
**Project Report on**

GUI Interface of Scientific Calculator using PYTHON


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|---|---|---|
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| SUBJECT | - | INT 213 (PYTHON) |
| PROJECT REPORT TOPIC | - | SCIENTIFIC CALCULATOR |
| SUBJECT TEACHER | - | NAVPREET RUPAL MAM |
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## TEAM MEMBERS FOR PROJECT ARE:

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| **Group** | 1 | 2 | 2 |

## Roles And Responsibilities :

1 Module 1: - Role 1: **Mohammed Faizan**

Responsibilities: 1 Making codes of function (+, -, *, /,%,//,**)

2 Putting All Function together in Python

3 Requirements & Design Analysis

2 Module 2: - Role 2: Divyansh Jaiswal

Responsibilities: 1 Making codes of function(sin,cos,tan,cosec,sec,cot)

2 Making Calculator GUI Interface in Python

3 Making Working Calculator GUI in Python with Tkinter

3 Module 3: - Role 3: Masana Swaraj Deep

Responsibilities: 1 Making codes of function(log,pow,exp,Abs,cell,floor)

2 Handle Backend part

3 Testing all the function Individual & Together

# INTRODUCTION

A scientific calculator is an electronic calculator, either in desktop or handheld, designed to perform mathematical operations. They have completely replaced slide rules and are used in both educational and professional settings.

When scientific calculators were originally marketed, they normally had only four of five capabilities (addition, subtraction, multiplication, division, and square root).

Modern scientific calculators generally have many more capabilities than the original four or five function calculators, and the capabilities differ between manufacturers and models.

The capabilities of a modern scientific calculator include:

- scientific notation
- logarithmic functions, using both base 10 and base e
- trigonometric functions
- exponential functions
- square root
- quick access to constants such as pi and e

In addition, high-end scientific calculators generally include:

- hexadecimal, binary, and octal calculations, including basic Boolean mathematics
- complex numbers
- fractions calculations
- statistics and probability calculations
- equation solving
- matrix calculations
- calculus
- conversion of units

While most scientific calculators have traditionally used a single line display similar to traditional pocket calculators, many of them have more digits (10 to 12), sometimes with extra digits for the floating-point exponent. A few have multi-line displays, with some models from Hewlett-Packard, Texas Instruments (both US manufacturers), Casio, Sharp, and Canon (all three Japanese makers) using dot matrix displays similar to those found on graphing calculators.

Scientific calculators are used widely in situations that require quick access to certain mathematical functions, especially those that were once looked up in mathematical tables, such as trigonometric functions or logarithms. They are also used for calculations of very large or very small numbers, as in some aspects of physics, and chemistry.

# BASIC DEFINATIONS

- Graphical User Interface
- Arithmetic Operation
- Addition Operation
- Subtraction Operation
- Multiplication Operation
- Division Operation
- Modulus
- Quotient
- Sqrt
- Square
- Trigonometry Ratios
- Logarithm
- Power
- Exponential
- Tools used

## Graphical User Interface:

A Graphical user interface is an interface through which a user can interact with electronic devices such as computers and other applications, with the help of a mouse there are so many graphical user interfaces Tkinter is mostly used as it is fast and easy to create GUI applications This interface uses icons, menus, and other visual indicator representations to display information and related user controls, unlike text-based interfaces, where data and commands are in the text.

## Arithmetic Operations:

Arithmetic operations is a branch of mathematics, that involves the study of numbers, and operation of numbers that are useful in all the other branches of mathematics. It basically comprises operations such as Addition, Subtraction, Multiplication, and Division.

## Addition (+) Operation:

Addition is a mathematical process of adding things together. The addition process is denoted by the '+' sign.

## Subtraction (-) Operation:

The subtraction operation gives the difference between two numbers. Subtraction is denoted by the '- ', sign.

## Multiplication (*) Operation:

Multiplication is known as repeated addition. It is denoted by '×' or '*'. It also combines with two or more values to result in a single value.

## Division (/) Operation:

The division is usually denoted by '÷ 'and is the inverse of multiplication. It constitutes two terms dividend and divisor, where the dividend is divided by the divisor to give a single term value.

## Modulus:

Here, a is divided by b, and the remainder of that division is returned.

## Quotient:

Here, a is divided by b, and the quotient of that division is returned.

## Square:

Here, a is divided by b, and the remainder of that division is returned.

## Sqrt:

The square root function is used by clicking on the "x" button or type "sqrt()".This function represent x^. where the result squared is equal to x

## Trigonometry Ratios:

The ratios of sides of a right-angled triangle with respect to any of its acute angles are known as the trigonometric ratios of that angle.

The three sides of the right triangle are:

- Hypotenuse (the longest side)
- Perpendicular (opposite side to the angle)
- Base (Adjacent side to the angle)

1. **Sin:** Sine of an angle is defined as the ratio of the side opposite(perpendicular side) to that angle to the hypotenuse.
2. **Cos:** Cosine of an angle is defined as the ratio of the side adjacent to that angle to the hypotenuse.
3. **Tan:** Tangent of an angle is defined as the ratio of the side opposite to that angle to the side adjacent to that angle.

## Logarithm:

A logarithm is defined as the power to which a number must be raised to get some other values. It is the most convenient way to express large number.

## Power:

The power (or exponent) of a number says how many times to use the number in a multiplication. It is written as a small number to the right and above the base number.

## Exponential:

Python number method **exp()** returns exponential of x: $e^x$.

# TOOLS USED

1. Python 3.7.0:

Python is a general-purpose programming language. Hence, you can use the programming language for developing both desktop and web applications. Also, you can use Python for developing complex scientific and numeric applications. Python is designed with features to facilitate data analysis and visualization

2. Tkinter:

Tkinter is Python's standard GUI (Graphical User Interface) package. Tkinter is not the only GUI-Programming toolkit for Python. It is however the most used one.

# OBJECTIVE

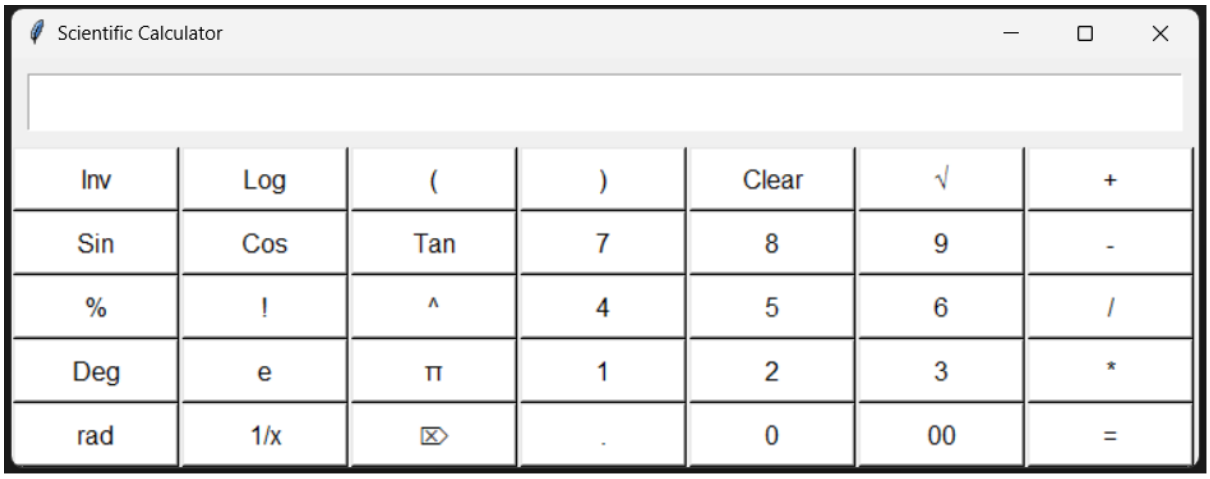
For those who do not know, a calculator is basically a program on a computer that simulates the behavior of any hand-held calculator useful for performing Mathematical Calculations. It is a very basic device used in our everyday lives. Now all the smartphones also have a Calculator application in them.

While creating any GUI Application there are mainly two steps:

- The first step is to create a User Interface.
- The second step is the most important one and in this, to add functionalities to
- the GUI

Now let's begin with creating a Scientific Calculator using Tkinter in Python which is used for calculations.

# DESIGN



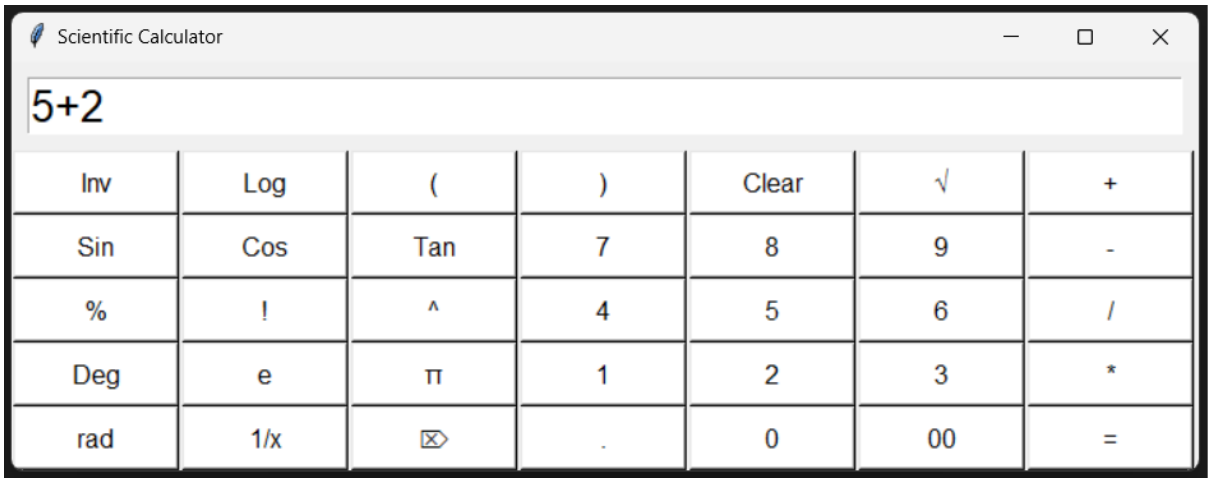

The Design of Scientific Calculator

## Data Flow Diagram:

A data flow diagram (DFD) is a graphical representation of the "flow" of data through an information system, modelling its process aspects. Often, they are a preliminary step used to create an overview of the system which can later be elaborated. DFDs can also be used for the visualization of data processing (structured design). A DFD shows what kinds of data will be input to and output from the system, where the data will come from and go to, and where the data will be stored. It does not show information about the timing of processes, or information about whether processes will operate in sequence or in parallel (which is shown on a flowchart).

# RESULT SCREENSHOT

## 1:Addition

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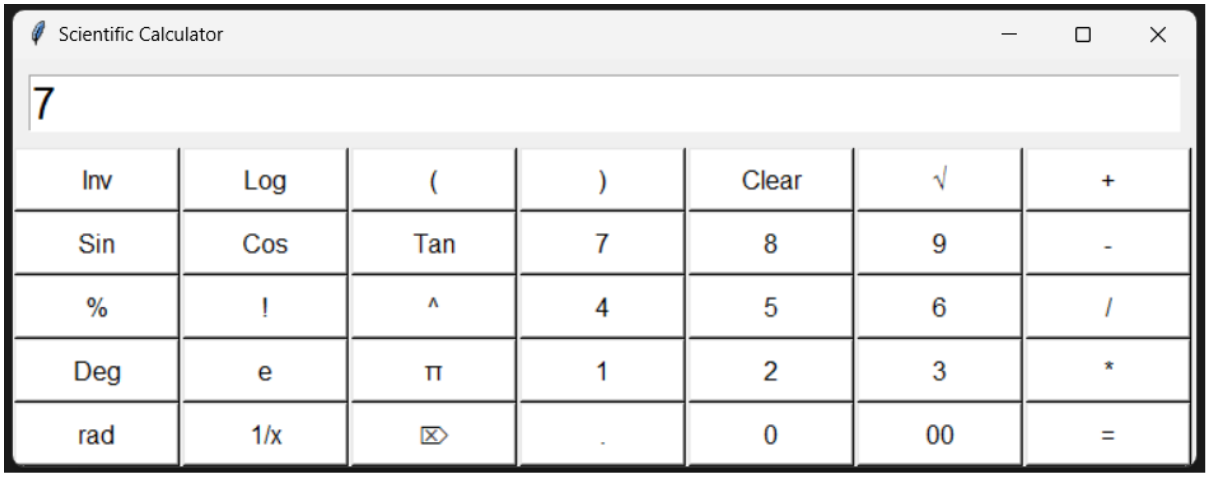
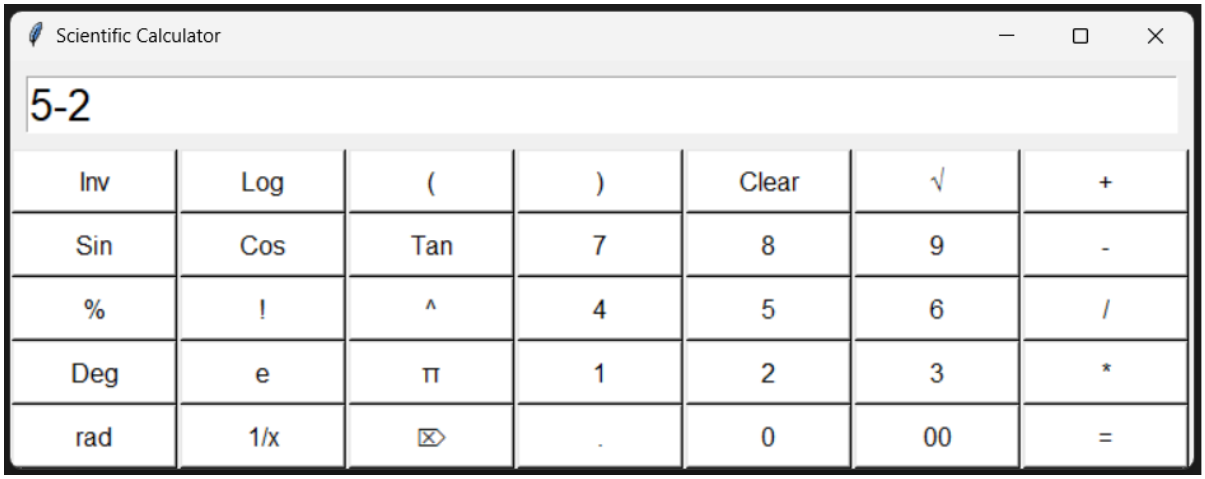


# 2:Submittion

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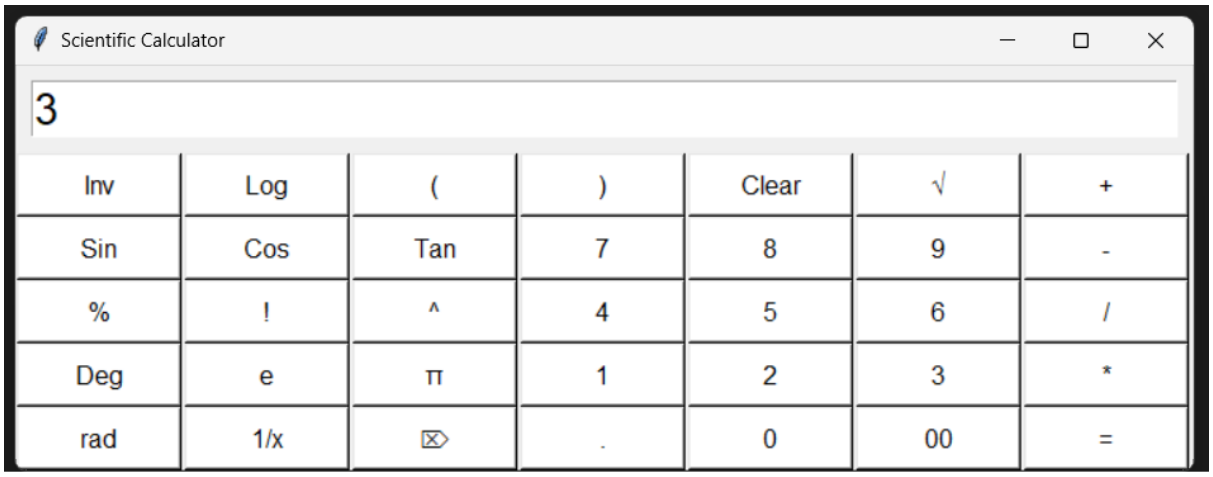
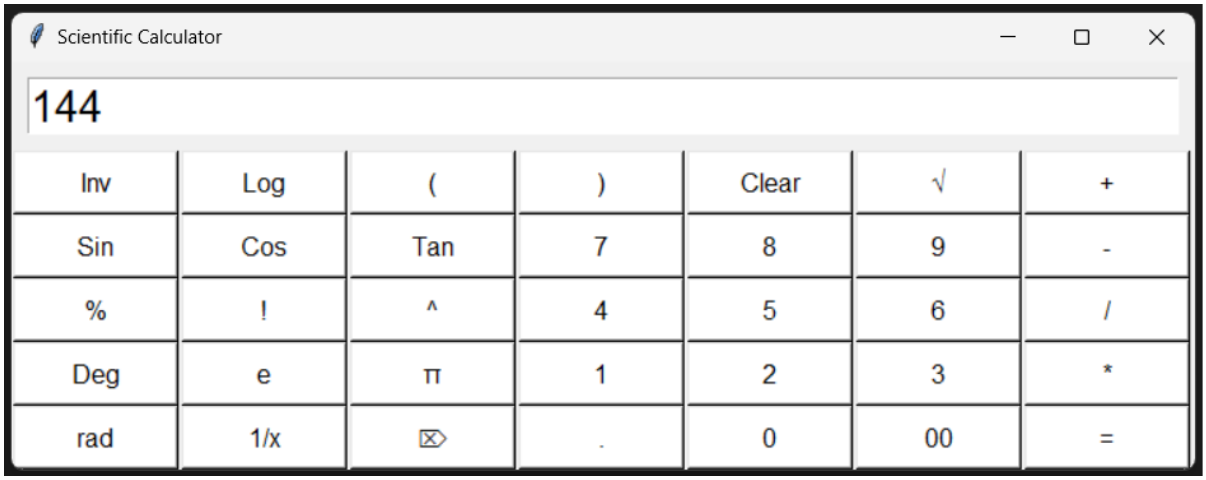
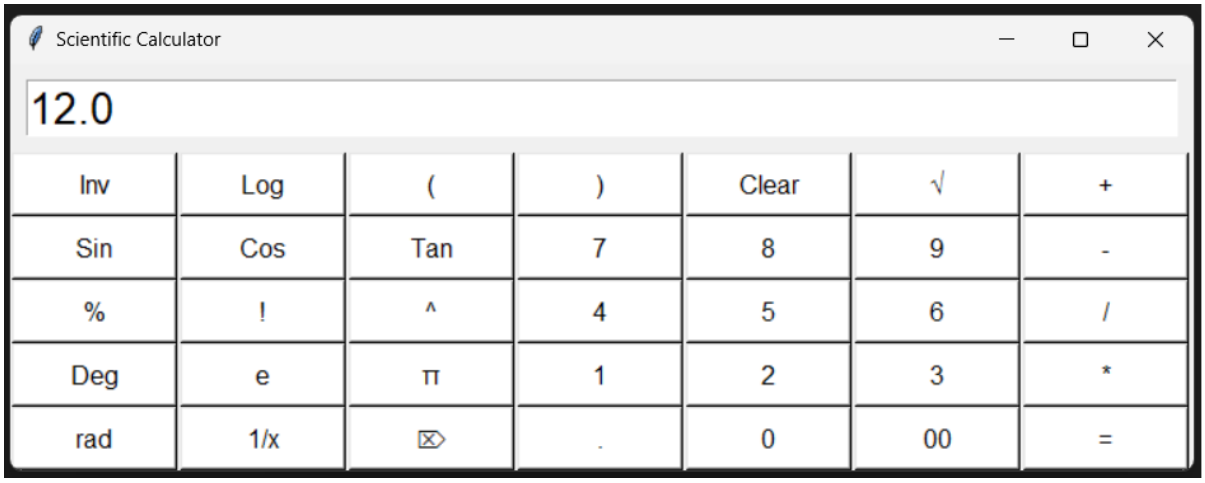


## 3:Sqrt

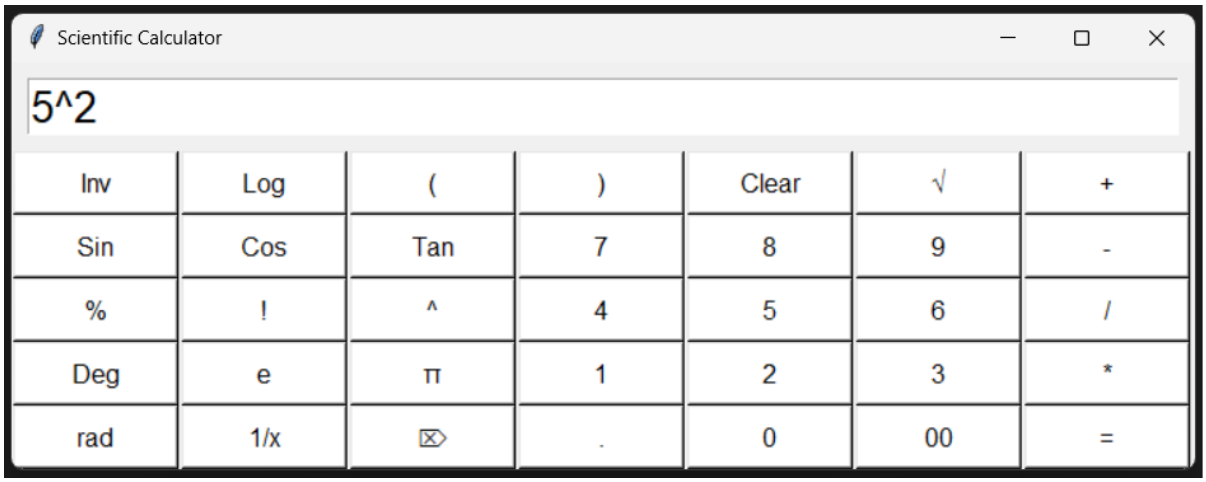



**Sqrt (operation)**

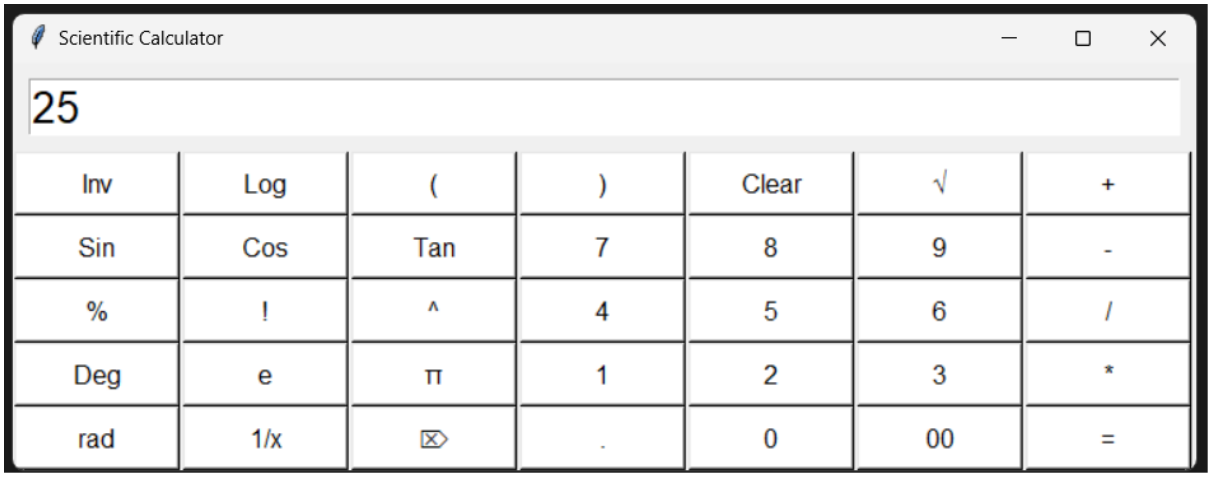
=



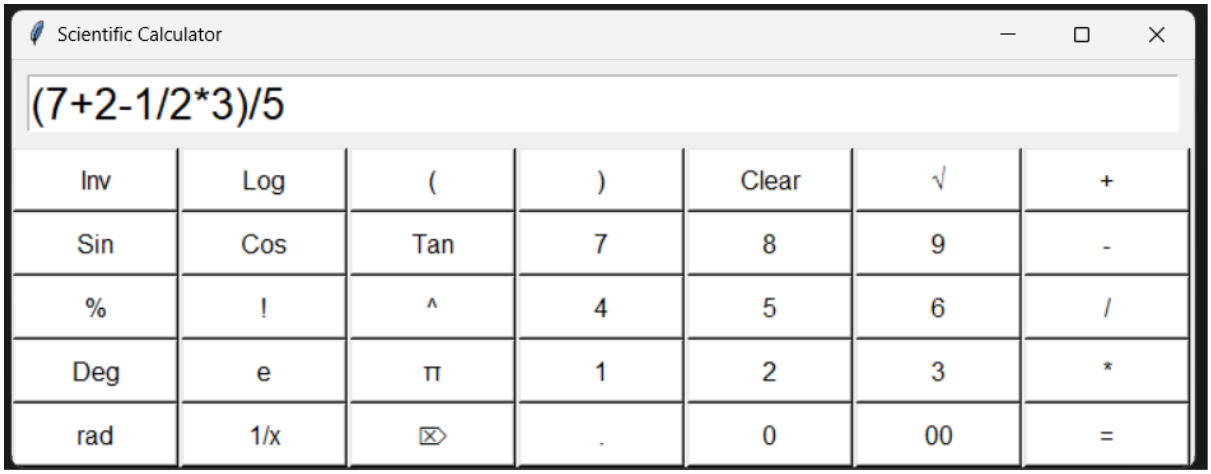
## 4:Power


Scientific Calculator
5^2
Inv Log ( ) Clear √ +
Sin Cos Tan 7 8 9 -
% ! ^ 4 5 6 /
Deg e π 1 2 3 *
rad 1/x ⌦ . 0 00 =

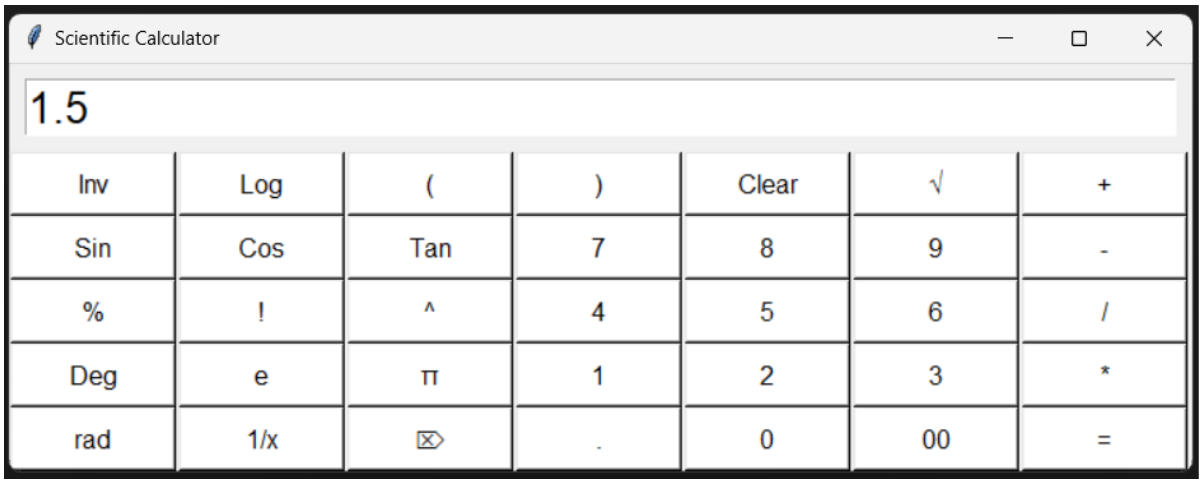
=


Scientific Calculator
25
Inv Log ( ) Clear √ +
Sin Cos Tan 7 8 9 -
% ! ^ 4 5 6 /
Deg e π 1 2 3 *
rad 1/x ⌦ . 0 00 =

# 5:Complex


Scientific Calculator
(7+2-1/2*3)/5
Inv Log ( ) Clear √ +
Sin Cos Tan 7 8 9 -
% ! ^ 4 5 6 /
Deg e π 1 2 3 *
rad 1/x ⌦ . 0 00 =

=


Scientific Calculator
1.5
Inv Log ( ) Clear √ +
Sin Cos Tan 7 8 9 -
% ! ^ 4 5 6 /
Deg e π 1 2 3 *
rad 1/x ⌦ . 0 00 =

# ACKNOWLEDGEMENT

Firstly, I would like to express my special thanks of gratitude to my PYTHON teacher "Navpreet Rupal" who gave me the golden Opportunity to do this wonderful project on the topic of "Scientific Calculator", which also helped me in doing a lot of research and I come to know about so many new things and for their guidance and support I am able to complete my Project.

Secondly, I would also like to thank my family and friends who helped me a lot in finishing project within the limited time

# CONCLUSION

Here I have came to the end of my project on the topic of "Scientific Calculator".

I would like to share my experience while doing this project.

I learnt many new things about Scientific Calculator, and it was a wonderful learning experience for me while working on this project.

This Project took me through the various phases of project development and gave me real insight into the world of programming and the joy of work and the thrill involved while tackling the various problems and challenges gave me a feel of developer's industry.

This project has developed my thinking skills and make more interest in this subject. This Project gave me real insight in the world of Programming. While doing this project I enjoy very much.

A special thanks to my Python Mam "Navpreet Rupal" for giving this Golden Opportunity to do this project. It was a wonderful and learning experience for me while working on this project.

Date: Name:

31/10/2022 Mohammed Faizan

# REFRENCES


- www.google.com
- https://en.wikipedia.org/wiki/Scientific_calculator
- https://www.youtube.com/watch?v=AbemIdfTt8g
- https://www.youtube.com/watch?v=B5g-gnHlLIA
- https://www.youtube.com/watch?v=6CAuI6YfvSw
- https://www.calculator.net/scientific-calculator.html

**CODE**

```
from tkinter import *
import tkinter.messagebox as tmsg
import math as m

root = Tk()
root.title("Scientific Calculator")

sc = StringVar()
sc = Entry(root,
width=48,textvariable=sc,relief=SUNKEN,font="cosmicsan
sms 20")
sc.grid(row=0,column=0,columnspan=8,padx=10,pady=10)

def sciCal(event):
    key = event.widget
    text = key['text']
    val = sc.get()
    sc.delete(0,END)
    if text=="Sin":
        sc.insert(0,m.sin(float(val)))
    elif text=="Cos":
        sc.insert(0,m.cos(float(val)))
    elif text=="Tan":
        sc.insert(0,m.tan(float(val)))

    elif text=="Log":
        if(float(val)<=0.00):
            sc.insert(0,"Not Possible")
        else:
            sc.insert(0,m.log10(float(val)))
```

```
    elif text=="Inv":
        if(float(val)<=0.00):
            sc.insert(0,"Not Possible")
        else:
            sc.insert(0,m.log(float(val)))
    elif text=="√":
        sc.insert(0,m.sqrt(float(val)))
    elif text=="!":
        sc.insert(0,m.factorial(int(val)))
    elif text=="rad":
        sc.insert(0,m.radians(float(val)))
    elif text=="deg":
        sc.insert(0,m.degrees(float(val)))
    elif text=="1/x":
        if(val=="0"):
            sc.insert(0,"∞")
        else:
            sc.insert(0,1/float(val))
    elif text=="π":
        if val=="":
             ans = str(m.pi)
             sc.insert(0,ans)
        else:
            ans = str(float(val) * (m.pi))
            sc.insert(0,ans)

    elif text=="e":
        if val=="":
            sc.insert(0,str(m.e))
        else:
            sc.insert(0, str(float(val) * (m.e)))

def click(event):
    key = event.widget
```

```
    text = key['text']
    oldValue = sc.get()
    sc.delete(0,END)
    newValue = oldValue + text
    sc.insert(0,newValue)

def clr(event):
    sc.delete(0,END)

def backspace(event):
    entered = sc.get()
    length = len(entered)-1
    sc.delete(length,END)

def calculate(event):
    answer = sc.get()
    if "^" in answer:
        answer = answer.replace("^","**")
    answer = eval(answer)
    sc.delete(0,END)
    sc.insert(0,answer)

class Calculator:
    def __init__(self,txt,r,c,funcName,color="white"):
        self.var =
Button(root,text=txt,padx=3,pady=5,fg="black",bg=color
,width=10,font="cosmicsansms 12")
        self.var.bind("<Button-1>",funcName)
        self.var.grid(row=r,column=c)

btn0 =Calculator("Inv",1,0,sciCal)

btn1 = Calculator("Log",1,1,sciCal)
```

```
btn2 = Calculator("(",1,2,click)

btn3 = Calculator(")",1,3,click)

btn4 = Calculator("Clear",1,4,clr)

btn5 = Calculator("√",1,5,sciCal)

btn6 = Calculator("+",1,6,click)



btn7 = Calculator("Sin",2,0,sciCal)

btn8 =  Calculator("Cos",2,1,sciCal)

btn9 =  Calculator("Tan",2,2,sciCal)

btn10 = Calculator("7",2,3,click)

btn11 = Calculator("8",2,4,click)

btn12 = Calculator("9",2,5,click)

btn13 = Calculator("-
",2,6,click)



btn14 =
Calculator("%",3,0,click)
```

```
btn15 =
Calculator("!",3,1,sciCal)

btn16 =
Calculator("^",3,2,click)


btn17 = Calculator("4",3,3,click)

btn18 =  Calculator("5",3,4,click)

btn19 =  Calculator("6",3,5,click)

btn20 = Calculator("/",3,6,click)



btn21 = Calculator("Deg",4,0,sciCal)

btn22 = Calculator("e",4,1,sciCal)

btn23 =  Calculator("π",4,2,sciCal)

btn24 = Calculator("1",4,3,click)

btn25 = Calculator("2",4,4,click)

btn26 = Calculator("3",4,5,click)

btn27 = Calculator("*",4,6,click)



btn28 = Calculator("rad",5,0,sciCal)
```

```
btn29 = Calculator("1/x",5,1,sciCal)

btn30 = Calculator("⌦",5,2,backspace)

btn31 =  Calculator(".",5,3,click)

btn32 =  Calculator("0",5,4,click)

btn33 = Calculator("00",5,5,click)

btn34= Calculator("=",5,6,calculate)

root.mainloop()
```