



Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
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ACCA5036

Scripting and Programming Concepts

Lecture 6: Understanding Tuples, Sets, and Dictionaries in Python

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Data structure – list Recap & Processing in python

1. To initialize a list:

```
list = []
```

This will set the list to empty

2. To process a list:

```
for i in list:
```

This will deal with all of the values in the list

3. To check contents of a list

*if i in list:
This will test if the value i is in the list*

*if i not in list:
This will test if the value i is not in the list*

4. The get the length of a list:

```
len(list)
```

This will return the length of a list

```
if len(list) == 0
```

This will test to see if the list is empty

5. To append to a list:

```
list.append(i)
```

This will append the item i to the list

6. to access the last element of a list

```
my_list[-1]
```



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Recap Quiz – Python Lists

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How do you access the first element?

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What method adds an item to a list?

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What function returns the length of a list?

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Which method removes an item from a list?

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What will be the output of this code: ``print([1, 2, 3] + [4, 5])``?

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What does ``len([1, 2, 3, 4])`` return?

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What is the output of ``print([1, 2, 3][1])``?

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What does ``list(range(3))`` produce?

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 What will ``my_list = [1, 2, 3]; my_list.append(4)`` result in?

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 What will this code output? ``print([1, 2, 3][3])``

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What does ``my_list = [1, 2, 3]`` return for ``my_list[1:3]``?

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What error occurs with ``print([1, 2, 3].append(4))``?

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What does ``print(len([1, 2, 3, 4]))`` output?

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design



What does ``print([1, 2, 3] * 2)`` return?

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This week

- More data structures
 - Tuples
 - Sets
 - Dictionaries

Introduction to Tuples

- Definition: Immutable, ordered collections.
- Syntax:
 - `my_tuple = (1, "apple", 3.14)`
 - `my_tuple = (1, 2, 3, 4, 5)`

Tuples - Operations

```
my_tuple = (10, 20, 30, 40)
print(my_tuple[1])
```

Tuples - Operations

```
my_tuple = (1, 2, 3)
my_tuple[0] = 10
```

Tuples - Operations

```
coordinates = (40.7128, -74.0060)
print(f"Coordinates: {coordinates}")
```

```
days = ("Monday", "Tuesday", "Wednesday", "Thursday", "Friday", "Saturday", "Sunday")
print(days[0])
```

Tuples - Duplicate Elements?

```
numbers = (1, 2, 3, 1, 2, 3)
print(numbers)
```

Tuples Vs Lists

```
import sys

my_list = [1, 2, 3, 4, 5]
my_tuple = (1, 2, 3, 4, 5)

print(f"List size: {sys.getsizeof(my_list)} bytes")
print(f"Tuple size: {sys.getsizeof(my_tuple)} bytes")
```

Tuples Vs Lists

```
import sys
```

```
my_list = [1, 2, 3, 4, 5]
```

```
my_tuple = (1, 2, 3, 4, 5)
```

```
print(f"List size: {sys.getsizeof(my_list)} bytes")
```

```
print(f"Tuple size: {sys.getsizeof(my_tuple)} bytes")
```

provides access to system-specific parameters and functions.



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Tuples Vs Lists

```
import sys
```

```
my_list = [1, 2, 3, 4, 5]
```

```
my_tuple = (1, 2, 3, 4, 5)
```

```
print(f"List size: {sys.getsizeof(my_list)} bytes")
```

```
print(f"Tuple size: {sys.getsizeof(my_tuple)} bytes")
```

sys.getsizeof() to check the memory usage of different objects.



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Tuple with Different Data Types?

```
mixed_tuple = (1, "Hello", 3.14, True)
```

```
print(mixed_tuple)
```

```
nested_tuple = (42, [1, 2, 3], ("apple", "banana"))
```

```
print(nested_tuple)
```



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Accessing Elements of Mixed Tuple

```
mixed_tuple = (1, "Hello", 3.14, True)
```

```
print(mixed_tuple)
```

```
nested_tuple = (42, [1, 2, 3], ("apple", "banana"))
```

```
print(nested_tuple)
```

```
print(mixed_tuple[1])
```

```
print(nested_tuple[2][1])
```



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Creating, accessing Tuple

```
tup1 = (1, 2, 3, 4, 5)
tup2 = ("apple", "banana", "cherry")
tup3 = (1, "hello", 3.14)
print(tup1[0])
print(tup2[-1])
```

Creating, accessing and slicing Tuple

```
tup1 = (1, 2, 3, 4, 5)
tup2 = ("apple", "banana", "cherry")
tup3 = (1, "hello", 3.14)
print(tup1[0])
print(tup2[-1])
print(tup1[1:4])
print(tup1[:3])
print(tup1[::2])
```

Concatenation and Repetition Tuple

```
tup1 = (1, 2, 3, 4, 5)
tup2 = ("apple", "banana", "cherry")
tup3 = (1, "hello", 3.14)
tup4 = tup1 + tup2
print(tup4)
tup5 = ("Hello",) * 3
print(tup5)
```

Checking Membership

```
tup1 = (1, 2, 3, 4, 5)
tup2 = ("apple", "banana", "cherry")
tup3 = (1, "hello", 3.14)
print(2 in tup1)
print("grape" in tup2)
```

Tuple Length

```
tup1 = (1, 2, 3, 4, 5)
tup2 = ("apple", "banana", "cherry")
tup3 = (1, "hello", 3.14)
print(len(tup1))
```

Tuple Methods

```
tup6 = (1, 2, 2, 3, 4, 2)
print(tup6.count(2))
print(tup6.index(3))
```

Unpacking a Tuple

```
a = (10, 20, 30)
```

```
print(a)
```

```
a, b, c = (10, 20, 30)
```

```
print(a, b, c)
```



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Converting Tuple to List & Vice Versa

```
tup1 = (1, 2, 3, 4, 5)
```

```
list1 = list(tup1)
```

```
print(list1)
```

```
tup7 = tuple(list1)
```

```
print(tup7)
```



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Iterating Through a Tuple

```
tup1 = (1, 2, 3, 4, 5)
for item in tup1:
    print(item)
```

Student Grade Management System

Store student data as tuples (ID, Name, Grade).
Display all student records.
Search for a student by ID.

Student Grade Management System

```
students = [
    (101, "Alice", "A"),
    (102, "Bob", "B"),
    (103, "Charlie", "A"),
]
```



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using **sets** in python....

What is the output of the following code?

```
my_set = {1, 2, 3, 2, 1}
print(my_set)
```

- A) {1, 2, 3, 2, 1}
- B) {1, 2, 3}
- C) [1, 2, 3]
- D) Error



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using **sets** in python....

What is the output of the following code?

```
my_set = {1, 2, 3, 2, 1}  
print(my_set)
```

- A) {1, 2, 3, 2, 1}
- B) {1, 2, 3}
- C) [1, 2, 3]
- D) Error



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using **sets** in python....

What is the output of the following code?

```
my_set = {1, "apple", 3.14, (1, 2)}  
print(my_set)
```

- A) {3.14, 1, (1, 2), 'apple'}
- B) {1, 3.14, (1,2)}
- C) [1, (1,2)]
- D) Error



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using **sets** in python....

What is the output of the following code?

```
my_set = {1, "apple", 3.14, (1, 2)}
print(my_set)
```

- A) {3.14, 1, (1, 2), 'apple'}
- B) {1, 3.14, (1,2)}
- C) [1, (1,2)]
- D) Error

using **sets** in python....

Which method adds an element to a set?

```
my_set = {1, 2, 3}
# What goes here to add 4 to the set?
```

- A) my_set.add(4)
- B) my_set.append(4)
- C) my_set.insert(4)
- D) my_set.push(4)

using **sets** in python....

Which method adds an element to a set?

```
my_set = {1, 2, 3}
```

What goes here to add 4 to the set?

- A) my_set.add(4)
- B) my_set.append(4)
- C) my_set.insert(4)
- D) my_set.push(4)

using **sets** in python....

What is the output of this code?

```
set1 = {1, 2, 3}
```

```
set2 = {3, 4, 5}
```

```
print(set1 & set2)
```

- A) {1, 2}
- B) {3}
- C) {1, 2, 3, 4, 5}
- D) Error

using **sets** in python....

What is the output of this code?

```
set1 = {1, 2, 3}
set2 = {3, 4, 5}
print(set1 & set2)
```

- A) {1, 2}
- B) {3}
- C) {1, 2, 3, 4, 5}
- D) Error

using **sets** in python....

What happens when you execute this code?

```
my_set = {1, 2, 3}
my_set.remove(4)
```

- A) Removes 4 from the set.
- B) Does nothing.
- C) Raises a KeyError.
- D) Adds 4 to the set.

using **sets** in python....

What happens when you execute this code?

```
my_set = {1, 2, 3}
my_set.remove(4)
```

- A) Removes 4 from the set.
- B) Does nothing.
- C) Raises a KeyError.
- D) Adds 4 to the set.

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using **sets** in python....

```
set1 = {1, 2, 3}
set2 = {3, 4, 5}
print(set1 | set2)
```

{1, 2, 3, 4, 5}

```
my_set = {5, 10, 15}
if 10 in my_set:
```

#complete the code

The in operator checks whether 10 is a member of the set my_set.

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using **sets** in python....

```
set1 = {1, 2, 3}
set2 = {3, 4, 5}
print(set1 | set2)
```

{1, 2, 3, 4, 5}

```
my_set = {5, 10, 15}
if 10 in my_set:
    print("10 is in the set")
else:
    print("10 is not in the set")
```

The in operator checks whether 10 is a member of the set my_set.



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using **sets** in python....

Write a python program to test if a string value is contained in a set, if it is in the set return true otherwise false.

Example:

```
colours = {"red", "yellow", "blue"}
x = "red"
```

Should return **true** as red is in the set.



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using **sets** in python....

Write a python program to test if a string

value is contained in a set,

if it is in the set return true otherwise false.

Example:

```
colours = {"red", "yellow", "blue"}
```

```
x = "red"
```

Should return **true** as red is in the set.

```

1 def check_string_in_set(colours, x):
2     # Convert the list to a set and check if x is in the set
3     colours_set = set(colours)
4
5     if x in colours_set:
6         return True
7     else:
8         return False
9
10 # Example usage
11 colours = {"red", "yellow", "blue"}
12 x = "red"
13
14 result = check_string_in_set(colours, x)
15 print(result) # Output: True

```

Shell

```

>>> %Run -c $EDITOR_CONTENT
True

```

using **sets** in python....

Write a python program to test if a string

value is contained in a set,

if it is in the set return true otherwise false.

Example:

```
colours = {"red", "yellow", "blue"}
```

```
x = "red"
```

Should return **true** as red is in the set.

using Dictionary in python....

Which of the following is the correct way to create a dictionary in Python?

- a) dict = (1, 2, 3)
- b) dict = { 'name': 'John', 'age': 25 }
- c) dict = [('name', 'John'), ('age', 25)]
- d) dict = ('name', 'John', 'age', 25)



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using Dictionary in python....

How do you access the value associated with the key 'age' in the dictionary

person = {'name': 'Alice', 'age': 30, 'city': 'New York'}?

- a) person['age']
- b) person.age
- c) person.get('age')
- d) Both a and c



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using Dictionary in python....

What will be the output of the following code?

```
person = {'name': 'Alice', 'age': 30, 'city': 'New York'}
person['age'] = 35
print(person)
```

- a) {'name': 'Alice', 'age': 30, 'city': 'New York'}
- b) {'name': 'Alice', 'age': 35, 'city': 'New York'}
- c) {'name': 'Alice', 'age': 30, 'city': 'Los Angeles'}
- d) {'name': 'Alice', 'age': 30}



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using Dictionary in python....

How do you add a new key-value pair email: 'alice@example.com' to the dictionary person?

- a) person['email'] = 'alice@example.com'
- b) person.add('email', 'alice@example.com')
- c) person.append('email', 'alice@example.com')
- d) person.insert('email', 'alice@example.com')



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using Dictionary in python....

What does the del keyword do when used with a dictionary, as in `del person['age']`?

- a) It deletes the entire dictionary.
- b) It deletes the key 'age' and its associated value.
- c) It deletes only the value associated with 'age'.
- d) It raises a KeyError if the key doesn't exist.



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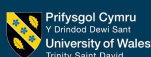
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using Dictionary in python....

Which of the following expressions checks if the key 'city' exists in the dictionary person?

- a) 'city' in person
- b) `person.has_key('city')`
- c) `person['city']` is not None
- d) `person.city` is not None



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using Dictionary in python....

What will `person.get('phone', 'N/A')` return if the dictionary

`person = {'name': 'Alice', 'age': 30, 'city': 'New York'}` does not contain the key 'phone'?

- a) None
- b) 'N/A'
- c) KeyError
- d) 'phone'



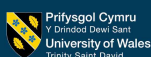
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using Dictionary in python....

What does the method `person.items()` return?

- a) A list of the dictionary's keys.
- b) A list of the dictionary's values.
- c) A list of key-value pairs as tuples.
- d) A list of keys and their corresponding data types.



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using Dictionary in python....

Which of the following is a valid dictionary in Python?

- a) {'name': 'Alice', 'age': 30, 'is_student': True}
- b) {'name': 'Alice', 30: 'age', 'is_student': True}
- c) {'Alice', 30, 'is_student'}
- d) {'name': 'Alice', 'age': 30, [1,2,3]: 'numbers'}

using Dictionary in python....

How can you merge two dictionaries, dict1 = {'a': 1, 'b': 2} and dict2 = {'c': 3, 'd': 4}?

- a) dict1.merge(dict2)
- b) dict1.update(dict2)
- c) dict1 + dict2
- d) dict1.append(dict2)

In-class Activity: Student Course Management System

This system allows users to manage **students and courses** while using different data structures:

- ✓ **List** → Stores student details.
- ✓ **Tuple** → Each student is stored as a tuple (ID, Name, Age).
- ✓ **Set** → Stores unique course names.
- ✓ **Dictionary** → Maps student IDs to enrolled courses.

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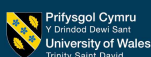
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In-class Activity: Student Course Management System

This system allows users to manage **students and courses** while using different data structures:

- ✓ **List** → Stores student details.
- ✓ **Tuple** → Each student is stored as a tuple (ID, Name, Age).
- ✓ **Set** → Stores unique course names.
- ✓ **Dictionary** → Maps student IDs to enrolled courses.

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A Simple Function

```
def greet():  
    print("Hello, welcome to Python programming!")  
  
# Call the function  
greet()
```

Summary

Key Points:

- Loops are essential for repeating actions in code.
- *While loops* continue as long as a condition is true.
- *For loops* iterate over a sequence of items.
- *Nested loops* are useful for multi-dimensional problems.
- Loop control statements (*break*, *continue*) alter the flow of loops.

Thank you

Gracias

Merci

Danke

Grazie

Obrigado / Obrigada

Dank je / Dank u

Спасибо (Spasibo)

谢谢 (Xièxiè)

ありがとう (Arigatou)

감사합니다 (Gamsahamnida)

धन्यवाद (Dhanyavaad)

شكرا (Shukran)

Teşekkürler

Ευχαριστώ (Efharisto)

תודה (Toda)

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