CSCI 127: Joy and Beauty of Data

Lecture 6: Iteration

Reese Pearsall

Snowmester 2020

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

Announcements

- Lab 3 due **TONIGHT** 11:59 PM
- Program 1 due date moved to Thursday 12/10 @11:59 PM
  Lab 4 also due on Thursday 12/10 @ 11:59 PM
- Lab 1 and 2 grades on D2L (solution videos posted)
- Some practice exam questions have also posted

True != true

Today

Intro to iteration

A few observations from the first couple of assignments

Variable Names

The beginning character of variables should always be lowercase

```
Boat_Name  → boat_name
Boat_Name → boatName
Boat_Name → boat_Name
Boat_Name → boatname
Name → name
```

There are standards and conventions for naming things in Python. If we capitalize our variable names, it usually indicates that it is something else (something we will talk about later)

Same goes for naming functions!

A few observations from the first couple of assignments

File Naming

Remember to follow the format for naming your .py when you submit

```
YourFirstName-YourLastName-LabX.py
```

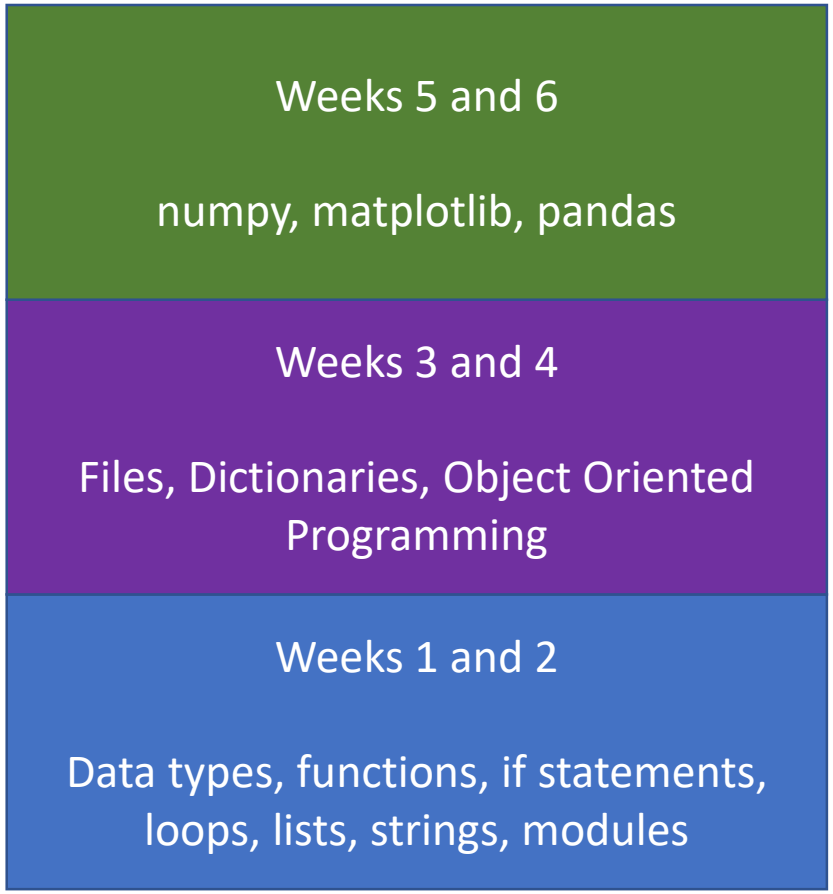
A few observations from the first couple of assignments

File Naming

Remember to follow the format for naming your .py when you submit

```
YourFirstName-YourLastName-LabX.py
```

Where we are in the class



Data Science in Python

Advanced Python

Basics/Foundation of Python

Intro to Iteration

Often times, we want to repeat a certain block of code

Iteration (**loops**) allows us to repeat code and make our solution more efficient

May want to repeat a certain number of times (definite) or an unknown number of times (indefinite)

for loops **while** loops

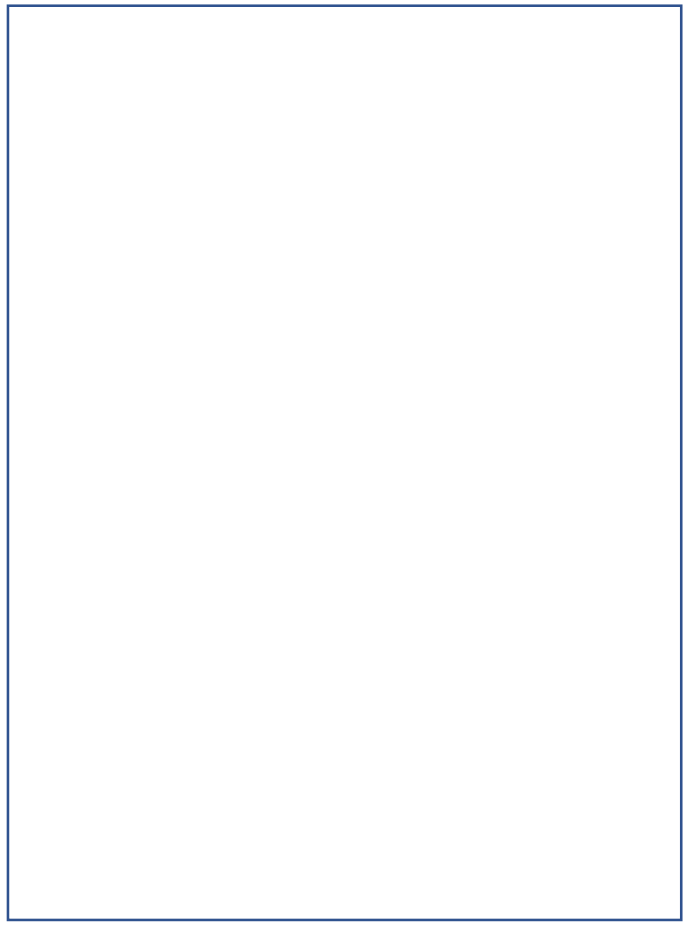
For example, we made a program that checks to a year is a leap year ?

What about a program that finds all leap years between 1900 to 2020 ?

A basic for loop

```
for i in range(5):
    print(“hello”)
```

Output



A basic for loop

```
for i in range(5):
    print("hello")
```

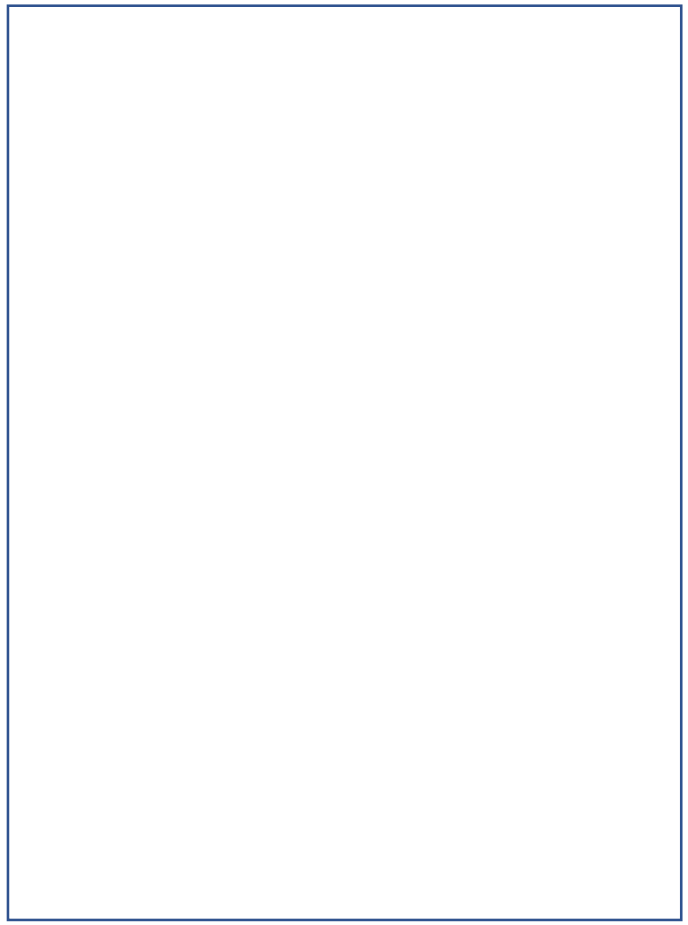
Output

```
hello
hello
hello
hello
hello
```

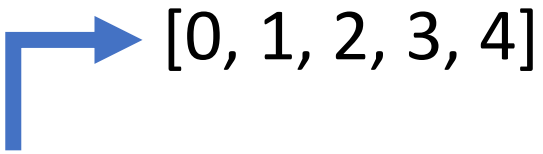
Control flow of a for loop

```
for i in range(5):
    print(“hello”)
    print(“world”)
    print(i)
```

Output



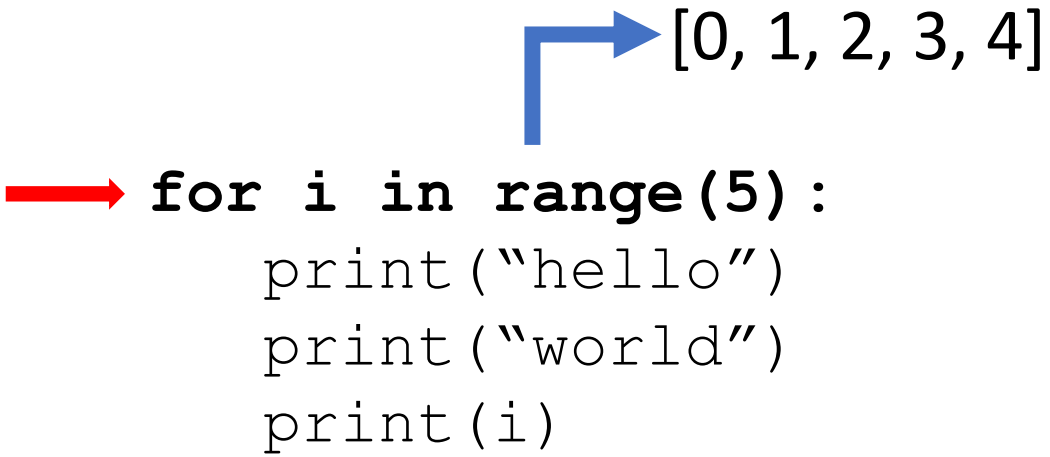
Control flow of a for loop




```
for i in range(5):
    print("hello")
    print("world")
    print(i)
```

Output

Control flow of a for loop

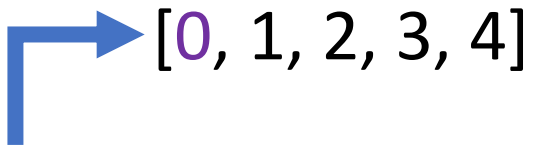


Output

Control flow of a for loop

Iteration 1

i = 0




```
for i in range(5):
    print("hello")
    print("world")
    print(i)
```

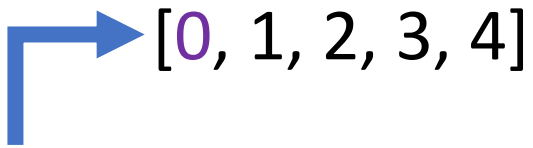
Output

```
hello
```

Control flow of a for loop

Iteration 1

i = 0




```
for i in range(5):
    print("hello")
    print("world")
    print(i)
```

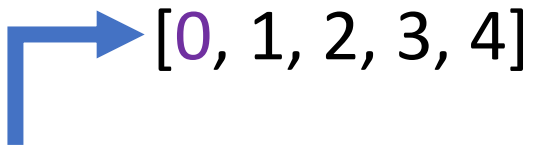
Output

```
hello
world
```

Control flow of a for loop

Iteration 1

i = 0




```
for i in range(5):
    print("hello")
    print("world")
    print(i)
```

Output

```
hello
world
0
```

Control flow of a for loop

Iteration 1

i = 0

[0, 1, 2, 3, 4]

```
for i in range(5):
    print("hello")
    print("world")
    print(i)
```

REPEAT!

Output

```
hello
world
0
```

Control flow of a for loop

Iteration 2

i = 1

[0, 1, 2, 3, 4]

```
for i in range(5):
    print("hello")
    print("world")
    print(i)
```

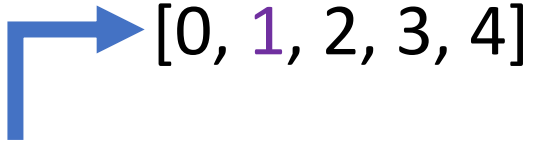
Output

```
hello
world
0
hello
```

Control flow of a for loop

Iteration 2

i = 1




```
for i in range(5):
    print("hello")
    print("world")
    print(i)
```

Output

```
hello
world
0
hello
world
```

Control flow of a for loop

Iteration 2

i = 1

[0, 1, 2, 3, 4]

```
for i in range(5):
    print("hello")
    print("world")
    print(i)
```

Output

```
hello
world
0
hello
world
1
```

Control flow of a for loop

Iteration 2

i = 1

[0, 1, 2, 3, 4]

```
for i in range(5):
    print("hello")
    print("world")
    print(i)
```

REPEAT!

Output

```
hello
world
0
hello
world
1
```

Control flow of a for loop

Iteration 3

i = 2

[0, 1, 2, 3, 4]

```
for i in range(5):
    print("hello")
    print("world")
    print(i)
```

Output

```
hello
world
0
hello
world
1
hello
```

Control flow of a for loop

Iteration 3

i = 2

[0, 1, 2, 3, 4]

```
for i in range(5):
    print("hello")
    print("world")
    print(i)
```

Output

```
hello
world
0
hello
world
1
hello
world
```

Control flow of a for loop

Iteration 3

i = 2

[0, 1, 2, 3, 4]

```
for i in range(5):
    print("hello")
    print("world")
    print(i)
```

Output

```
hello
world
0
hello
world
1
hello
world
i
```

Control flow of a for loop

Iteration 3

i = 2

[0, 1, 2, 3, 4]

```
for i in range(5):
    print("hello")
    print("world")
    print(i)
```

REPEAT!

Output

```
hello
world
0
hello
world
1
hello
world
i
```

Control flow of a for loop

Iteration 4

i = 3

[0, 1, 2, 3, 4]

```
for i in range(5):
    print("hello")
    print("world")
    print(i)
```

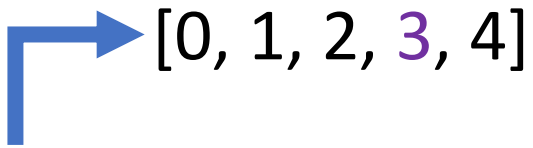
Output

```
hello
world
0
hello
world
1
hello
world
I
hello
```

Control flow of a for loop

Iteration 4

i = 3




```
for i in range(5):
    print("hello")
    print("world")
    print(i)
```

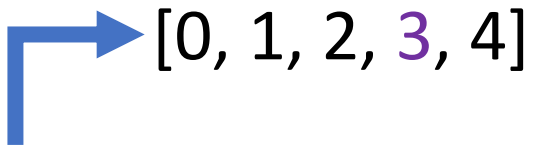
Output

```
hello
world
0
hello
world
1
hello
world
2
hello
world
```

Control flow of a for loop

Iteration 4

i = 3




```
for i in range(5):
    print("hello")
    print("world")
    print(i)
```

Output

```
hello
world
0
hello
world
1
hello
world
2
hello
world
3
```

Control flow of a for loop

Iteration 4

i = 3

[0, 1, 2, 3, 4]

```
for i in range(5):
    print("hello")
    print("world")
    print(i)
```

REPEAT!

Output

```
hello
world
0
hello
world
1
hello
world
2
hello
world
3
```

Control flow of a for loop

Iteration 5

i = 4

[0, 1, 2, 3, 4]

```
for i in range(5):
    print("hello")
    print("world")
    print(i)
```

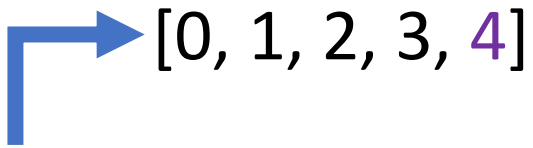
Output

```
hello
world
0
hello
world
1
hello
world
2
hello
world
3
hello
```

Control flow of a for loop

Iteration 5

i = 4




```
for i in range(5):
    print("hello")
    print("world")
    print(i)
```

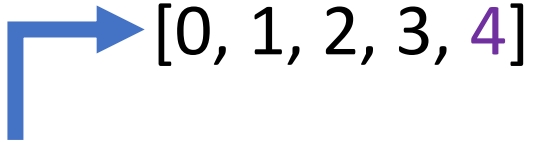
Output

```
hello
world
0
hello
world
1
hello
world
2
hello
world
3
hello
world
```

Control flow of a for loop

Iteration 5

i = 4




```
for i in range(5):
    print("hello")
    print("world")
    print(i)
```

Output

```
hello
world
0
hello
world
1
hello
world
2
hello
world
3
hello
world
4
```

Control flow of a for loop

Iteration 5

i = 4

[0, 1, 2, 3, 4]

```
for i in range(5):
    print("hello")
    print("world")
    print(i)
```

REPEAT ??

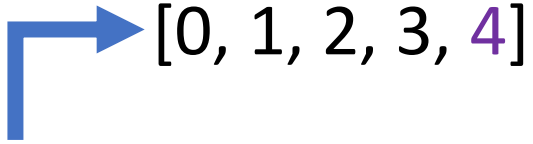
Output

```
hello
world
0
hello
world
1
hello
world
2
hello
world
3
hello
world
4
```

Control flow of a for loop

Iteration 5

i = 4




```
for i in range(5):
    print("hello")
    print("world")
    print(i)
```

REPEAT ??

No! we've looped 5 times already (exhausted our range of numbers)

Output

```
hello
world
0
hello
world
1
hello
world
2
hello
world
3
hello
world
4
```

Control flow of a for loop

```
for i in range(5):
    print("hello")
    print("world")
    print(i)
```

Program Done!

Output

```
hello
world
0
hello
world
1
hello
world
2
hello
world
3
hello
world
4
```

The `range()` function

`range()` format:

`range(start, stop, step)`

`range(n)`

Generates a list of integer number from 0 to n (not including n)

`range(10)` → [0,1,2,3,4,5,6,7,8,9]

`range(m,n)`

Generates a list of integer number from m to n (not including n)

`range(3,10)` → [3,4,5,6,7,8,9]

`range(m,n,s)`

Generates a list of integer number from m to n (not including n) and increments by s each time

`range(2,10,2)` → [2,4,6,8]

Example: List of squares

(you might find this example helpful for lab 4 and program 1)

Write a program that will generate a list of squared numbers up from 1 to some user defined **n**

For example. `list_of_squares(6)` should print out something like this:

List of squares up to 6:

1. 1
2. 4
3. 9
4. 16
5. 25
6. 36

Examples

Write a function, is_prime, that takes a single integer argument and returns True when the argument is a *prime number* and False otherwise.

Rewrite the function sumTo(n) that returns the sum of all integer numbers up to and including *n*. This time use the accumulator pattern.

(You might find this example helpful for program 1…)

Write a program that will print out whether a number is even or odd for all number from 1 to 100