CS5001 HW3 Written Questions

1. Explain the difference between a set and a dictionary in Python.

Set:
• A set is an unordered collection of unique elements. It does not allow duplicate elements.
• Sets are typically used when you need to store distinct items and check for membership.
• Syntax: set() or {} (for non-empty sets).

Dictionary:
• A dictionary is a collection of key-value pairs. Each key must be unique, and it maps to a value.
• Dictionaries are used when you need to associate keys with values (e.g., storing attributes of an object).
• Syntax: {key: value}.

Key Differences:
• Set stores only values, while dictionary stores key-value pairs.
• Set elements must be unique, while dictionary keys must be unique.
• Set is unordered, while dictionary maintains insertion order starting from Python 3.7.

2. How do you initialize a dictionary? How do you initialize a set? How do you initialize a list? Pair with examples please.

Dictionary
• We can initialize a dictionary using curly braces {} with key-value pairs or with the dict() function.
• Examples:

```
my_dict = {"name": "Alice", "age": 25}  # Using curly braces
my_dict = dict(name="Alice", age=25)  # Using the dict() function
```

Set:
• We can initialize a set using curly braces {} with values or using the set() function. Note that an empty set must be created using set(), not {} (because {} creates an empty dictionary).
• Examples:

```
my_set = {1, 2, 3}  # Non-empty set
empty_set = set()  # Empty set
```

List:
• You can initialize a list using square brackets [] or the list() function.
• Examples:

```
my_list = [1, 2, 3, 4]  # Using square brackets
my_list = list([1, 2, 3, 4]) # Using the list() function
```

3. Can you create a dictionary whose keys are strings, values are dictionaries?

Yes, we can create a dictionary in Python where the keys are strings and the values are dictionaries. This is known as a nested dictionary.
• Example:

```python
nested_dict = {
    "student_1": {"name": "Alice", "age": 25},
    "student_2": {"name": "Bob", "age": 22}
}
```