Objectives

- More on functions
 - Passing parameters
- Top-down design
- Files
 - Writing files
 - > Handling numeric data

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Review

- What is the keyword we use to create a new function?
- How do we get output from a function?
- What happens in the program execution when a function reaches a return statement?
- Why do we write functions?
- What makes a good function?
- How should you comment your functions?
- What is the name for the process for changing a program to improve readability/organization/ readability without changing functionality?

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Immutable vs Mutable Parameters

PASSING PARAMETERS

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Passing Parameters

- Only copies of the actual parameters are given to the function
 - For **immutable** data types

Which are?

- The actual parameters in the calling code do not change
- Swap example:
 - > Swap two values in script
 - ➤ Then, put into a function

 $\begin{array}{c}
x = 5 \\
y = 7
\end{array}$ $\begin{array}{c}
x = 7 \\
y = 5
\end{array}$

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Immutable Data is Passed by Value

```
def swap(a, b):
    tmp = a
    a = b
    b = tmp
    print(a, b)

x = 5
y = 7

swap(x, y)

# at the end, y should be 5 and x should be 7
print("x =", x)
print("y =", y)
```

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swap.py

Immutable Data is Passed by Value

```
def swap(a, b):
tmp = a
a = b
b = tmp
print(a, b)

X = 5
y = 7

Swap(x, y)

# at the end, y should be 5 and x should be 7
print("x = ", x)
print("y = ", y)

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This code does not have the desired effect.

Because the integers are passed by value, the value of X and y are not changed by the call to the SWQP function.

Swap(x, y)

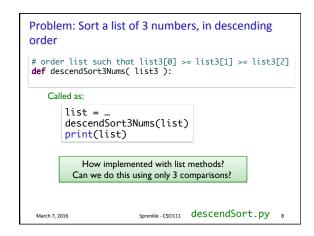
# at the end, y should be 5 and x should be 7
print("y = ", y)

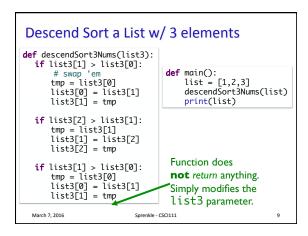
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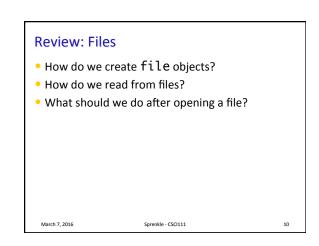
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SWQP. Py 6
```

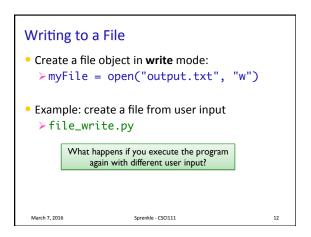
Lists as Parameters to Functions If a list that is passed as a parameter into a function is modified in the function, the list is modified outside the function > Lists are not passed-by-value/copied > Different from immutable types (e.g., numbers, strings) • Parameter is actually a pointer to the list in memory







Method Name	Functionality
read()	Read the entire content from the file, returned as a string object
readline()	Read one line from file, returned as a string object (which includes the "\n"). If it returns "then you've reached the end of the file
write(string)	Write a string to the file
close()	Close the file. Must close the file after done reading from/writing to a file



Handling Numeric Data

- We have been dealing with reading and writing strings so far
 - > Read from a file: get a string
 - ➤ Write to file: use a string
- What do we need to do to read numbers from a file?
- How can we write numbers to a file?

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Handling Numeric Data

- We have been dealing with reading and writing strings so far
 - > Read from a file: get a string
 - > Write to file: use a string
- What do we need to do to read numbers from a file?
 - > Cast as a numeric type, e.g., int or float
- How can we write numbers to a file?
 - > Cast number as a str

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Problem: Temperature Data

- **Given**: data file that contains the daily high temperatures for last year at one location
 - > Data file contains one temperature per line
 - Example: data/florida.dat
- **Problem**: What is the average high temperature (to 2 decimal places) for the location?

Rule of Thumb: Always look at data file before processing it

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avgData.py

Looking Ahead

- Lab 7 due Friday
- Broader Issue due Friday

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