Lesson 9: Lists

Introduction to Lists

In Python, **lists** are a data type, similar to integers or strings, that can store collections of other data types in, well, a list.

For example, imagine trying to store the names of students in a class. You could create a bunch of variables:

```
student1 = "Rohit"
student2 = "Sagar"
student3 = "Siddharth"
...
```

Or you could store the names in one list:

```
students = ["Rohit", "Sagar", "Siddharth", ...]
```

1. Notice that a list is composed of brackets with commas separating each element

Using a list in this case not only makes our code look more neat, it also provides a bunch of benefits that we'll discover as we use lists more.

Common Ways to Use Lists

The most common ways we'll use lists are to access elements, add elements, and remove elements. First, we can access elements using the [index] notation:

```
my_list = [0, 1, 2, 3]
print(my_list[0])
print(my_list[2])
```

VERY IMPORTANT: indices of a list count from 0. This means that the first element is at index 0, the second is at index 1, and so on.

What will the code above print out?

We can also add (or **append**) to lists:

```
my_list = [1, 2, 0, 1]
my_list.append(5)
print(my_list)
```

1. Note that lists do not need to be in a certain order

Example 1 1
Make a list with 4 elements. Now try to print out a fifth element (index 4). What happens?

Append the number 1 to the list. Now try to print out a fifth element (index 4). What happens?

To remove an element, we can use the **pop()** method. This will remove the last element of a list. For now, we won't need to remove other elements of a list.

```
my_list = [1, 2, 0, 1]
my_list.pop()
print(my_list)
```

Example 2 2
(1) If you have a list with 4 elements, how many times can you use pop on the list?
(2) What happens if you use pop() on an empty list

Finally, we can get the size of a list (how many elements are in it) by using the len() function and putting the list as an input. For example:

```
my_list = [1, 2, 0, 1]
print(len(my_list))
```

Example 3 3
Make a list with one element. Print out the length of this list. Append two elements to the end of the list. Now print out the length of the list.

List Exercises

Exercise 1 1

Write a function that takes in a list of integers and modifies the list so that each number is squared. Then test that function with the following list:

a) [1, 2, 3, 4, 5]
b) [-2, 4, 8]

Note: use the ** operator for powers.

Exercise 2

1. Write a function to find value 20 in the list, and if it is present, replace it with 200.
2. Now only update the first 20 in the list.