

Lesson 5: Python Arrays and Related

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5.1. Arrays

Arrays are used to store multiple values in one single variable, and you can access the values by referring to an index number. Use the `len()` method to return the length of an array (the number of elements in an array).

You can use the `append()` method to add an element to an array.

You can use the `pop()` method to remove an element from the array.

You can also use the `remove()` method to remove an element from the array.

Example

Create an array containing car names:

```
cars = ["Ford", "Volvo", "BMW"]
```

Get the value of the first array item:

```
x = cars[0]
```

Modify the value of the first array item:

```
cars[0] = "Toyota"
```

Return the number of elements in the `cars` array:

```
x = len(cars)
```

Add one more element to the `cars` array:

```
cars.append("Honda")
```

Delete the second element of the `cars` array:

```
cars.pop(1)
```

Delete the element that has the value "Volvo":

```
cars.remove("Volvo")
```

5.2. List

Lists are used to store multiple items in a single variable. Lists are one of 4 built-in data types in Python used to store collections of data, the other 3 are Tuple, Set, and Dictionary, all with different qualities and usage.

Lists are created using square brackets:

```
thislist = ["apple", "banana", "cherry"]
```

```
list1 = ["abc", 34, True, 40, "male"]
```

```
print(thislist)
```

```
print(list1)
```

List items are ordered, changeable, and allow duplicate values.

List items are indexed, the first item has index `[0]`, the second item has index `[1]` etc.

Lists are ordered, that the items have a defined order, and that order will not change. If you add new items to a list, the new items will be placed at the end of the list.

The list is changeable, meaning that we can change, add, and remove items in a list after it has been created.

Since lists are indexed, lists can have items with the same value (duplicates).

To determine how many items a list has, use the `len()` function.

List items can be of any data type. A list can contain different data types.

5.3. Tuples

Tuples are used to store multiple items in a single variable. A tuple is a collection which is ordered and unchangeable. Tuples are written with round brackets.

Tuple items are ordered, unchangeable, and allow duplicate values.

Tuple items are indexed, the first item has index `[0]`, the second item has index `[1]` etc.

To determine how many items a tuple has, use the `len()` function.

```
thistuple = ("apple", "banana", "cherry", "apple", "cherry")
print(thistuple)
```

To create a tuple with only one item, you have to add a comma after the item, otherwise Python will not recognize it as a tuple.

```
thistuple = ("apple",)
print(type(thistuple))
#NOT a tuple
thistuple = ("apple")
print(type(thistuple))
```

5.4. Sets

Sets are used to store multiple items in a single variable.

A set is a collection which is *unordered*, *unchangeable**, and *unindexed*.

Sets are written with curly brackets.

```
thisset = {"apple", "banana", "cherry"}
print(thisset)
```

To determine how many items a set has, use the `len()` function.

5.5. Dictionaries

Dictionaries are used to store data values in key: value pairs.

Dictionaries are written with curly brackets, and have keys and values.

Dictionary items are ordered, changeable, and does not allow duplicates.

Dictionary items are presented in key: value pairs, and can be referred to by using the key name.

Example:

Create and print a dictionary:

```
thisdict = {
    "brand": "Ford",
    "model": "Mustang",
    "year": 1964
}
print(thisdict)
```

Print the "brand" value of the dictionary:

```
print(thisdict["brand"])
```

Lesson 5: Review Questions

1. Explain difference between array, set, list, tuple and dictionary.
2. Write a program to demonstrate how to add an item in a dictionary.
3. Create an array that stores marks for five students.