PYTHON CLASS 15

LOOPS, LISTS AND DICTIONARIES

LOOPS AND LISTS

```
days = ["Mon", "Tues", "Wed" , "Thurs" , "Fri", "Sat", "Sun"]

for x in days:
    print(x)
```

What is the type of days?

What is the type of the information in days (What is the type of x?)?

WAYS TO CONTROL A FOR-LOOP

- Use range(a)
- Use range(a,b)
- Use in + a list (or dictionary, or other data structure)

VENDING MACHINE, AGAIN

- Let's go back to the vending machine project and use loops to show the product names and prices.

LOOPS, IF AND SCOPE

- Loops and **if** work very differently than functions.

```
def my_func(a):
        x = 5 * (a*a) + 11

my_func(10)

print(x) # this gives an error
```

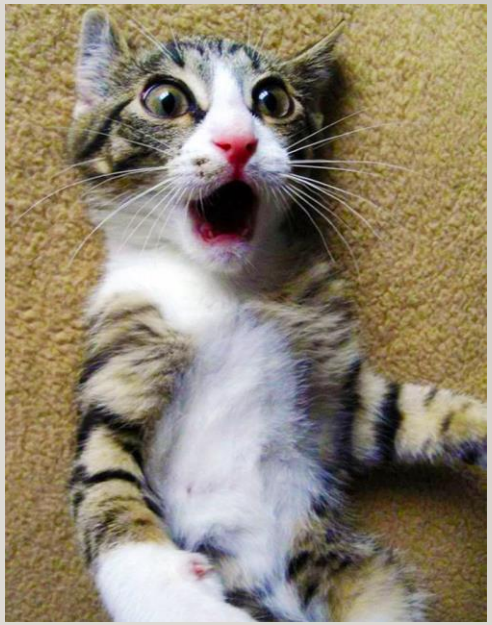
```
for x in range(10):
    a = 2 * x
    print(a)

print(a) #this is fine!
print(x) #this is fine, too!
```

```
n = "y"

if n == "w":
    b = "y2"
else:
    c = "x"

print(b) #this gives an error
print(c) #this is fine!
```



LOOPS AND SCOPE

- If you need to keep a value while running a for-loop, you should make the variable before the loop.

```
for x in range(10):
    a = 0
    a = a + x

print(a)
```

a is set to 0 each time you run through the loop, so the last value is 9…

```
a = 0

for x in range(10):
    a = a + x

print(a)
```

a is set to 0 outside the loop, so previous value gets added to it each time

LOOP EXERCISES

- Create a loop that counts from 0 to 100
- Create a loop that multiplies the numbers from 1-20.
- Create a loop that adds random numbers to a list.
- Use a loop to find the largest and smallest numbers, and the average.

WAYS TO CONTROL ACTION INSIDE A LOOP

- You can use if-statements and break or continue to control action

```
li = [2,4,6,8,10,11,14,16,18]

for x in li:
    if x % 2 != 0:
        break
    print(x)
```

we want to stop the loop completely if we have an odd number

```
li = [1,4,9,16,25,0,36,49,64]

for x in li:
    if x == 0:
        continue
    else:
        print((li.index(x) +1) / x)
```

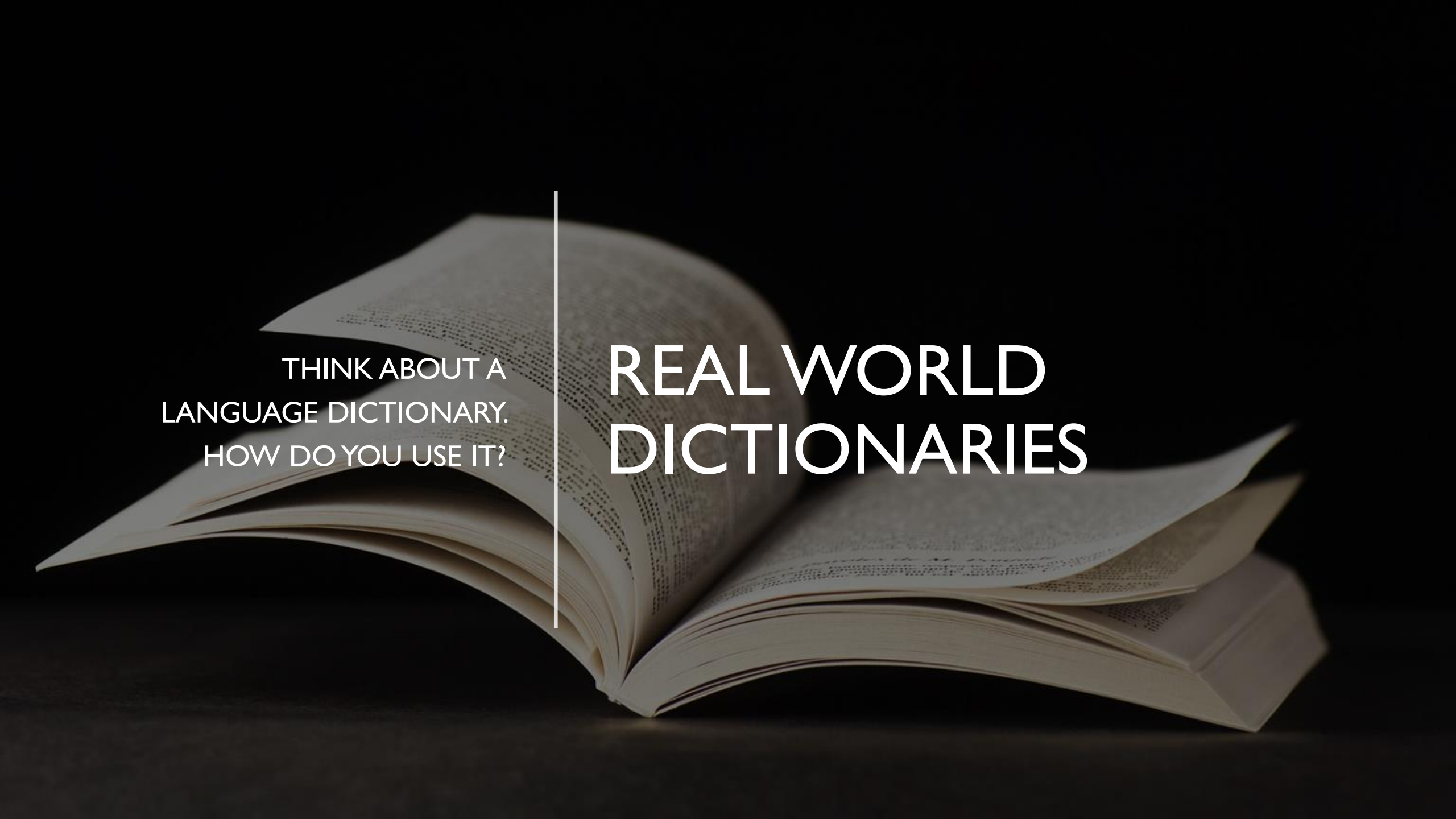
we just want to skip the number to avoid dividing by 0

LISTS AND LOOP PRACTICE

- Practice using continue and break together with loops and lists.
  - Make a list of strings. We want to find the first string that is longer than 5 letters. If the length of the string is longer than 5, stop the loop.
  - Make a list of integers. Divide them by 8. If the remainder is 0, go to the next number. If it is not 0, add the number to a new list.

MORE LIST PRACTICE

- Make a list of nucleic acids (DNA). Make a function to change it into a string. Check if the string contains this "ATTACAG."
- Make a list of random Japanese sounds. Make a function to change it into a string. Check if the string contains a word (you choose the word).
- Make list of random numbers and use a **for-loop** to find the biggest one, and the smallest one. Also, find the average.



THINK ABOUT A LANGUAGE DICTIONARY. HOW DO YOU USE IT?

REAL WORLD DICTIONARIES

LISTS IN PYTHON, REVIEW

- Remember how lists work.

```
li = ["L","I","S","T"]

print(li[0])

li.append("q")

for x in li:
    if x.isupper():
        print(x + " is a capital letter")
```

DICTIONARIES IN PYTHON

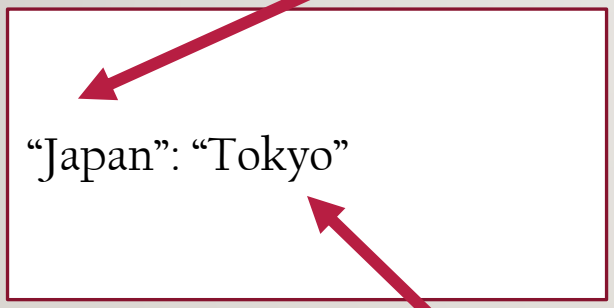
- Dictionaries use curly brackets, **{}**.
- The data in a dictionary is in pairs: the first item is the key. The second item is the value.
- In the dictionary below, both the key and the value are strings, but you can use any combination – date:date, date:string, int:date,, int:string, string:bool, etc.
- You can even have dictionaries or lists inside your dictionary!
- Just like lists, we use di[x] to get the information in location x.

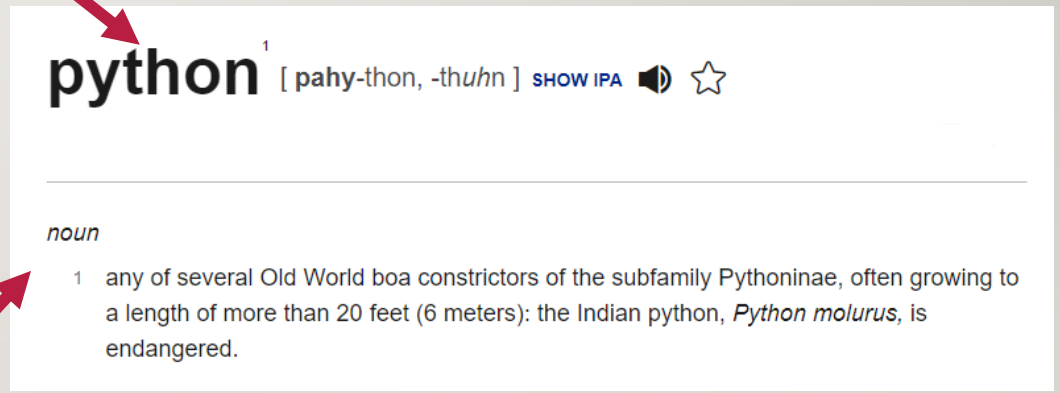
```
di = {"Japan": "Tokyo", "USA": "Washington, DC", "France": "Paris"}

print(di["USA"]) # this will print Washington, DC
```

KEY-VALUE PAIR

key: this is how you find the value.





value: this is the data you store

DIFFERENCES FROM LIST

- A list is ordered – the elements in it always have the same position. It is a *sequence*.
- A dictionary is not ordered. Each element is accessed by a key, not by a position. The order of the keys might change each time you run your program (on the same or on different computers). (Dictionaries in the newest version of Python are also ordered.)
- Speed – if you need to find a specific element quickly, dictionaries are much, much, much faster. You need to know the position of an item in a list, but in a dictionary, you only need to know the key.

MOVIE DATABASE

- Pick your favorite actor, actress, director, etc.
- Make a dictionary of their films. Use the release year as the key, and the movie title as the value. Put at least 4 movies in the dictionary at the beginning.
- Add 2 movies to it using this syntax.

```
movie_dictionary[year] = "title"
```

- Be careful about using the same year / key: this replaces the old value.

DICTIONARY AND LOOPS

- Use for to go through your movie database and print each movie title.
- Use this syntax to change the name of a movie.

```
movie_dictionary[year] = "title"
```

- Use movie_dictionary.keys()
- Use movie_dictionary.values()
- Remove an item using movie_dictionary.pop(year)
- Get a value using movie_dictionary.get(year) or movie_dictionary[year]

ANOTHER REAL WORLD EXAMPLE

- You have a student ID number, right?
- This ID number is like the key of a dictionary – the school can use the key to access lots of information related to each student – name, birthday, address, classes, number of absences, grades in each class, etc.
- Companies do the same thing with employees and with customers – assign a number or ID to them, and then store information related to that number.

READING A FILE

OPEN A FILE

- To open a file, we use the built-in function open()
- open() takes two arguments

–*file*

–*mode*

OPEN ARGUMENTS

- open(***file***,mode)

–file is the path and name of the file

–**For example** *C:\Users\David Hunter\Documents\Seitoku Python Curriculum*

–This is the path where I save my files for this class.

–*C:\Users\David Hunter\Documents\Seitoku Python Curriculum/**2022 Python Class 15.pptx***

–The **BOLD** part is the file name.

KISS

Keep It Simple, Stupid!!

- Let's keep our file on the desktop so we can avoid typing "C:\\blah blah blah.myfile"
- Instead, we can just do this

```
my_file = open("Hello.txt", "r")
```

OPEN ARGUMENTS, 2

- open(file,***mode***)

–mode is how you want to open the file

–“r” -reads the file. Error if no file

–“a” -appends. Creates the file if no file.

–“w” - opens the file to write. Creates the file if no file

–“x” - create the file. Error if the file exists.

MODE（ファイルの読み方）

- You can also say how the file should be read.
  - “b” is for binary (二進法(にしんほう)) → (normal) People cannot read this format, but computers can.
  - “t” is for text (This is the default.)

FILE VARIABLES

- file.closed – True or False
- file.mode- the mode
- file.name – the name
- ~~file.softspace – not really important~~

FILE FUNCTIONS

- file.close() - closes the file
- file.read() - this gives you the data/information in the file (as a string)
- file.write(str) – this adds a string to the file
- file.writelines(sequence) – this adds a list of strings to the file

PRACTICE

```
my_file = open("Hello.txt", "w")
print(my_file.name)
print(my_file.mode)

my_file.close()
```

Two things to be careful about: if you open the file, you always need to close it.

If your program crashes before you close it, you'll have to restart Python.

PRACTICE WRITING INFORMATION TO A FILE

```
my_file = open("Hello.txt", "w")

my_file.write("Hello")

my_file.close()
```

PRACTICE READING DATA FROM A FILE

```
my_file = open("Hello.txt", "r")

data = my_file.read()

my_file.close()

print(data)
```

PRACTICE READING DATA FROM A FILE

- Go to Mr. Hunter's Github page → github.com/davidcbhunter/POP2022
- Download these two files
  - Movies.txt
  - Movies_Revenue.txt

- Practice opening them, reading the data, and closing them.
- Use the **str** function **split** or **splitlines** to make a list, then a dictionary.
- Use a for-loop to print the information.
- Use a for-loop to find the total revenue, average revenue, and the largest revenue.