Dictionaries and Sets

1. Dictionaries

Dictionaries store data as key-value pairs. Keys must be unique and immutable.

1.1 Creating Dictionaries

```
# Creating dictionaries
student = {
    "name": "Alice",
    "age": 20,
    "major": "Computer Science",
    "gpa": 3.8
}
print(f"Student dict: {student}")

# Empty dictionary
empty = {}
print(f"Empty dict: {empty}")
```

```
Student dict: {'name': 'Alice', 'age': 20, 'major': 'Computer Science', 'gpa': 3.8}
Empty dict: {}
```

1.2 Accessing Values

Access dictionary values using keys. Use get() for safe access with default values.

```
student = {"name": "Alice", "age": 20, "gpa": 3.8}

# Direct access
print(f"Name: {student['name']}")
print(f"Age: {student['age']}")

# Using get() - safer
print(f"GPA: {student.get('gpa')}")
print(f"Grade (doesn't exist): {student.get('grade', 'N/A')}")
```

```
Name: Alice
Age: 20
GPA: 3.8
Grade (doesn't exist): N/A
```

1.3 Modifying Dictionaries

```
student = {"name": "Alice", "age": 20}
```

```
# Update existing key
student['age'] = 21
print(f"After updating age: {student}")

# Add new key
student['courses'] = ['AI', 'ML', 'DL']
print(f"After adding courses: {student}")

# Remove key
del student['age']
print(f"After deleting age: {student}")
```

```
After updating age: {'name': 'Alice', 'age': 21}
After adding courses: {'name': 'Alice', 'age': 21, 'courses': ['AI', 'ML', 'DL']}
After deleting age: {'name': 'Alice', 'courses': ['AI', 'ML', 'DL']}
```

1.4 Dictionary Methods

```
student = {"name": "Alice", "age": 20, "gpa": 3.8}

# Get all keys
print(f"Keys: {list(student.keys())}")

# Get all values
print(f"Values: {list(student.values())}")

# Get key-value pairs
print(f"Items: {list(student.items())}")
```

```
Keys: ['name', 'age', 'gpa']
Values: ['Alice', 20, 3.8]
Items: [('name', 'Alice'), ('age', 20), ('gpa', 3.8)]
```

2. Sets

Sets are unordered collections of unique elements.

```
# Creating sets
numbers = {1, 2, 3, 4, 5}
print(f"Set: {numbers}")

# Duplicates are removed
duplicates = {1, 2, 2, 3, 3, 3}
print(f"With duplicates: {duplicates}")

# Set operations
a = {1, 2, 3, 4}
b = {3, 4, 5, 6}
print(f"Union: {a | b}")
print(f"Intersection: {a & b}")
print(f"Difference: {a - b}")
```

```
Set: {1, 2, 3, 4, 5}
With duplicates: {1, 2, 3}
Union: {1, 2, 3, 4, 5, 6}
Intersection: {3, 4}
Difference: {1, 2}
```

Key Takeaways

• Dictionaries: key-value pairs, keys must be unique
• Use get() for safe dictionary access
• Sets: unordered, unique elements
• Set operations: union (|), intersection (&), difference (-)