TASK-1

Weather Modeling Using the Quadratic Solution in Stages

# Objective

To implement a basic weather modeling system using the quadratic formula in progressive stages. Each stage introduces new functionality—from hardcoded input to file-based processing—and concludes with saving, debugging, and uploading to GitHub.

# Stage 1: Hard-Coded Variables

In this initial stage, the coefficients of a quadratic equation T(t) = a t^2 + b t + c are hardcoded into the program.

Python Code:  
import math  
  
a = 1  
b = -3  
c = -4  
  
discriminant = b\*\*2 - 4\*a\*c  
  
if a == 0:  
 print("Not a quadratic equation.")  
elif discriminant >= 0:  
 t1 = (-b + math.sqrt(discriminant)) / (2\*a)  
 t2 = (-b - math.sqrt(discriminant)) / (2\*a)  
 print(f"Roots (times): {t1:.2f}, {t2:.2f}")  
else:  
 print("No real solution")

# Stage 2: Keyboard Input

This version allows the user to input the coefficients a, b, and c via the keyboard. It makes the program more interactive and flexible.

Python Code:  
import math  
  
a = float(input("Enter a: "))  
b = float(input("Enter b: "))  
c = float(input("Enter c: "))  
  
discriminant = b\*\*2 - 4\*a\*c  
  
if a == 0:  
 print("Not a quadratic equation.")  
elif discriminant >= 0:  
 t1 = (-b + math.sqrt(discriminant)) / (2\*a)  
 t2 = (-b - math.sqrt(discriminant)) / (2\*a)  
 print(f"Roots: {t1:.2f}, {t2:.2f}")  
else:  
 print("No real solution")

# Stage 3: Read a Single Set of Coefficients from a File

The program reads a single line of input from a file named input.txt. This simulates reading weather model parameters from a data file.

Sample File (input.txt):  
1 -3 -4  
  
Python Code:  
import math  
  
try:  
 with open("input.txt", "r") as f:  
 line = f.readline()  
 a, b, c = map(float, line.strip().split())  
except FileNotFoundError:  
 print("Error: input.txt not found.")  
 exit()  
  
discriminant = b\*\*2 - 4\*a\*c  
  
if a == 0:  
 print("Not a quadratic equation.")  
elif discriminant >= 0:  
 t1 = (-b + math.sqrt(discriminant)) / (2\*a)  
 t2 = (-b - math.sqrt(discriminant)) / (2\*a)  
 print(f"Roots: {t1:.2f}, {t2:.2f}")  
else:  
 print("No real solution")

# Stage 4: Read Multiple Sets of Coefficients from a File

This version processes multiple sets of coefficients from a file (inputs.txt). Each line represents a different quadratic weather model.

Sample File (inputs.txt):  
1 -3 -4  
2 4 -6  
1 2 5  
  
Python Code:  
import math  
  
def solve\_quadratic(a, b, c):  
 if a == 0:  
 return None # Not a quadratic  
 d = b\*\*2 - 4\*a\*c  
 if d < 0:  
 return None  
 t1 = (-b + math.sqrt(d)) / (2\*a)  
 t2 = (-b - math.sqrt(d)) / (2\*a)  
 return (t1, t2)  
  
try:  
 with open("inputs.txt", "r") as f:  
 lines = f.readlines()  
except FileNotFoundError:  
 print("Error: inputs.txt not found.")  
 exit()  
  
for line in lines:  
 if not line.strip():  
 continue  
 a, b, c = map(float, line.strip().split())  
 result = solve\_quadratic(a, b, c)  
 if result:  
 t1, t2 = result  
 print(f"Roots: {t1:.2f}, {t2:.2f}")  
 else:  
 print("No real roots or not a quadratic equation")

# Final Tasks

a. Save all versions as separate .py files.  
b. Debug and fix problems such as incorrect input parsing, negative discriminant, and file reading errors.  
c. Create a GitHub repository and upload all files.