CS 152: Lists and Tuples

CS 152: Python for STEM

Colorado State University
Computer Science Department
Slides Originally Created by Albert Lionelle and Updated by Marcia Moraes

Weekly Announcements!

TODO Reminders:

- Reading 6 (zybooks) – you should have already done that ☺
- Lab 04
- Reading 7 (zybooks) - you should have already done that ☺
- Lab 05
- Reading 8 (zybooks) - you should have already done that ☺

Recall Activity

- What is the difference between a List and a Tuple? Explain using your own words.

- Turn you paper to the TAs or myself at the end of the class

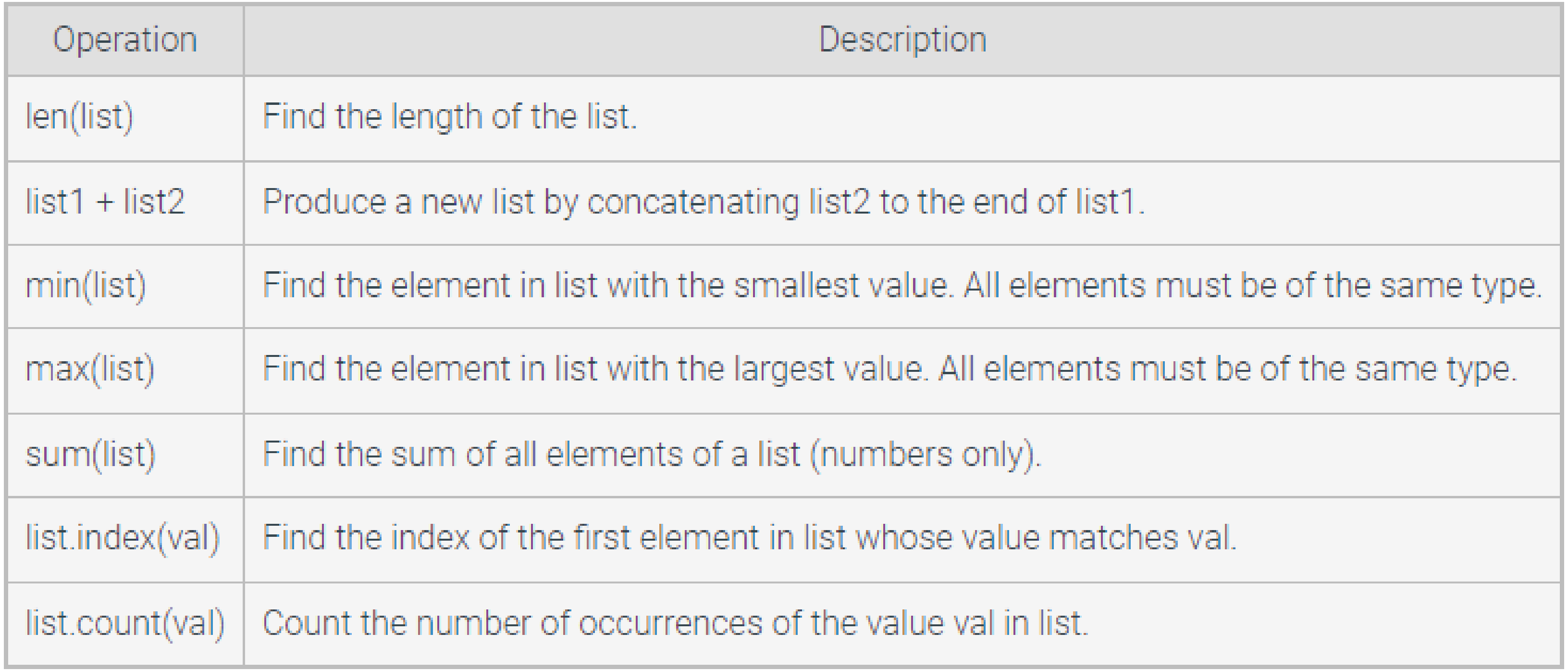
Lists

- Fundamental to Python
  - List of items, any item.
  - mutable (can be modified)

```
machete = [4, 5, 2, 3, 6, 7, 8, 9]
machete_names = ["A New Hope", "The Empire Strikes Back", "Attack of  the Clones",
                 "Revenge of the Sith", "Return  of the Jedi", "The Force Awakens",
                 "The Last Jedi",  "The Rise of Skywalker"]
title = machete_names[2]
episode = machete[2]
print(f"Star Wars {episode}: {title}“, episode, title)
```

Prints - Star Wars 2: Attack of the Clones

List Functions



Operation	Description
len(list)	Find the length of the list.
list1 + list2	Produce a new list by concatenating list2 to the end of list1.
min(list)	Find the element in list with the smallest value. All elements must be of the same type.
max(list)	Find the element in list with the largest value. All elements must be of the same type.
sum(list)	Find the sum of all elements of a list (numbers only).
list.index(val)	Find the index of the first element in list whose value matches val.
list.count(val)	Count the number of occurrences of the value val in list.

List Functions

```
glacier_size = [0.53, 0.34, 0.59, 0.2, 0.28, 0.13, 0.25, 5.5, 3.25,0.84, 0.5, 0.75]
missing_glaciers = [0.19, 0.04, 0.08, 0.29, 0.22, 0.07, 0.12]

print(min(glacier_size)) # 0.13
print(max(glacier_size)) # 5.5
print(glacier_size.index(5.5)) #7
glacier_size[7] = "Five.Five"
print(glacier_size[7]) # Five.Five

combined = glacier_size[7:9] +  missing_glaciers[0:3]
print(combined) # ["Five.Five", 3.25, 0.19, 0.04, 0.08]
```

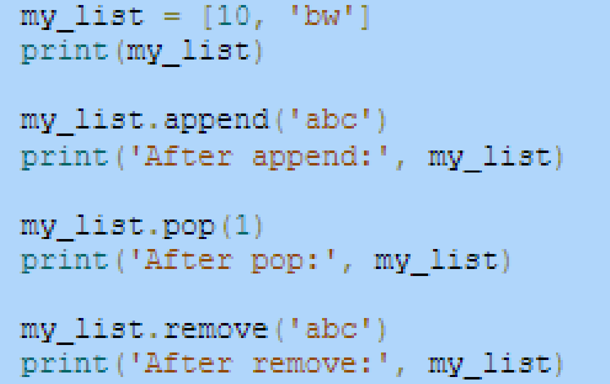
List Functions

Adding elements to a list:

- list.append(value): Adds value to the end of list. Ex: `my_list.append('abc')`

Removing elements from a list:

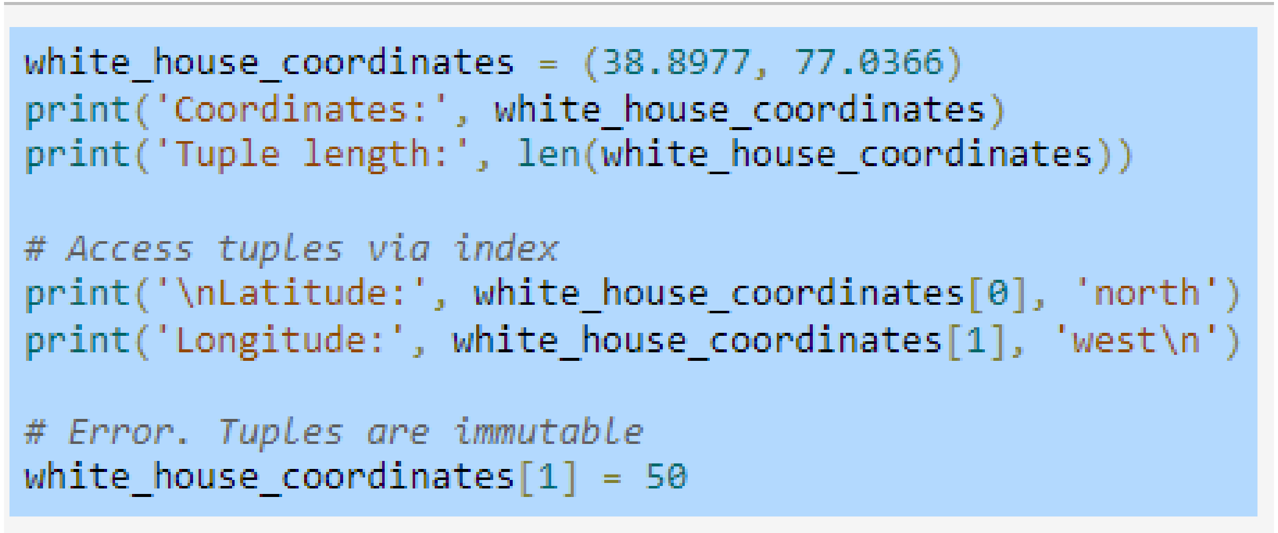
- list.pop(i): Removes the element at index i from list. Ex: `my_list.pop(1)`
- list.remove(v): Removes the first element whose value is v. Ex: `my_list.remove('abc')`



```
my_list = [10, 'bw']
print(my_list)

my_list.append('abc')
print('After append:', my_list)

my_list.pop(1)
print('After pop:', my_list)

my_list.remove('abc')
print('After remove:', my_list)
```

Tuples

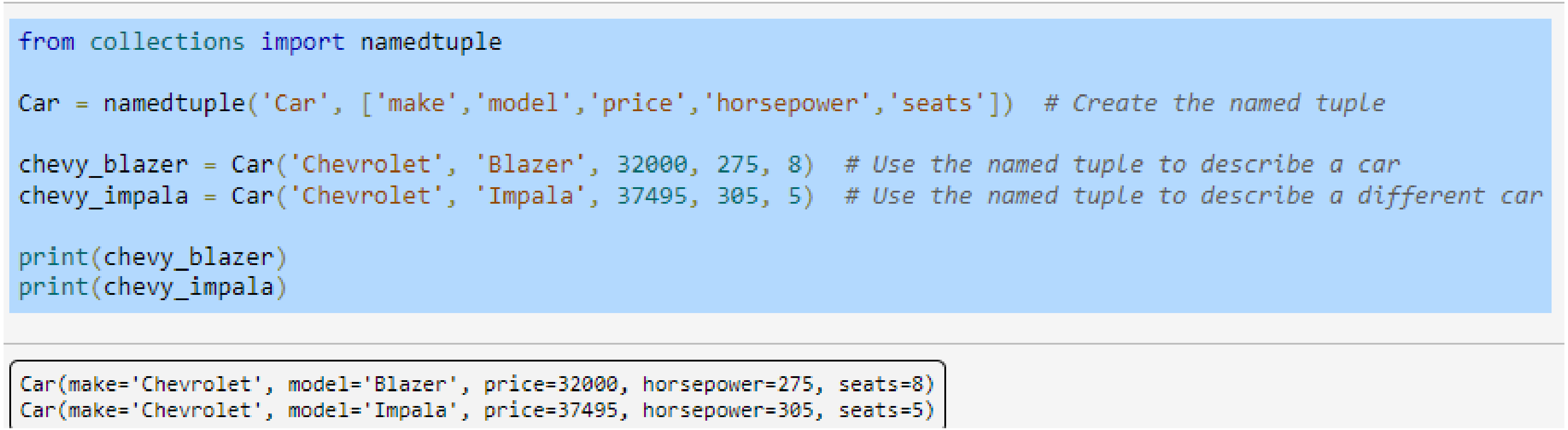
- Behaves similar to a list but is immutable – once created the tuple's elements cannot be changed



```
white_house_coordinates = (38.8977, 77.0366)
print('Coordinates:', white_house_coordinates)
print('Tuple length:', len(white_house_coordinates))

# Access tuples via index
print('\nLatitude:', white_house_coordinates[0], 'north')
print('Longitude:', white_house_coordinates[1], 'west\n')

# Error. Tuples are immutable
white_house_coordinates[1] = 50
```

Named Tuples

- Allows the programmer to define a new simple data type that consists of named attributes



```
from collections import namedtuple

Car = namedtuple('Car', ['make','model','price','horsepower','seats'])  # Create the named tuple

chevy_blazer = Car('Chevrolet', 'Blazer', 32000, 275, 8)  # Use the named tuple to describe a car
chevy_impala = Car('Chevrolet', 'Impala', 37495, 305, 5)  # Use the named tuple to describe a different car

print(chevy_blazer)
print(chevy_impala)
```

```
Car(make='Chevrolet', model='Blazer', price=32000, horsepower=275, seats=8)
Car(make='Chevrolet', model='Impala', price=37495, horsepower=305, seats=5)
```

List Activities

- Write a Python function to multiply all the items in a list.
- Write a Python function to calculate the average of the elements in a list.
- Write a Python function to calculate the number of values that are greater than the average of the elements in a list.
- Given a list, write a Python function to swap first and last element of the list.
- Given a list, write a Python function to invert the list.
- Write a Python function to find the max elements in a list and its position.
- Write a Python function to print the numbers of a specified list after removing even numbers from it.