CSCI 127: Joy and Beauty of Data

Lecture 7: Lists

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https://reesep.github.io/classes/127/main.html

Announcements

Lab 4 and Program 1 due Thursday (Tomorrow) @ 11:59 PM

Program 2 due Wednesday 12/16 @ 11:59 PM

Today

Intro to list, Example programs using lists

Lists

A **list** is an ordered collection of items (elements)

Usually denoted by square brackets []

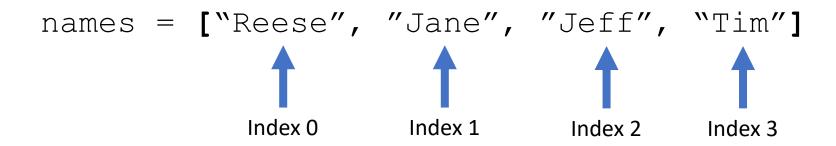
```
names = ["Reese", "Jane", "Jeff"]
```

Can be of any data types

```
course = ["CSCI", 127, "Snowmester"]
```

Lists Index

List elements are ordered by their **index**



We can access specific elements of the list by providing the index of the element we want

List Size

We can get the size/length of a list by using the **len()** function

```
names = ["Reese", "Jane", "Jeff", "Tim"]
print( len(names) ) → 4

primes = [2, 3, 5, 6, 7, 11, 13, 17, 19]
print( len(primes) ) → 9
```

List Size

We can get the size/length of a list by using the **len()** function

```
names = ["Reese", "Jane", "Jeff", "Tim"]
print( len(names) ) → 4

primes = [2, 3, 5, 6, 7, 11, 13, 17, 19]
print( len(primes) ) → 9
```

List Concatenation

We can concatenate lists together using the + operator

```
[1, 2, 3, "a", "b", "c"]
```

List Repetition

We can repeat lists using the * operator

List Membership

We can check to see if something is in a list using in and not in

```
cities = ["Billings", "Bozeman", "Butte", "Helena", "Missoula"]
```

List Mutability

Lists are **mutable** (we can change things in the list)

```
date = ["December", 9, 2020]
print(date)
date[1] = 10
print(date)
date[2] = "2020"
print(date)
```

```
["December", 9, 2020]
["December", 10, 2020]
["December", 10, "2020"]
```

List Slicing

We can access specific "slices" of lists using list slicing

list_name[X:Y]

Get slice from X to Y but not including Y

Adding Element to list

We can add items to lists using .append() or .insert()

.append(item)

Add *item* to the end of the list

```
days = ["Mon", "Tue", "Wed"]
print(days)
days.append("Thurs")
print(days)
```

Output

```
["Mon", "Tue", "Wed"]
["Mon", "Tue", "Wed", "Thurs"]
```

.insert(position, item)

Add *item* to specific index to list

```
days = ["Mon", "Tue", "Wed"]
print(days)
days.insert(1, "Thurs")
print(days)
```

```
["Mon", "Tue", "Wed"]
["Mon", "Thurs" "Tue", "Wed"]
```

Removing Items from Lists

We can remove items from lists using .pop() or .remove()

.pop(index) or .pop()

Removes item at specific index.

If index is not specified, then it will remove the last element in the list.

```
days = ["Mon", "Tue", "Wed"]

print(days)

days.pop(1)

print(days)

days.pop()

Print(days)
"Mon", "Tue", "Wed"]

["Mon", "Wed"]

["Mon"]
```

.remove(item)

Will search through list for specific item and remove it

```
days = ["Mon", "Tue", "Wed"]
print(days)
days.remove("Tue")
print(days)
```

```
["Mon", "Tue", "Wed"]
["Mon", "Wed"]
```

Counting frequency in lists

We can count the number of times an item appears in a list using .count()

scores =
$$[100, 99, 81, 72, 100, 34, 86, 92, 100, 100, 66]$$

To print out the number of times **100** occurs in the list, we can do:

```
print(scores.count(100)) \rightarrow 4
```

Sorting a List

We can sort elements in a list using .sort()

```
scores = [100,99,81,72,100,34,86,92,100,100,66]
print(scores)
scores.sort()
print(scores)
```

Output

```
[100, 99, 81, 72, 100, 34, 86, 92, 100, 100, 66]
[34, 66, 72, 81, 86, 92, 99, 100, 100, 100, 100]
```

Sorted least to greatest!

Sorting a List

We can sort elements in a list using .sort()

```
words = ["Cat", "Dog", "Apple", "Banana"]
print(words)
words.sort()
print(words)
```

Output

```
["Cat", "Dog", "Apple", "Banana"]
["Apple", "Banana", "Cat", "Dog"]
```

Sorted alphabetically!

Reversing a List

We can reverse a list using .reverse()

```
words = ["Cat", "Dog", "Apple", "Banana"]
print(words)
words.reverse()
print(words)
```

Output

```
["Cat", "Dog", "Apple", "Banana"]
["Banana", "Apple", "Dog", "Cat"]
```

List has been reversed!

Iterating through items in a list

We can iterate through a list using a for loop in two different ways

By Element:

```
words = ["Cat", "Dog", "Apple" ,"Banana"]
for each_word in words:
    print(words)
```

By Position/Index:

```
words = ["Cat", "Dog", "Apple", "Banana"]
for i in range(len(words)):
    print(words[i])
```

Example

Write a python function that will take in a list of test scores (of any size) and returns the average of those exam scores

Write a python function that will take in a list of words and return a list with all duplicate words removed

Write a python function that will return the largest value in a list. Next, generate a list of a random size (between 10 and 20) that is filled with random integers between 1 and 1000 and pass it into the function you created

Write a python function that will calculate the mode in a list of integers (you can always assume there will always be one single answer)