PYTHON LABORATORY

Project report

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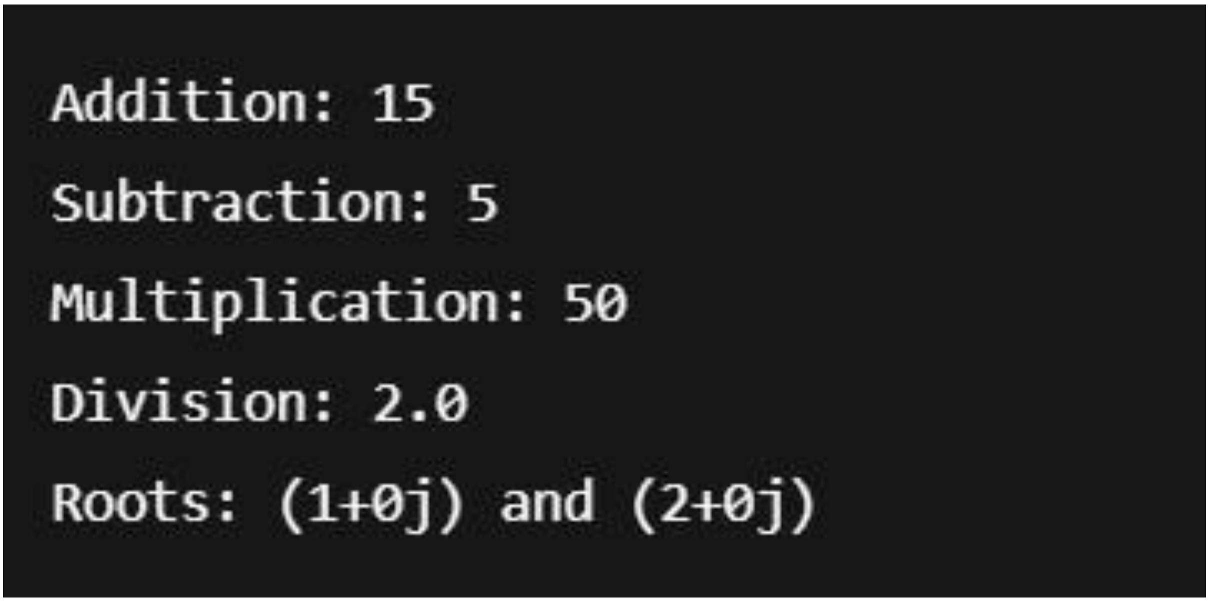
1. Introduction

This Python project covers a range of basic to intermediate programming tasks such as math operations, equation solving, visualization, and game development using Tkinter.

Output:

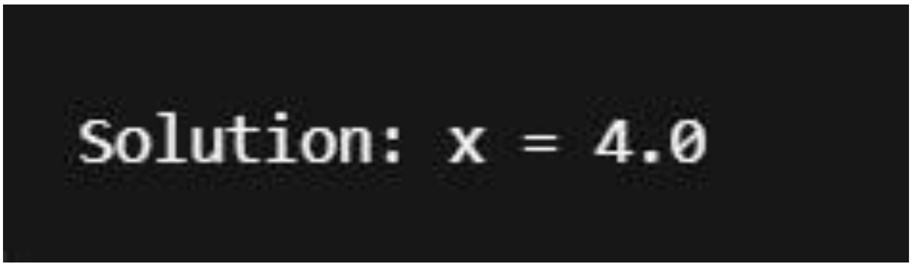


```
Addition: 15
Subtraction: 5
Multiplication: 50
Division: 2.0
Roots: (1+0j) and (2+0j)
```

3. Linear Equation Solver Code:

```
def solve_linear(a, b):     if
a == 0:
        print("No solution" if b != 0 else "Infinite solutions")     else:
        x = -b / a

print(f"Solution: x = {x}")


# Example solve_linear(2, 8)
```

Output :

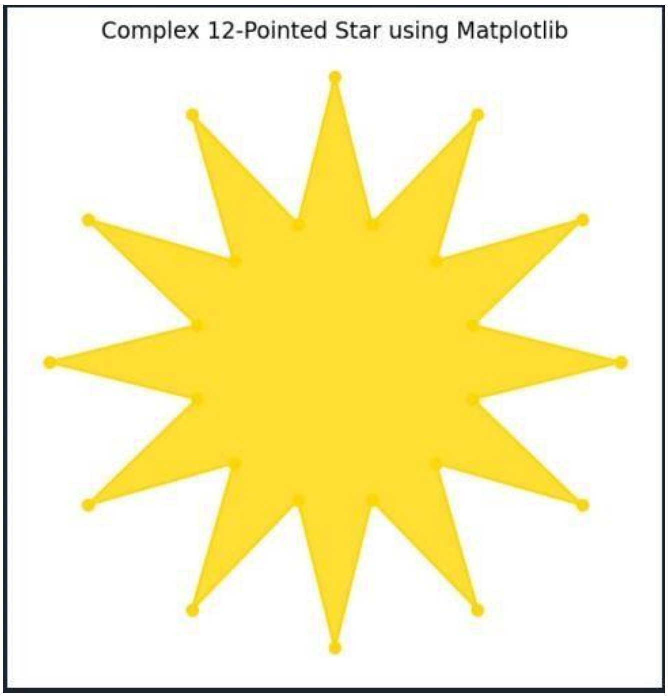


```
Solution: x = 4.0
```

4. Graphical Representations Code
:

```
import matplotlib.pyplot as plt import numpy
as np
# Function to create a complex star def complex_star(num_points=12,
outer_radius=5, inner_radius=2.5):
    angles = np.linspace(0, 2 * np.pi, num_points * 2 + 1)  # +1 to close the star
radius = np.array([outer_radius if i % 2 == 0 else inner_radius for i in
range(len(angles))])     x = radius * np.cos(angles)     y = radius * np.sin(angles)
return x, y
# Generate coordinates for a 12-pointed complex star x, y
= comple x_star()
```

Output :

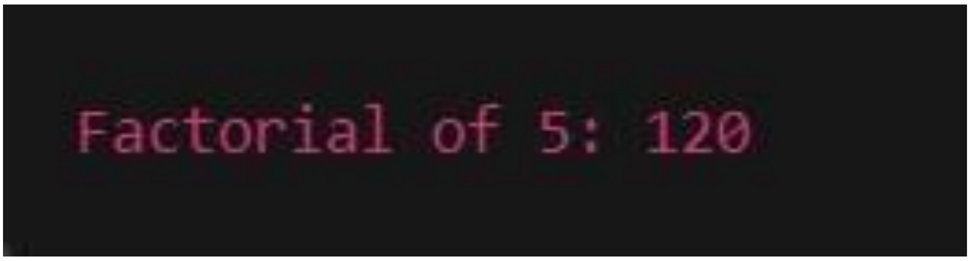


5. Function Implementation

(Factorial) Code :

```
def factorial(n):     if n
== 0 or n == 1:
       return 1     return n * factorial(n
- 1)


print("Factorial of 5:", factorial(5))
```

Output :



```
Factorial of 5: 120
```

7. "Color Catcher" – A Reflex and Memory Game using Tkinter Code :

```
import tkinter as tk import
random


# --- Game Variables ---   colors = ['red', 'blue',

'green', 'yellow', 'purple'] score = 0 time_left = 60

target_color = random.choice(colors) ball_speed

=

ball_interval = 1500  #
milliseconds


# --- Create Main Window --- root

= tk.Tk()   root.title("Color Catcher")

root.geometry("400x600")

root.resizable(False,

False)


canvas = tk.Canvas(root, width=400, height=600, bg='white') canvas.pack()


# --- Basket ---   basket = canvas.create_rectangle(170, 550, 230,
570, fill='black')
# --- Score & Time ---   score_text = canvas.create_text(10, 10, anchor='nw', font=('Arial', 14),

text="Score: 0") time_text = canvas.create_text(300, 10, anchor='nw', font=('Arial', 14),

text="Time: 60")

target_text = canvas.create_text(10, 35, anchor='nw', font=('Arial', 14), text=f"Catch: {target_color}",
fill=target_color)
```

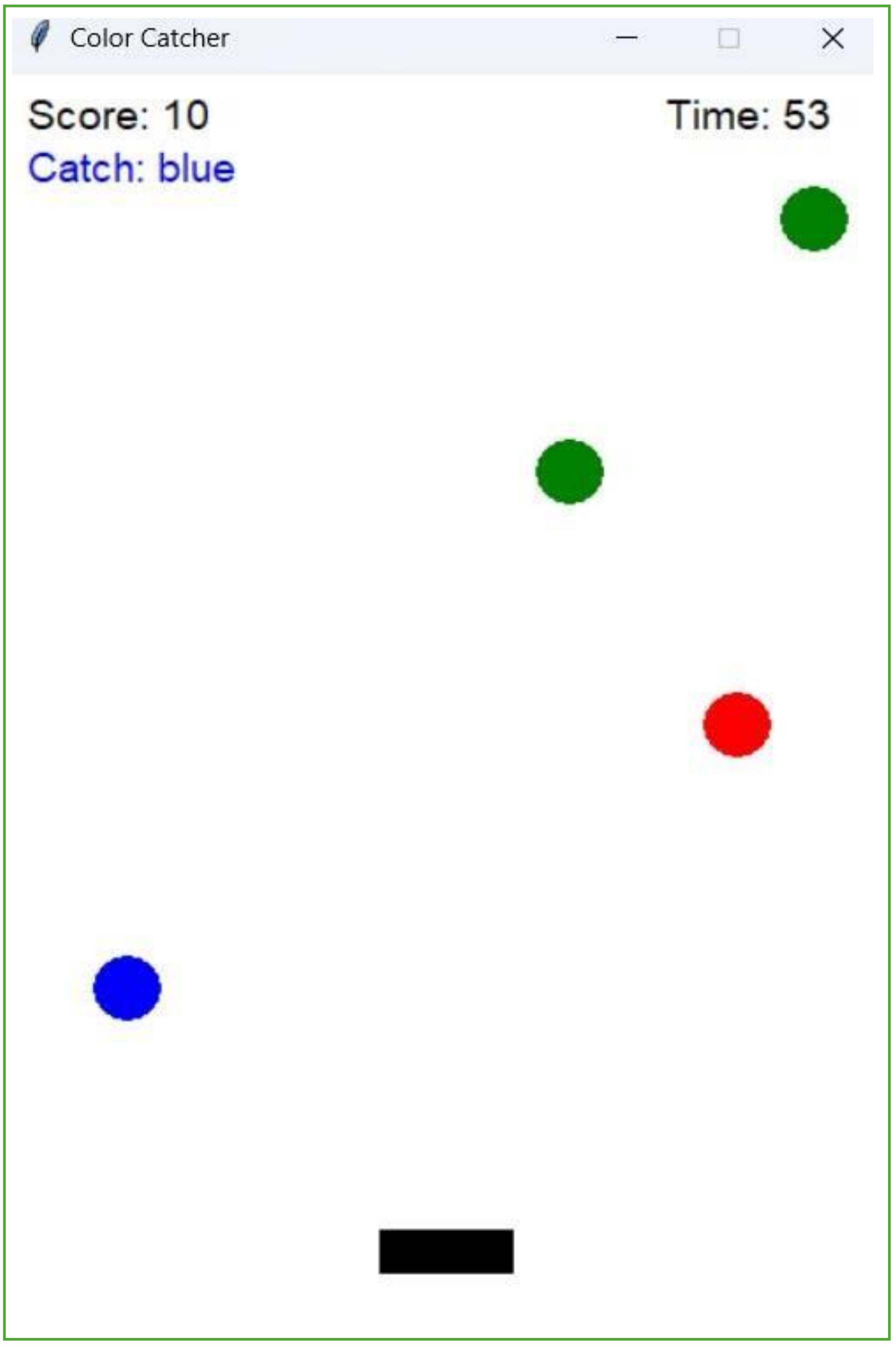
```
# --- Ball List --- balls

= []


# --- Controls --- def
move_left(event):
    canvas.move(basket, -20, 0)


def move_right(event):
    canvas.move(basket, 20, 0)


root.bind("<Left>", move_left) root.bind("<Right>",
move_right)


# --- Update Score Display --- def update_score():
    canvas.itemconfig(score_text, text=f"Score: {score}")
# --- Drop Balls --- def
drop_ball():
    color = random.choice(colors)     x = random.randint(10, 370)
ball = canvas.create_oval(x, 0, x + 30, 30, fill=color, outline=color)
balls.append((ball, color))     root.after(ball_interval, drop_ball)
# --- Move Balls --- def
move_balls():     global
score     to_remove = []
for ball, color in balls:
```

```
    canvas.move(ball, 0, ball_speed)        pos = canvas.coords(ball)        if pos[3] >= 550 and pos[2] >=
canvas.coords(basket)[0] and pos[0] <= canvas.coords(basket)[2]:
      # Collision detected            if
color == target_color:
        score += 10

else:
        score -= 5

canvas.delete(ball)

to_remove.append((ball, color))

update_score()        elif pos[3] >= 600:

canvas.delete(ball)

to_remove.append((ball, color))    for b in

to_remove:

balls.remove(b)    root.after(50,
move_balls)


# --- Update Target Color --- def change_target_color():      global target_color      target_color =

random.choice(colors)      canvas.itemconfig(target_text, text=f"Catch: {target_color}",

fill=target_color)    root.after(10000, change_target_color)


# --- Countdown Timer --- def
countdown():
  global time_left    time_left
-= 1
  canvas.itemconfig(time_text, text=f"Time: {time_left}")    if
time_left > 0:
```

```
    root.after(1000, countdown)
else:
    canvas.create_text(200, 300, text="Game Over!", font=('Arial', 24),
fill='red')      canvas.create_text(200, 340, text=f"Final Score: {score}",
font=('Arial', 18))
# --- Start Game ---
drop_ball() move_balls()
change_target_color()
countdown()
root.mainloop()
```

OUTPUT

:



Color Catcher
Score: 10
Time: 53
Catch: blue