PES UNIVERSITY, BENGALURU

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UE25CS151A – PYTHON FOR COMPUTATIONAL PROBLEM SOLVING LAB MANUAL

WEEK 3

TOPICS:

Programs on Input and Output Functions

Operators and Expressions

Usage of Libraries

OBEJCTIVE:

➢ Utilize input functions to capture user data and output functions to display results effectively.

➢ Apply arithmetic, relational, logical, and other operators to construct and evaluate expressions for problem-solving.

➢ Explore and integrate Python libraries to enhance program functionality and perform complex tasks efficiently

Problem Statement 1:

Write a Python program to calculate the slope of a line passing through two points (x1, y1) and (x2, y2).

The slope is calculated using the formula: Slope = (y2 - y1) / (x2 - x1).

Assume that inputs are valid numbers and x2 ≠ x1 as per the given constraints.

Constraints:

- Inputs are valid numbers.
- x2 ≠ x1 (to avoid division by zero).

Example:

- Input: x1 = 1, y1 = 2, x2 = 3, y2 = 4 → Output: Slope of the line: 1.0
- Input: x1 = 2, y1 = 4, x2 = 6, y2 = 8 → Output: Slope of the line: 1.0

Solution:

```
In [1]: x1 = float(input("Enter x1: "))
        y1 = float(input("Enter y1: "))
        x2 = float(input("Enter x2: "))
        y2 = float(input("Enter y2: "))
        slope = (y2 - y1) / (x2 - x1)
        print("Slope of the line:", slope)

        Enter x1: 6
        Enter y1: 7
        Enter x2: 8
        Enter y2: 9
        Slope of the line: 1.0
```

Problem Statement 2:

Given two integers a and b as input, calculate the square root of their sum using the math module. Output the result rounded to two decimal places.

Constraints:

- Inputs are valid integers.

- The sum a + b is non-negative.

Example:

- Input: a = 3, b = 4 → Output: Square root of sum: 2.24

- Input: a = 0, b = 16 → Output: Square root of sum: 4.00

Solution:

```
In [1]: import math

        # Input: Two integers
        a = int(input("Enter first number: "))
        b = int(input("Enter second number: "))

        # Calculate sum and square root
        sum_ab = a + b
        sqrt_result = math.sqrt(sum_ab)

        # Output result rounded to 2 decimal places
        print("Square root of sum:", "{:.2f}".format(sqrt_result))

        Enter first number: 3
        Enter second number: 4
        Square root of sum: 2.65
```

Problem Statement 3:

Write a Python program to input a person's date of birth (year, month, day) as integers and calculate the total number of days they have lived until today's date (September 7, 2025). Use the datetime library to handle date calculations and compute the difference between the current date and the birth date. Output the total number of days lived.

Constraints:

- Year is a valid integer (e.g., 1900 or later).

- Month is an integer between 1 and 12.

- Day is an integer between 1 and 31.

- Assume the input forms a valid date before September 7, 2025.

Example:

- Input: year = 2000, month = 1, day = 1

- Output: You have lived for 9379 days. (Exact number depends on the current date)

- Input: year = 1995, month = 6, day = 15

- Output: You have lived for 11033 days. (Exact number depends on the current date)

3

Solution:

```python
In [2]: from datetime import datetime
        # Input: Date of birth (year, month, day)
        year = int(input("Enter birth year: "))
        month = int(input("Enter birth month: "))
        day = int(input("Enter birth day: "))
        # Create datetime objects for birth date and current date
        dob = datetime(year, month, day)
        today = datetime.now()
        # Calculate days lived
        days_lived = (today - dob).days
        # Output the total days lived
        print("You have lived for", days_lived, "days.")

Enter birth year: 1983
Enter birth month: 3
Enter birth day: 30
You have lived for 15502 days.
```

Problem Statement 4:

Write a Python program to simulate the exam performance of a student named XYZ. Use random.uniform(0, 100) to generate five random floating-point exam marks between 0 and 100 (inclusive) for five subjects: Mathematics, Physics, Chemistry, English, and Computer Science.

Calculate the GPA using the formula: GPA = (sum of marks) / 5 / 10

Output the student's name, the marks for each subject (rounded to two decimal places), the average marks (rounded to two decimal places), and the GPA (rounded to two decimal places).

Constraints:

- Marks are floating-point numbers between 0 and 100 (inclusive).

- The GPA is calculated as the average of the marks divided by 10.

Example:

- Output (randomized)

    Student: XYZ

    Mathematics: 85.23

    Physics: 90.45

Chemistry: 72.67

English: 88.12

Computer Science: 95.89

Average Marks: 86.47

GPA: 8.65

```
In [ ]: import random
        # Generate random floating-point marks for five subjects (0 to 100)
        math = random.uniform(0, 100)
        physics = random.uniform(0, 100)
        chemistry = random.uniform(0, 100)
        english = random.uniform(0, 100)
        computer_science = random.uniform(0, 100)
        # Calculate average marks
        average = (math + physics + chemistry + english + computer_science) / 5
        # Calculate GPA: average marks / 10
        gpa = average / 10
        # Output student name, marks, average, and GPA
        print("Student: XYZ")
        print("Mathematics:", "{:.2f}".format(math))
        print("Physics:", "{:.2f}".format(physics))
        print("Chemistry:", "{:.2f}".format(chemistry))
        print("English:", "{:.2f}".format(english))
        print("Computer Science:", "{:.2f}".format(computer_science))
        print("Average Marks:", "{:.2f}".format(average))
        print("GPA:", "{:.2f}".format(gpa))
```

Note: Each time the program is run, random marks are taken as input by random.uniform()

Problem Statement 5:

Problem Statement

You are designing a **College Event Planner Tool**. The organizer wants to quickly check the calendar of any month to decide on suitable dates for events.

Write a Python program using the calendar module to display the calendar of a specific month and year entered by the user.

Constraints

- Use Python's in-built calendar module.
- Year must be between 1900 and 9999.

- Month must be an integer between 1 and 12.

- The program should clearly display the calendar of the given month in a readable format.

Example:

Enter year: 2025

Enter month: 9

September 2025

```
Mo Tu We Th Fr Sa Su
 1  2  3  4  5  6  7
 8  9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30
```

Solution:

```python
import calendar
year = int(input("Enter year: "))
month = int(input("Enter month: "))
cal = calendar.month(year, month)
print(cal)
```

```
Enter year: 1983
Enter month: 3
     March 1983
Mo Tu We Th Fr Sa Su
    1  2  3  4  5  6
 7  8  9 10 11 12 13
14 15 16 17 18 19 20
21 22 23 24 25 26 27
28 29 30 31
```

Problem Statement 6:

A vehicle moves with an initial velocity u (m/s) and accelerates at a constant rate a (m/s²) for a time t seconds.
The final velocity v and the distance travelled s can be calculated using the following formulas from physics:

v=u + a * t

s=u * t + (1/2) * a * t²

Write a Python program to input u, a, and t and then display both v (final velocity) and s (distance travelled).

Constraints

- Use only input, output, and operators.
- Inputs must be integers or floats.
- No conditionals, no loops, no error handling.

Example:

> Enter initial velocity: 5
> Enter acceleration: 2
> Enter time: 10
> **Output:**
> Final velocity = 25.0 m/s
> Distance travelled = 150.0 m

Solution:

```
In [7]: u = float(input("Enter initial velocity: "))
        a = float(input("Enter acceleration: "))
        t = float(input("Enter time: "))

        v = u + a * t
        s = u * t + 0.5 * a * t * t

        print("Final velocity =", v, "m/s")
        print("Distance travelled =", s, "m")

        Enter initial velocity: 5
        Enter acceleration: 2
        Enter time: 10
        Final velocity = 25.0 m/s
        Distance travelled = 150.0 m
```

Practice Programs:

1. A customer buys an item at price P rupees. A shop offers a 12% discount on the item.
   Write a Python program to calculate and print the final price after discount.
2. The cost of one movie ticket is given. A group of n friends go to watch the movie together.
   Write a Python program to calculate the total cost including 18% GST.
3. A traveler wants to convert money from USD to INR.
   Write a Python program that accepts the amount in USD and the exchange rate (1 USD = ? INR) as input, and prints the equivalent amount in INR.
4. Find Leap Year or Not (no if-else, just using calendar module)
5. Write a Python program using the os module to display the current working directory of the system, to display all files and folders and to identify the operating system type of the computer.

Errors guide you, Corrections shape you