PYTHON LABORATORY

Project report

KU

KAZIRANGA UNIVERSITY

KNOWLEDGE & BEYOND

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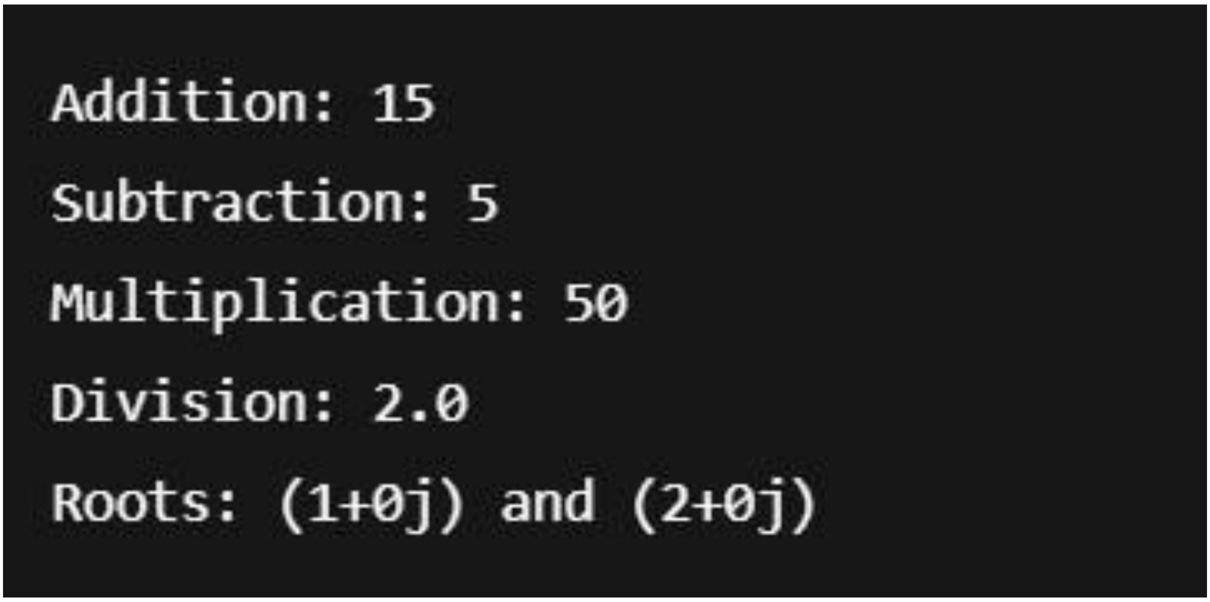
1. Introduction

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:

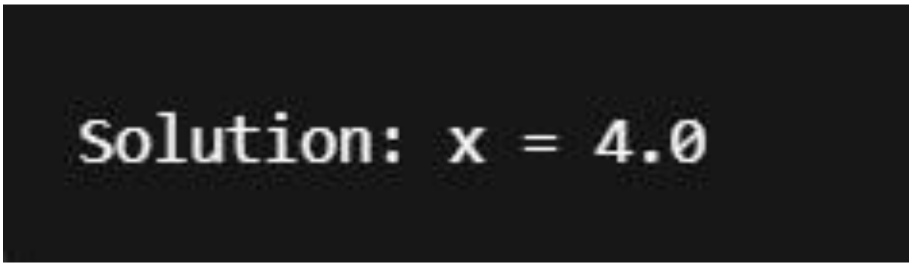


```
Addition: 15
Subtraction: 5
Multiplication: 50
Division: 2.0
Roots: (1+0j) and (2+0j)
```

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 :

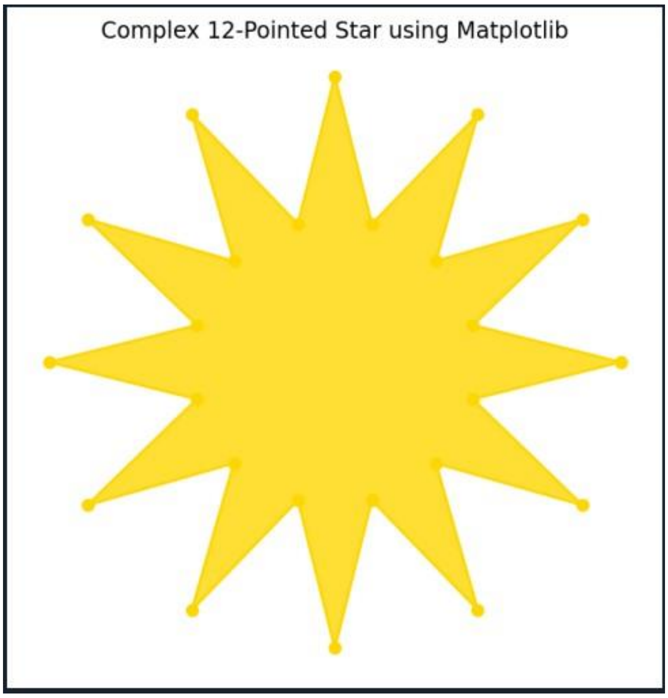


```
Solution: x = 4.0
```

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 :

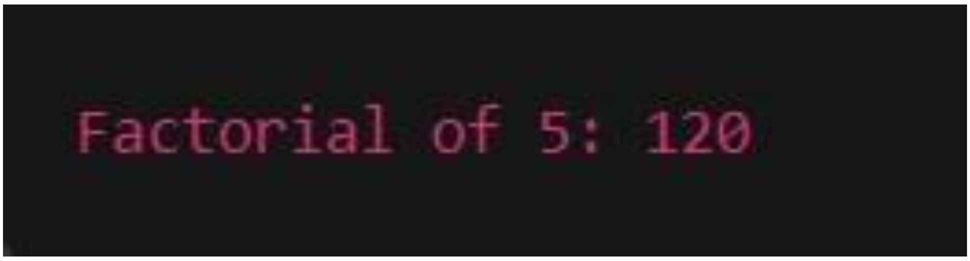


5. Function Implementation

(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 :

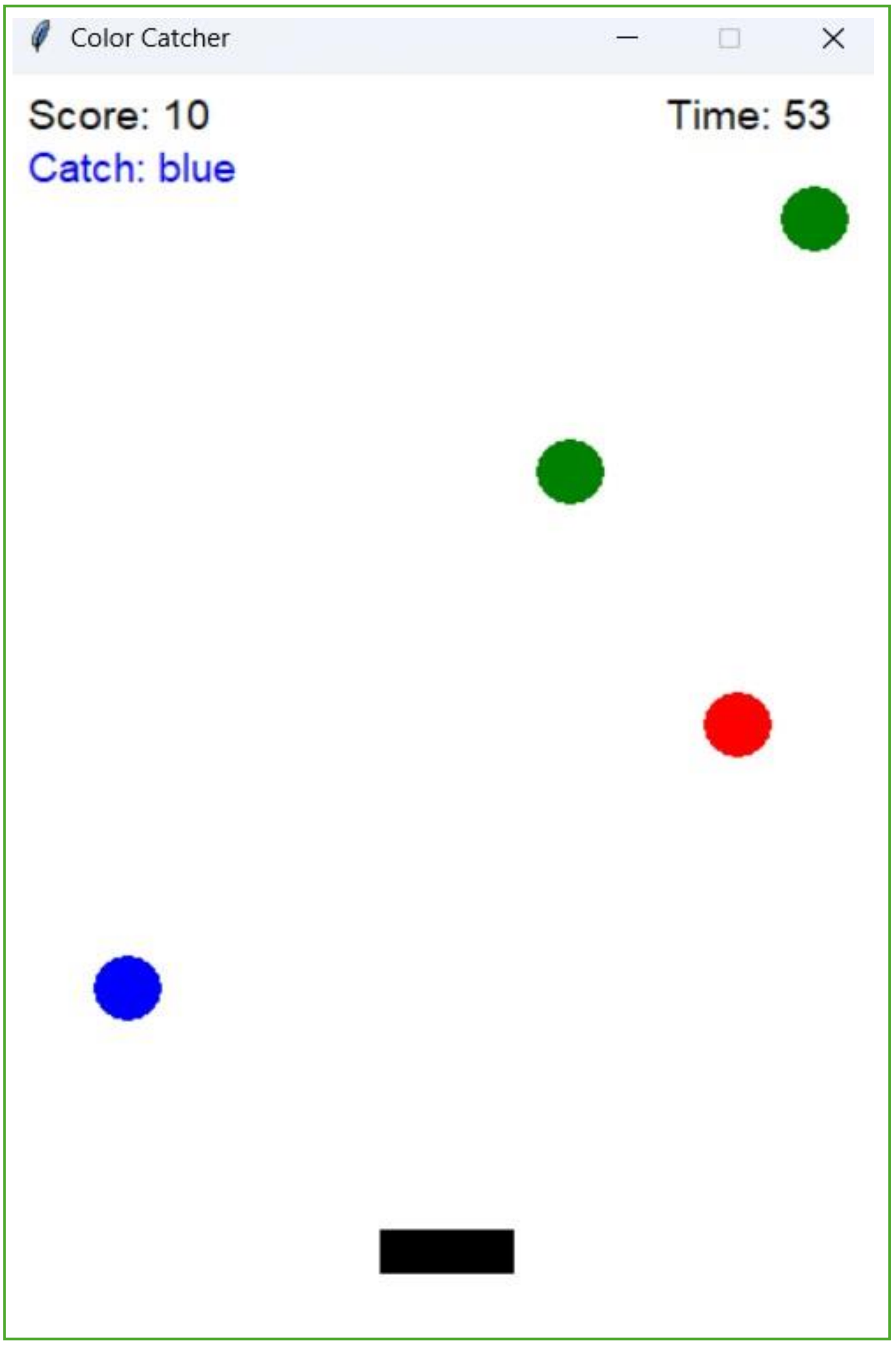
```
import tkinter as tk import

random



# --- Game Variables ---

colors = ['red', 'blue', 'green', 'yellow', 'purple']

score = 0 time_left = 60

target_color = random.choice(colors) ball_speed =

5

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 :



Score: 10

Time: 53

Catch: blue