponential function and the square root.
- Quick access of constants **pi** and **e**.

In our project, we have designed a GUI based scientific calculator using python. It include all the basic functionality of the scientific calculator. Further modification and improvement could be done by making changes in the code by adding new buttons and functions.

1.1 Operators and Functions

In addition to numerical values from 0 to 9, some important operators and functions are also included in our calculator. The basic arithmetic functions like addition or multiplication take two operands and any operator between them and perform calculations accordingly. While the advance functions like “**log**” take only one operand and the operator (first the operand and then the operator). The operation and functions that we included in our scientific calculator are as follow:

i. **Addition:**

This operation add two number by just clicking on “+” button and produce the summed result.

ii. **Subtraction:**

This operation minus the second number from the first by clicking on the “-“ button and produce the subtracted result.

iii. **Multiplication:**

The multiplication function produce the product of the two numbers by clicking of the “*” sign and produce the multiplied results.

iv. Division:

The division or divide function is operated on the 2 input values by clicking on “/” sign and divide the first value by the second and give the quotient as output.

v. Equal:

To get the answer of any calculation, by clicking on the “=” sign.

vi. Backspace:

To remove the wrong enter of the input one by one instead on removing all the values the button pointing toward left is used.

vii. Clear screen:

All the values or the results got cleared by clicking on the “C” button.

viii. Point:

To enter any decimal or fractional value, point “.” button is used.

ix. Parenthesis:

These operators are used for including precedence while calculation. “(“ and “)” are clicked to start and close the precedence respectively.

x. Power:

The value of any number raised to some power is calculated by clicking on the “x^y” button and give the results after the number is multiplied by itself y times.

xi. Square:

The square of any number is calculated by clicking on the “x^2” button and give the results as the number multiplied by itself.

xii. Logarithm:

The log of any value of base 10 is obtained by clicking on the “log” button.

xiii. Natural logarithm:

The natural logarithm of any value of base e is calculated by clicking “ln” button.

xiv. Round:

This option convert the decimal into significant figures. The values less than 5 after decimal point give the number before the decimal point. If the value after decimal point is greater than 5 it will results in a number next to that before decimal point. 11.4 is rounded to 11 and 11.7 is rounded to 12.

xv. Sign:

To get the negative value “+/-“ button is clicked after entering the numerical value. It multiplies the value with -1.

xvi. Trigonometric functions:

To find the trigonometric functions of the number. There are six trigonometric functions in our calculator as sin, cos tan and their inverse sec, cosec and cot.

xvii. Square root:

The square root of any number is found by clicking the “ $\sqrt{}$ ” symbol and give the results as $\frac{1}{2}$ power of the input

xviii. Factorial:

The factorial of any number is calculated by clicking on the “n!” button.

xix. Pi:

The constant pi is calculated by clicking on the “ π ” button. It could be added, subtracted, multiplied and divided by any number.

xx. e:

the natural exponent is used by clicking the “e” button. It has the value 2.7182. it could be multiplied or used as the power of any digit.

2. Methodology

The methodology of the development of scientific calculator with GUI in python is given below.

2.1 Importing libraries:

First of all we import the library of python known as “tkinter” which is used for GUI purposes. All the packages are imported from tkinter. For performing mathematical operations and functions we have imported all the packages from “math” library. An object of the tkinter library named “root” is created.

2.2 Defining fuctions:

A separate function is declared for assigning role to each button of the calculator. While declaring the button functions we have assigned the role to each button.

```
def cos_clicked():  
    try:  
        ans = float(dispatch.get())  
        ans = math.cos(ans)  
        dispatch.delete(0, END)  
        dispatch.insert(0, str(ans))  
    except Exception:  
        tkinter.messagebox.showerror("Value Error", "Check your values and operators")
```

In this function, a button named “cos” is being declared and assigned the role to calculate cos of the value entered by the user and display the answer to user on screen. At first the input entered by user is stored in the variable “ans” and then cos function present in the math library s performed on it and the result is displayed on the screen after clearing the screen.

2.3 Creating buttons:

After declaring the functions for each button’s action we create the buttons and arrange them in a sequential order of 4 rows and 9 columns. We pack the buttons to arrange them in a row. Symbols are given to each button and the respective functions are assigned to them.

```
cos_btn = Button(btnrow1, text="cos", font="Segoe 18", command=cos_clicked)  
cos_btn.pack(side=LEFT, expand=TRUE, fill=BOTH)
```

In these lines of code, we have created a button, assigned it a symbol and the function for assigned role to it. Then we pack it with other buttons in the row.

2.4 mainloop():

This is the infinite loop to iterate the program until output window is not closed.

Output

Scientific Calculator								
850*45								
π	x!	sin	cos	tan	1	2	3	+
e	√x	sin-1	cos-1	tan-1	4	5	6	-
+/-	Round	ln	log	x^y	7	8	9	*
x^2	()	•	C	⊠	0	=	/