Batch 1 – Module 3 (Project 2)

Basic Set Operations and Visualization

Build a **Set Operations and Visualization Tool** in Python. The tool allows users to create sets, perform operations (union, intersection, difference, complement), and visualize results using **Venn diagrams**.

Features

1. **Set Creation Tool**: Users define sets by inputting elements and naming them.
2. **Visual Operation Performer**: Perform union, intersection, difference, and complement operations with visualization.
3. **Cardinality Calculator**: Count and display the number of elements in sets.

Algorithm

Step 1: Start

- Display menu options:
    1. Create Sets
    2. Perform Operations (Union, Intersection, Difference, Complement)
    3. Show Cardinality
    4. Visualize Venn Diagram
    5. Exit

Step 2: Set Creation

- Ask user for set name (e.g., A, B).
- Ask for set elements.
- Store set in a dictionary with the name as key.

Step 3: Perform Operations

- If **Union**: Combine elements of two sets.
- If **Intersection**: Keep only common elements.
- If **Difference**: Subtract elements of one set from another.

- If **Complement**: Define a universal set, then subtract the chosen set.

Step 4: Cardinality

- For each set, count elements and display.

Step 5: Visualization

- Use Venn diagrams (matplotlib_venn) to visualize set relations.

Step 6: Repeat

- Loop until user exits.

Pseudocode

```
BEGIN
CREATE dictionary SETS

FUNCTION create_set
PROMPT user for set_name
PROMPT user for elements (comma-separated)
CONVERT input into set of unique elements
STORE in SETS with key set_name
END FUNCTION

FUNCTION display_menu
PRINT options:
1. Create a set
2. Union of two sets
3. Intersection of two sets
4. Difference of two sets
5. Complement of a set
6. Cardinality of a set
7. Exit
END FUNCTION

FUNCTION perform_operation(choice)
IF choice == Union
```

```
ASK for two set names A and B
RESULT = A union B
DISPLAY RESULT and Venn diagram
ELSE IF choice == Intersection
ASK for two set names A and B
RESULT = A intersection B
DISPLAY RESULT and Venn diagram
ELSE IF choice == Difference
ASK for two set names A and B
RESULT = A - B
DISPLAY RESULT and Venn diagram
ELSE IF choice == Complement
ASK for set A and Universal set U
RESULT = U - A
DISPLAY RESULT and Venn diagram
ELSE IF choice == Cardinality
ASK for set name
DISPLAY size of set
ELSE IF choice == Exit
TERMINATE program
END FUNCTION

LOOP
CALL display_menu
GET user choice
CALL perform_operation(choice)
END LOOP
END
```