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Module 5

Part 1: Write a program that uses nested loops to collect data and calculate the average rainfall over a period of years. The program should first ask for the number of years. The outer loop will iterate once for each year. The inner loop will iterate twelve times, once for each month. Each iteration of the inner loop will ask the user for the inches of rainfall for that month. After all iterations, the program should display the number of months, the total inches of rainfall, and the average rainfall per month for the entire period.

Pseudocode

```
START
  ASK user for number_of_years
  SET total_rainfall = 0
  SET total_months = number_of_years * 12

  FOR year from 1 to number_of_years
    FOR month from 1 to 12
      ASK user for rainfall_inches for that month
      ADD rainfall_inches to total_rainfall
    END FOR
  END FOR

  SET average_rainfall = total_rainfall / total_months

  DISPLAY total_months
  DISPLAY total_rainfall
  DISPLAY average_rainfall
END
```

Python source code part 1

```python
# Part 1: Rainfall Program
# This program uses nested loops to calculate the average rainfall over a number of years

# Ask the user for the number of years
years = int(input("Enter the number of years: "))

total_rainfall = 0.0
total_months = years * 12
```

```python
# Outer loop for each year
for year in range(1, years + 1):
    print(f"\nYear {year}")

    # Inner loop for each month
    for month in range(1, 13):
        rainfall = float(input(f"  Enter rainfall (in inches) for month {month}: "))
        total_rainfall += rainfall

# Calculate average rainfall
average_rainfall = total_rainfall / total_months

# Display results
print("\n--- Rainfall Summary ---")
print(f"Total months: {total_months}")
print(f"Total inches of rainfall: {total_rainfall:.2f}")
print(f"Average rainfall per month: {average_rainfall:.2f}")
```

Figure 1: Part 1 Rainfall Program Execution

```
Enter the number of years: 1

Year 1
  Enter rainfall (in inches) for month 1: 2
  Enter rainfall (in inches) for month 2: 3
  Enter rainfall (in inches) for month 3: 1
  Enter rainfall (in inches) for month 4: 4
  Enter rainfall (in inches) for month 5: 2
  Enter rainfall (in inches) for month 6: 3
  Enter rainfall (in inches) for month 7: 2
  Enter rainfall (in inches) for month 8: 1
  Enter rainfall (in inches) for month 9: 3
  Enter rainfall (in inches) for month 10: 2
  Enter rainfall (in inches) for month 11: 4
  Enter rainfall (in inches) for month 12: 3

--- Rainfall Summary ---
Total months: 12
Total inches of rainfall: 30.00
Average rainfall per month: 2.50
```

Part 2: The CSU Global Bookstore has a book club that awards points to its students based on the number of books purchased each month. The points are awarded as follows: If a customer purchases 0 books, they earn 0 points. If a customer purchases 2 books, they earn 5 points. If a customer purchases 4 books, they earn 15 points. If a customer purchases 6 books, they earn 30 points. If a customer purchases 8 or more books, they earn 60 points. Write a program that asks the user to enter the number of books that they have purchased this month and then display the number of points awarded.

Pseudocode part 2

START
  ASK user for books_purchased

  IF books_purchased == 0: points = 0
  ELSE IF books_purchased == 2: points = 5

```
  ELSE IF books_purchased == 4: points = 15
  ELSE IF books_purchased == 6: points = 30
  ELSE IF books_purchased >= 8: points = 60
  ELSE: points = 0  (or handle as "no points" since it's not listed)

  DISPLAY points
END
```

Python source code part 2

```python
# Part 2: Book Club Points Program
# This program determines points earned based on books purchased

# Ask the user for the number of books purchased
books_purchased = int(input("Enter the number of books purchased this month: "))

# Determine points earned
if books_purchased == 0:
    points = 0
elif books_purchased == 2:
    points = 5
elif books_purchased == 4:
    points = 15
elif books_purchased == 6:
    points = 30
elif books_purchased >= 8:
    points = 60
else:
    points = 0

# Display the points awarded
print(f"Points awarded: {points}")
```

Figure 2: Multiple executions of the Book Club Program Demonstrating Conditional Logic for Different number of Books Purchased

```
Enter the number of books purchased this month: 0
Points awarded: 0


Enter the number of books purchased this month: 2
Points awarded: 5


Enter the number of books purchased this month: 4
Points awarded: 15


Enter the number of books purchased this month: 6
Points awarded: 30


Enter the number of books purchased this month: 8
Points awarded: 60
```