

Intro to Programming for Public Policy Week 4

Sets

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Copying a list

To copy an existing list, pass it to the `list()` function:

```
>>> ls = [1,2,3,4]
>>> ls_copy = list(ls)
>>> ls.pop()
4
>>> ls
[1,2,3]
>>> ls_copy
[1,2,3,4]
```

Data structures

So far we have seen two main data structures:

- ▶ Lists
 - ▶ Useful for storing an ordered sequence of elements.
- ▶ Dictionaries
 - ▶ Dictionaries are useful for storing a mapping for keys to values. The keys are unique, the values need not be.

Sets

- ▶ Sets are another python data structure.
- ▶ They store a collection of unique elements
 - ▶ They are like the keys of a dictionary
 - ▶ Without the values

Constructing a set

- ▶ Construct a set using the `set()` function:

```
>>> s = set()  
set()
```

- ▶ Add elements with the `add` function:

```
>>> s.add('a')  
>>> s  
{'a'}
```

Adding the same element twice

Since a set only stores unique elements, adding the same element twice has no effect:

```
>>> s = set()
>>> s.add('a')
>>> s.add('b')
>>> s
{'a', 'b'}
>>> s.add('a')
>>> s
{'a', 'b'}
```

Construct set from a list

Or construct it using a list:

```
>>> set(['a', 'b', 'c', 'd'])  
{'a', 'b', 'c', 'd'}
```

Again duplicate elements are ignored:

```
>>> set(['a', 'b', 'b', 'c'])  
{'a', 'b', 'c'}
```

Unique list

Thus if a list and its corresponding set have the same length, then all elements in the list were unique:

```
>>> ls = ['a', 'b', 'b', 'c']
>>> len(ls)
4
>>> len(set(ls))
3
```


Comparing unique elements

Sets are very useful for checking whether two lists have the same elements:

```
>>> ls1 = ['a', 'b', 'c', 'c', 'd', 'e', 'a']
>>> ls2 = ['b', 'c', 'd', 'a']
>>> set(ls1)
{'a', 'b', 'c', 'd', 'e'}
>>> set(ls2)
{'a', 'b', 'c', 'd'}
>>> set(ls1) == set(ls2)
False
```

Another example

```
students = ['A', 'B', 'C']
hospital_prefs = {
    'X': ['B', 'A', 'C'],
    'Y': ['A', 'B', 'C'],
    'Z': ['A', 'B', 'C']
}
```

Want to check whether hospital *X* ranked every student:

```
set(hospital_prefs['X']) == set(students):
```

And that *X*'s rankings contain no duplicates:

```
len(set(hospital_prefs['X'])) == len(hospital_prefs['X']):
```