Week 2 – Data Structures and Functions

Topics Covered

1. Python Data Structures
  - Lists: Ordered, mutable collections.
  - Tuples: Ordered, immutable collections.
  - Dictionaries: Key-value pairs.
  - Sets: Unordered collections of unique elements.

2. Functions
  - Created using def.
  - Parameters & return values.
  - Lambda functions → lambda x: x*x.
  - Recursion → functions calling themselves.

3. List Comprehension
  - Compact way to build lists.
  - Example: [x*x for x in range(5)] → [0, 1, 4, 9, 16].

Program 1: Sum of Squares

This program calculates the sum of squares of numbers in a list.

```
def sum_of_squares(numbers):
    return sum([x**2 for x in numbers])

nums = [1, 2, 3, 4, 5]
print("Numbers:", nums)
print("Sum of Squares:", sum_of_squares(nums))
```

Program 2: Data Cleaning (Remove Duplicates & Filter)

This script cleans a list by removing duplicates and filtering values greater than a threshold.

```
def remove_duplicates(data):
    return list(set(data))


def filter_data(data):
    return [x for x in data if x > 10]
```

```
raw_data = [5, 12, 7, 12, 18, 5, 25]
print("Raw Data:", raw_data)

cleaned_data = remove_duplicates(raw_data)
print("After Removing Duplicates:", cleaned_data)

filtered_data = filter_data(cleaned_data)
print("After Filtering (>10):", filtered_data)
```

Key Takeaways

- Understood the role of lists, tuples, dicts, sets in handling structured data.
- Learned how functions make code reusable.
- Practiced lambda, recursion, list comprehension for efficient coding.
- Applied theory in a data cleaning project.

✨ Week 2 helped me move from basic Python syntax → writing practical functions for data transformation & cleaning, which is a core skill in Data Science.