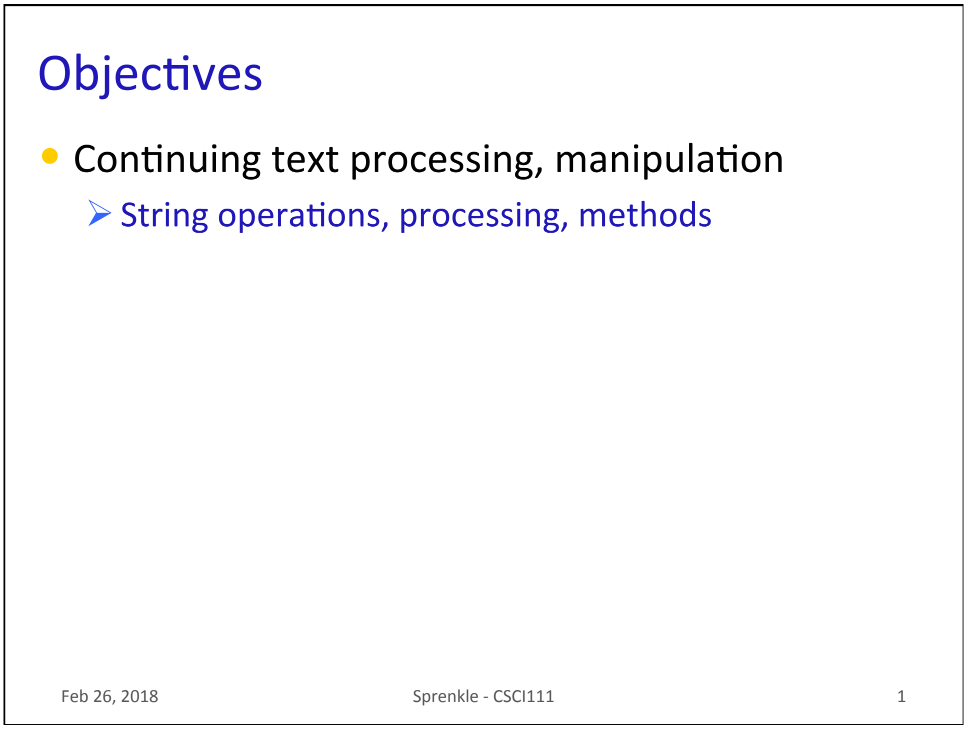
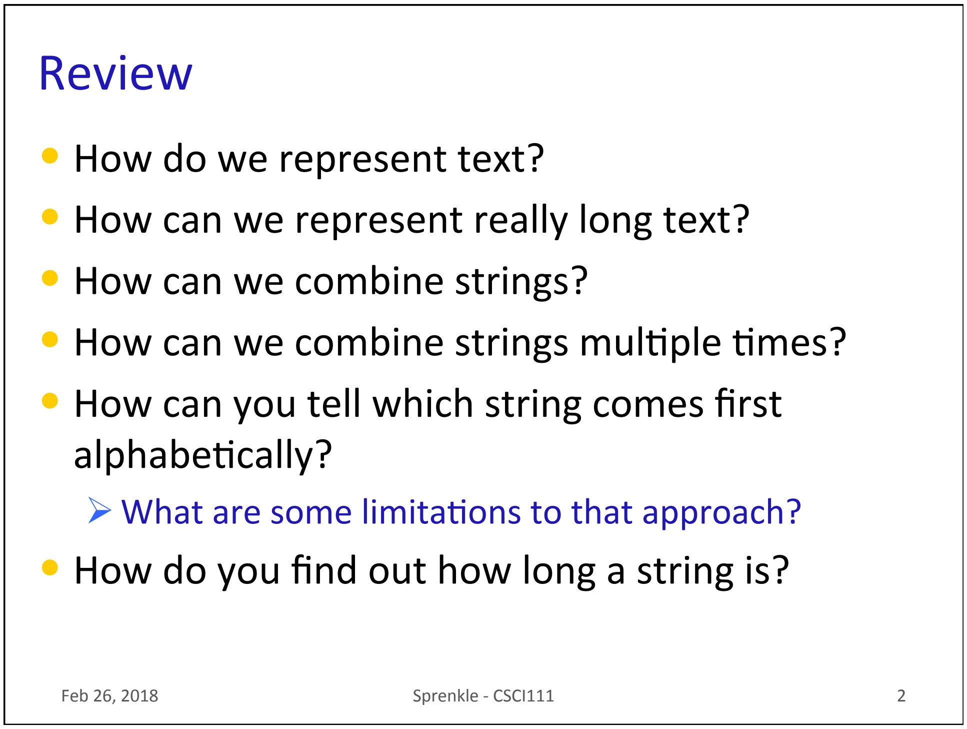


Objectives

- Continuing text processing, manipulation
    - String operations, processing, methods



Review

- How do we represent text?
- How can we represent really long text?
- How can we combine strings?
- How can we combine strings multiple times?
- How can you tell which string comes first alphabetically?
    - What are some limitations to that approach?
- How do you find out how long a string is?

String Comparisons

- Same operations as with numbers:
  - ==, !=
  - <, <=
  - >, >=

Alphabetical comparison

- Use in conditions in `if` statements

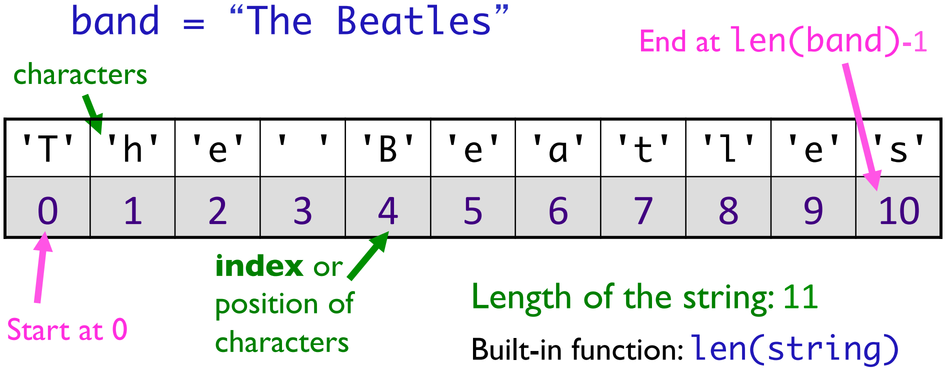
```
if courseChoice == "CSCI111":
    print("Good choice!")
else:
    print("Maybe next semester")
```

string_compare.py

Strings

- A ***sequence*** of one-character strings
  - Example:

  band = “The Beatles”



End at len(band)-1

characters

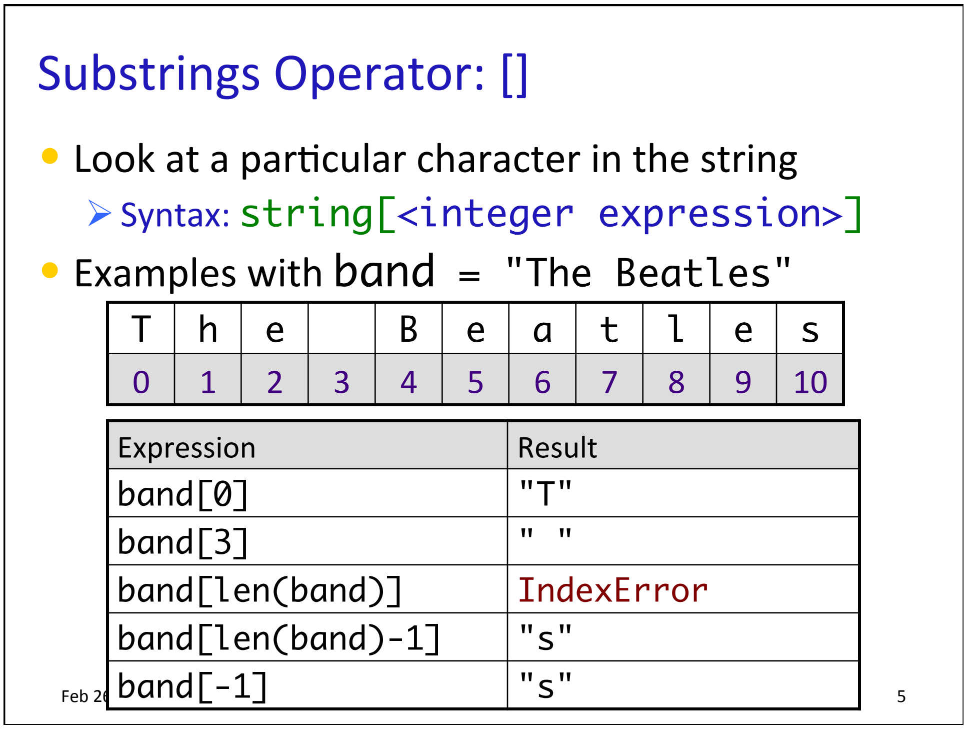
'T'	'h'	'e'	' '	'B'	'e'	'a'	't'	'l'	'e'	's'
0	1	2	3	4	5	6	7	8	9	10

Start at 0

index or position of characters

Length of the string: 11

Built-in function: `len(string)` to find length of a string

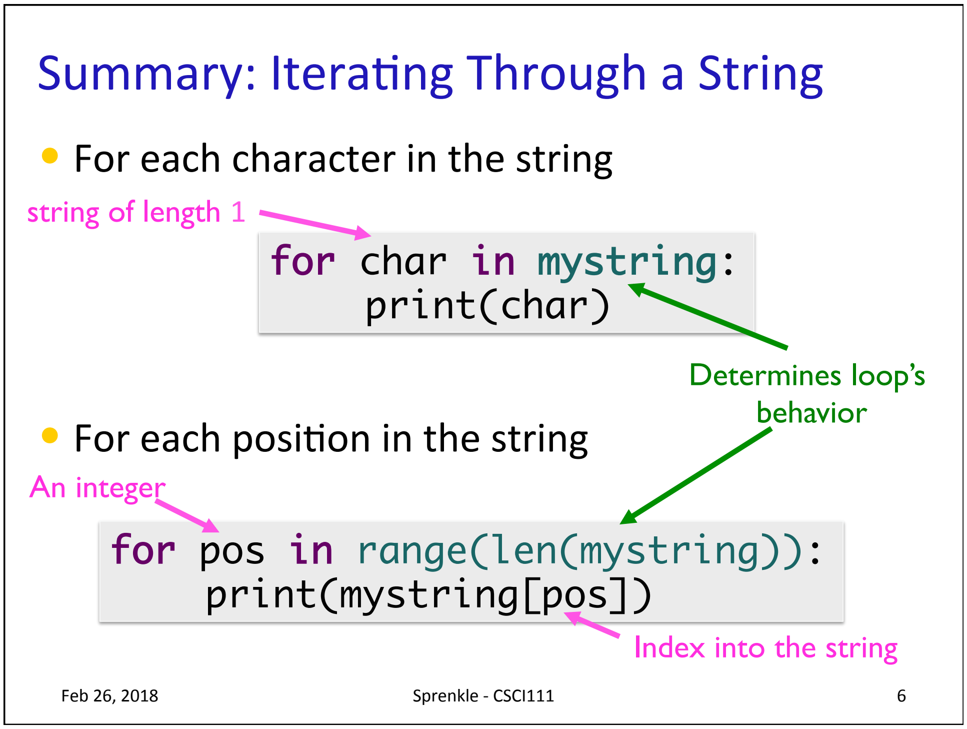


Substrings Operator: []

- Look at a particular character in the string
  - Syntax: `string[<integer expression>]`
- Examples with band = "The Beatles"

T	h	e		B	e	a	t	l	e	s
0	1	2	3	4	5	6	7	8	9	10

Expression	Result
band[0]	"T"
band[3]	" "
band[len(band)]	IndexError
band[len(band)-1]	"s"
band[-1]	"s"



Summary: Iterating Through a String

- For each character in the string

string of length 1

```
for char in mystring:
    print(char)
```

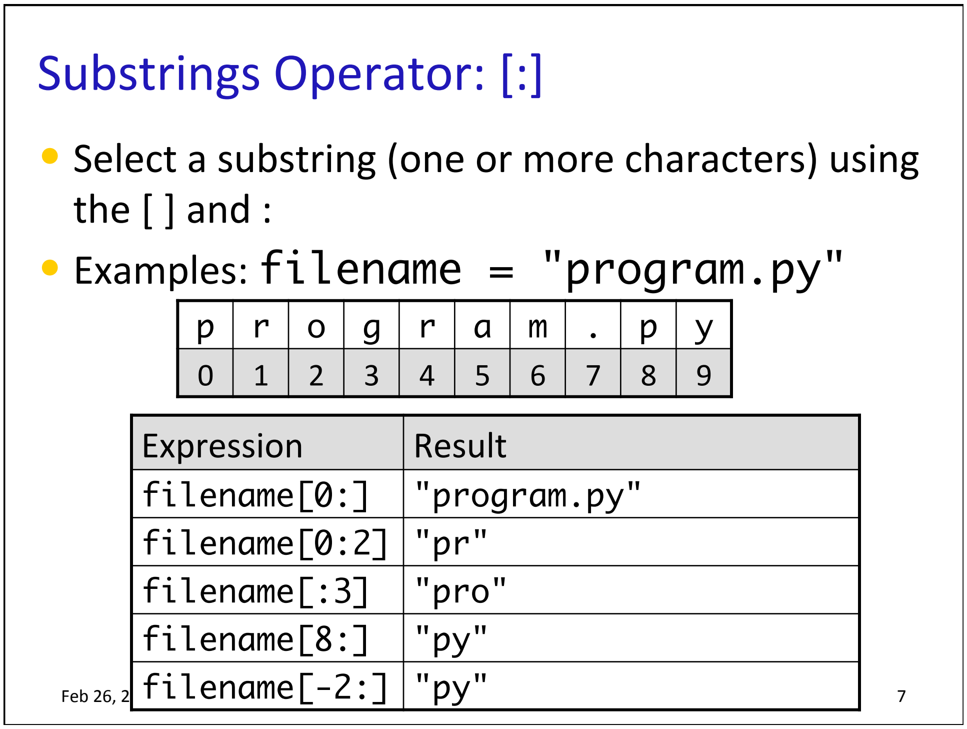
Determines loop's behavior

- For each position in the string

An integer

```
for pos in range(len(mystring)):
    print(mystring[pos])
```

Index into the string

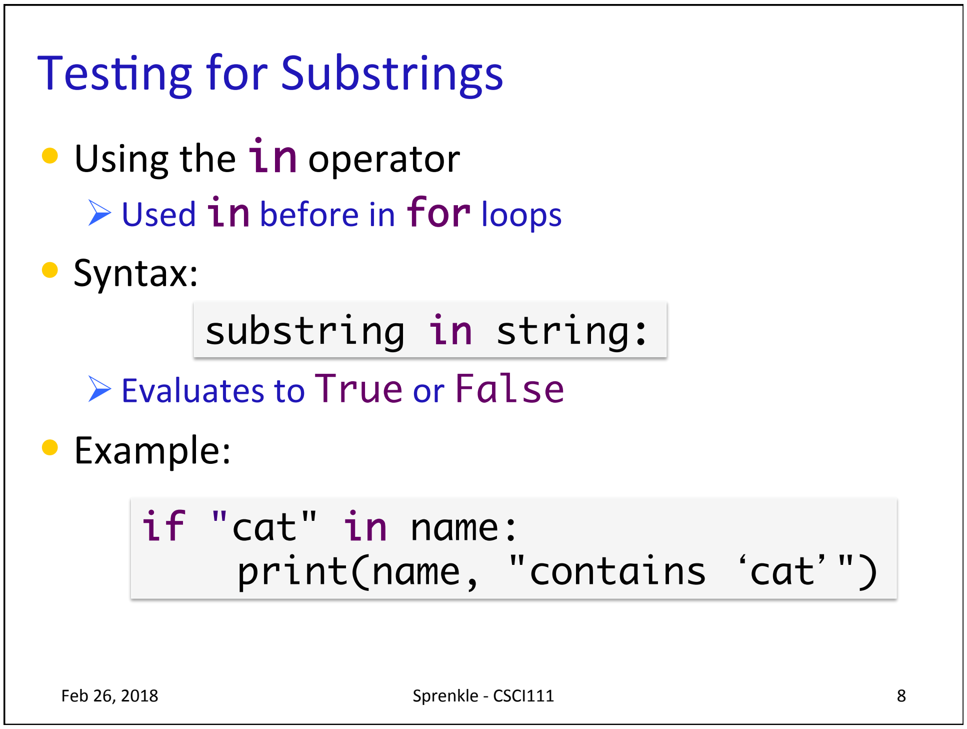


Substrings Operator: [:]

- Select a substring (one or more characters) using the [ ] and :
- Examples: `filename = "program.py"`

p	r	o	g	r	a	m	.	p	y
0	1	2	3	4	5	6	7	8	9

Expression	Result
filename[0:]	"program.py"
filename[0:2]	"pr"
filename[:3]	"pro"
filename[8:]	"py"
filename[-2:]	"py"



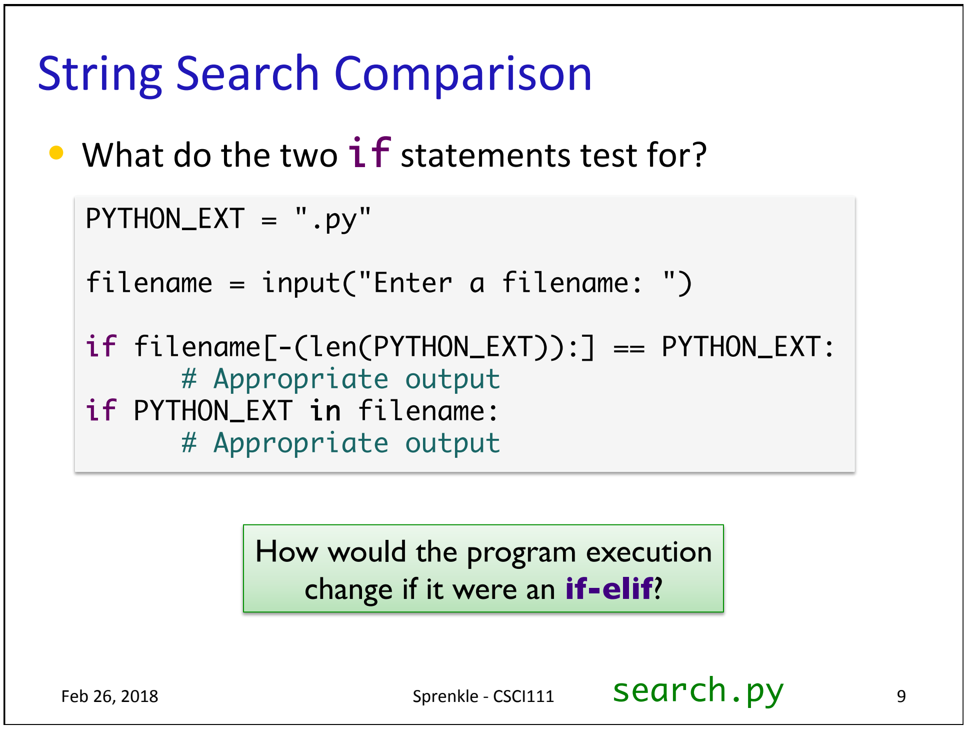
Testing for Substrings

- Using the **in** operator
  - Used **in** before in **for** loops
- Syntax:

```
substring in string:
```

  - Evaluates to True or False
- Example:

```
if "cat" in name:
    print(name, "contains ‘cat’")
```



String Search Comparison

- What do the two `if` statements test for?

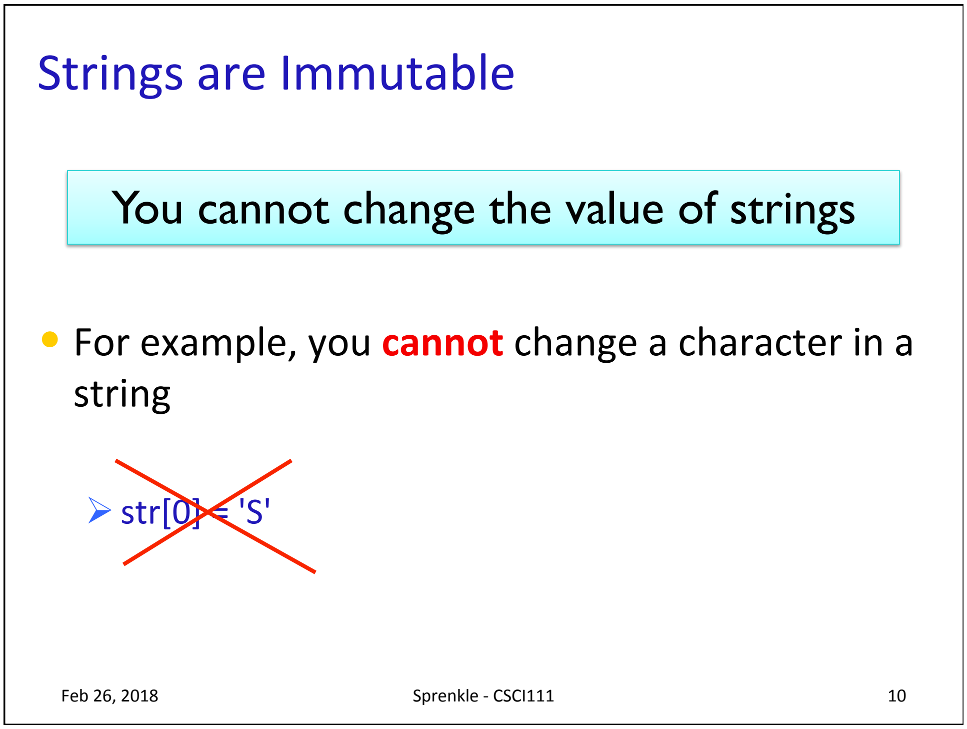
```
PYTHON_EXT = ".py"

filename = input("Enter a filename: ")

if filename[-(len(PYTHON_EXT)):] == PYTHON_EXT:
      # Appropriate output
if PYTHON_EXT in filename:
      # Appropriate output
```

How would the program execution change if it were an **if-elif**?

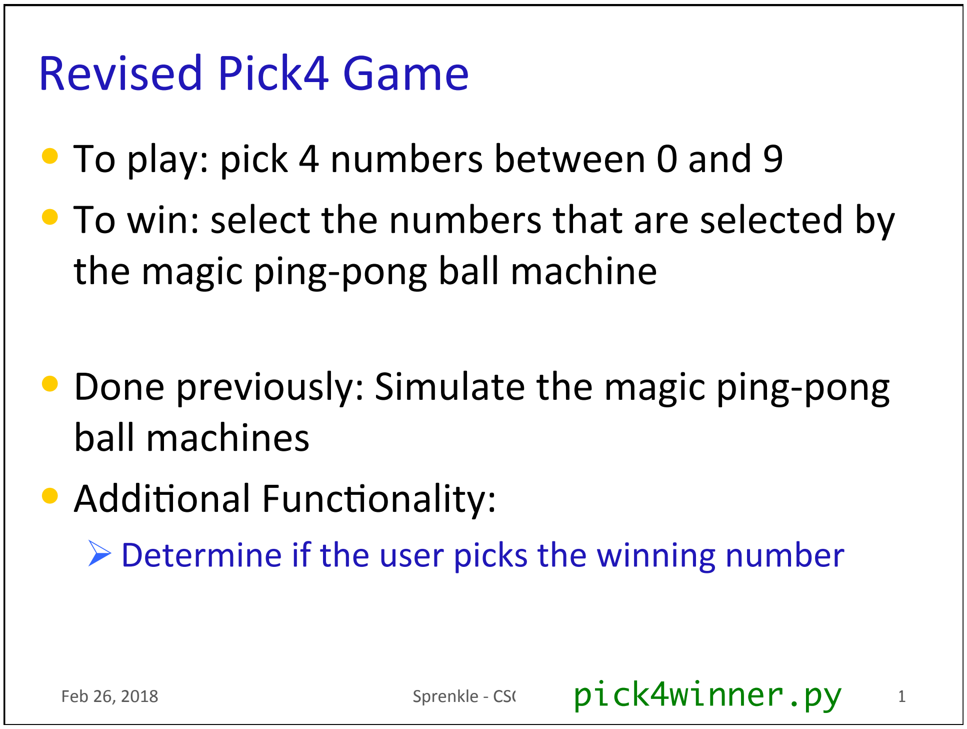
`search.py`



Strings are Immutable

You cannot change the value of strings

- For example, you **cannot** change a character in a string
  - ~~str[0] = 'S'~~

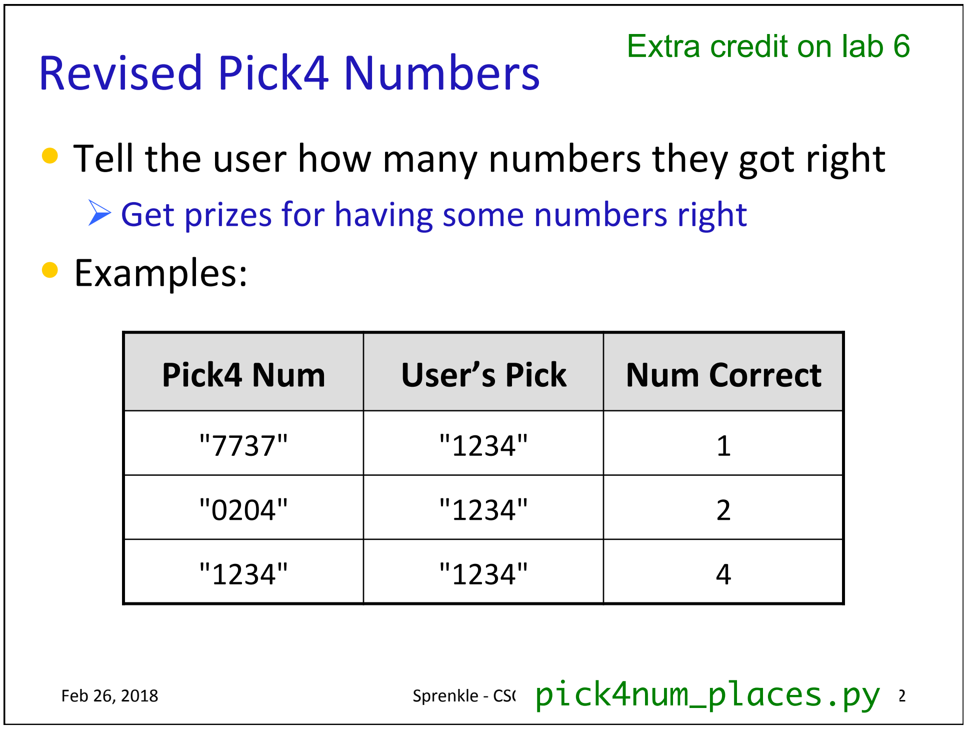


Revised Pick4 Game

- To play: pick 4 numbers between 0 and 9
- To win: select the numbers that are selected by the magic ping-pong ball machine

- Done previously: Simulate the magic ping-pong ball machines
- Additional Functionality:
  - Determine if the user picks the winning number

pick4winner.py



Extra credit on lab 6

Revised Pick4 Numbers

- Tell the user how many numbers they got right
  - Get prizes for having some numbers right
- Examples:

Pick4 Num	User’s Pick	Num Correct
"7737"	"1234"	1
"0204"	"1234"	2
"1234"	"1234"	4

pick4num_places.py

USING THE STR API

Review

- What is an API?
- How do we call methods on an object?

str Methods

- `str` is a ***class*** or a ***type***

- **Methods**: available operations to perform on `str` objects
  - Provide common functionality

- To see all methods available for `str` class
  - `help(str)`

str Methods

- Example method: `find(substring)`
  - Finds the index where substring is in string
  - Returns -1 if substring isn't found

- To call a method:
  - `<str_obj>.methodname([arguments])`
  - Example: `filename.find(".py")`

Executed on this string

Common `str` Methods

Method	Operation
`center(width)`	Returns a copy of string centered within the given number of columns
`count(sub[, start [, end]])`	Return # of non-overlapping occurrences of substring `sub` in the string.

`endswith(sub)`
`startswith(sub)`
	Return `True` iff string ends with/starts with `sub`

`find(sub[, start [, end]])`	Return first index where substring `sub` is found
`isalpha(), isdigit(), isspace()`	Returns `True` iff string contains letters/ digits/whitespace only
`lower(), upper()`	Return a copy of string converted to lowercase/uppercase

`string_methods.py`

Common `str` Methods

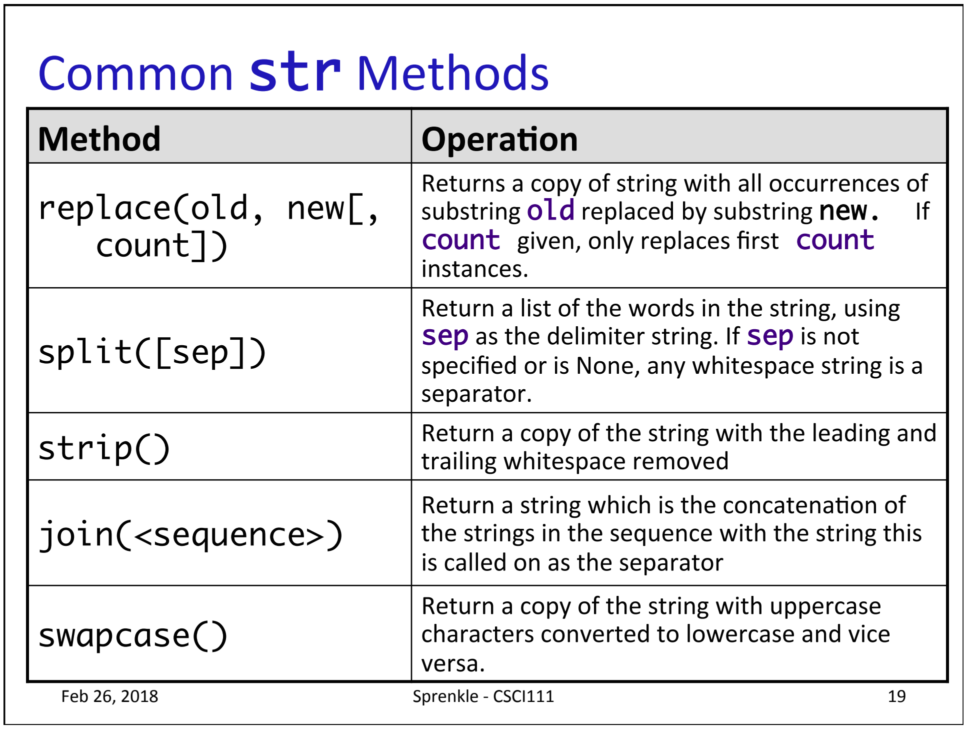
What do the square brackets mean?

Method	Operation
`center(width)`	Returns a copy of string centered within the given number of columns
`count(sub[, start [, end]])`	Return # of non-overlapping occurrences of substring `sub` in the string.

`endswith(sub)`
`startswith(sub)`
	Return `True` iff string ends with/starts with `sub`

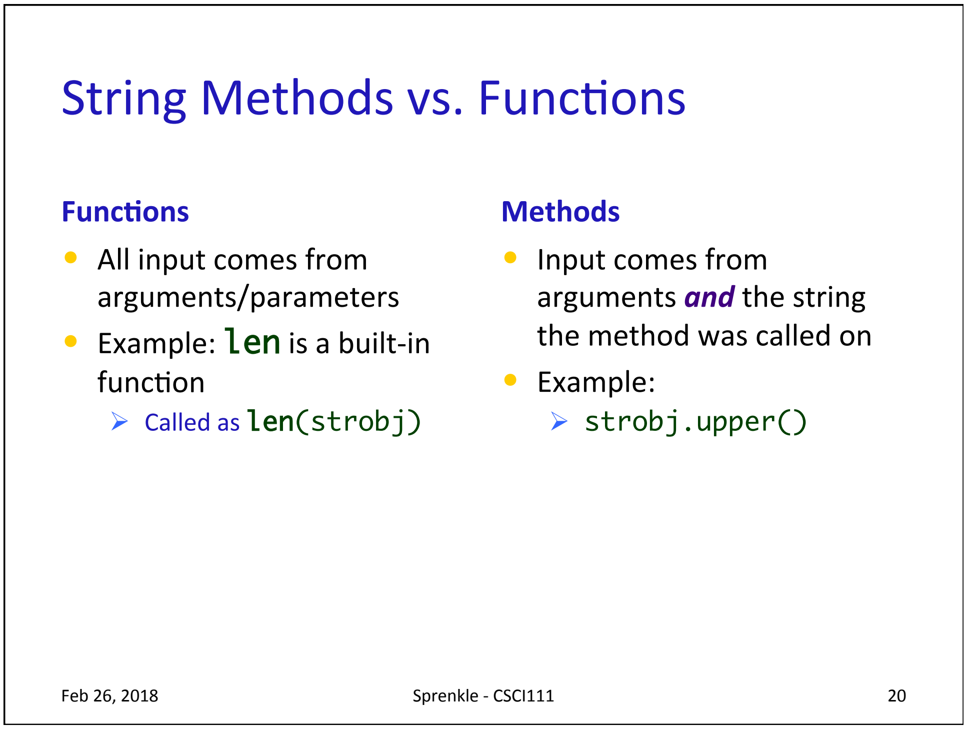
`find(sub[, start [, end]])`	Return first index where substring `sub` is found
`isalpha(), isdigit(), isspace()`	Returns `True` iff string contains letters/ digits/whitespace only
`lower(), upper()`	Return a copy of string converted to lowercase/uppercase

`string_methods.py`



Common `str` Methods

Method	Operation
`replace(old, new[, count])`	Returns a copy of string with all occurrences of substring `old` replaced by substring `new`. If `count` given, only replaces first `count` instances.
`split([sep])`	Return a list of the words in the string, using `sep` as the delimiter string. If `sep` is not specified or is None, any whitespace string is a separator.
`strip()`	Return a copy of the string with the leading and trailing whitespace removed
`join(<sequence>)`	Return a string which is the concatenation of the strings in the sequence with the string this is called on as the separator
`swapcase()`	Return a copy of the string with uppercase characters converted to lowercase and vice versa.



String Methods vs. Functions

Functions

- All input comes from arguments/parameters
- Example: `len` is a built-in function
  - Called as `len(strobj)`

Methods

- Input comes from arguments ***and*** the string the method was called on
- Example:
  - `strobj.upper()`

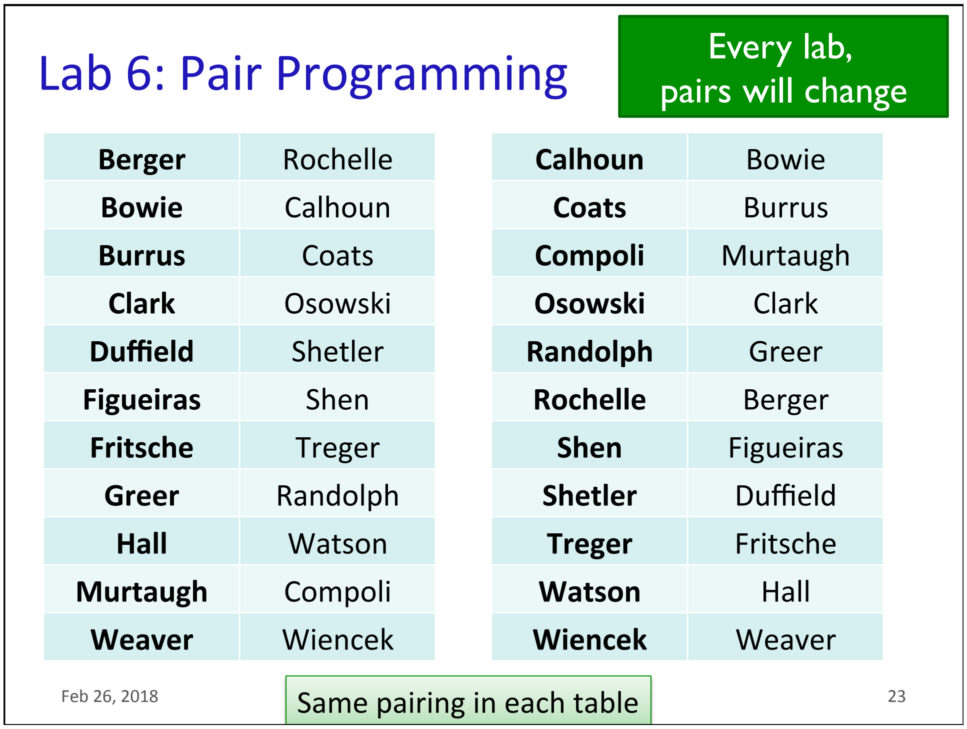
Using the APIs

- Given a problem, break down the problem
  - Can any of the parts of the problem be solved using a method in the API?

Are You Smarter Than a 5th Grader?

- Problem in spelling from the show: How many a's are in abracadabra?
  - Solve using `str` methods

- Silly problem but can generalize to other problems
  - How many a's are in a given word?
  - How many of a certain letter are in a given word?



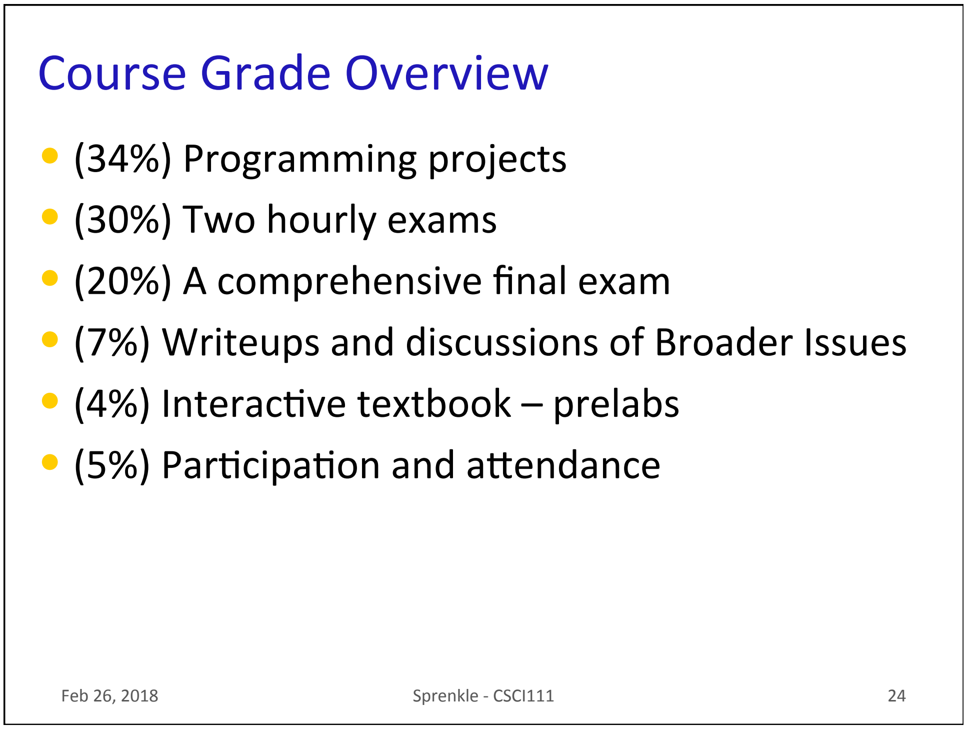
Lab 6: Pair Programming

Every lab, pairs will change

Berger	Rochelle
Bowie	Calhoun
Burrus	Coats
Clark	Osowski
Duffield	Shetler
Figueiras	Shen
Fritsche	Treger
Greer	Randolph
Hall	Watson
Murtaugh	Compoli
Weaver	Wiencek

Calhoun	Bowie
Coats	Burrus
Compoli	Murtaugh
Osowski	Clark
Randolph	Greer
Rochelle	Berger
Shen	Figueiras
Shetler	Duffield
Treger	Fritsche
Watson	Hall
Wiencek	Weaver

Same pairing in each table



Course Grade Overview

- (34%) Programming projects
- (30%) Two hourly exams
- (20%) A comprehensive final exam
- (7%) Writeups and discussions of Broader Issues
- (4%) Interactive textbook – prelabs
- (5%) Participation and attendance

Exam 1 Review

- Out of 100 points (101 points possible, plus EC)
- Reflection
  - What strategies did you use to study?
  - What did you do well on? What did you miss?
  - What strategies should you keep? What should change?

	Sections			Total
	A	B	C	
Median	90.7	76.4	77.9	**86.0**
Average	88.8	73.3	78.0	**85.5**

Looking Ahead

- Lab 6 Prep due tomorrow
- Lab 6 tomorrow!
  - Pair Programming
- Broader Issue Friday