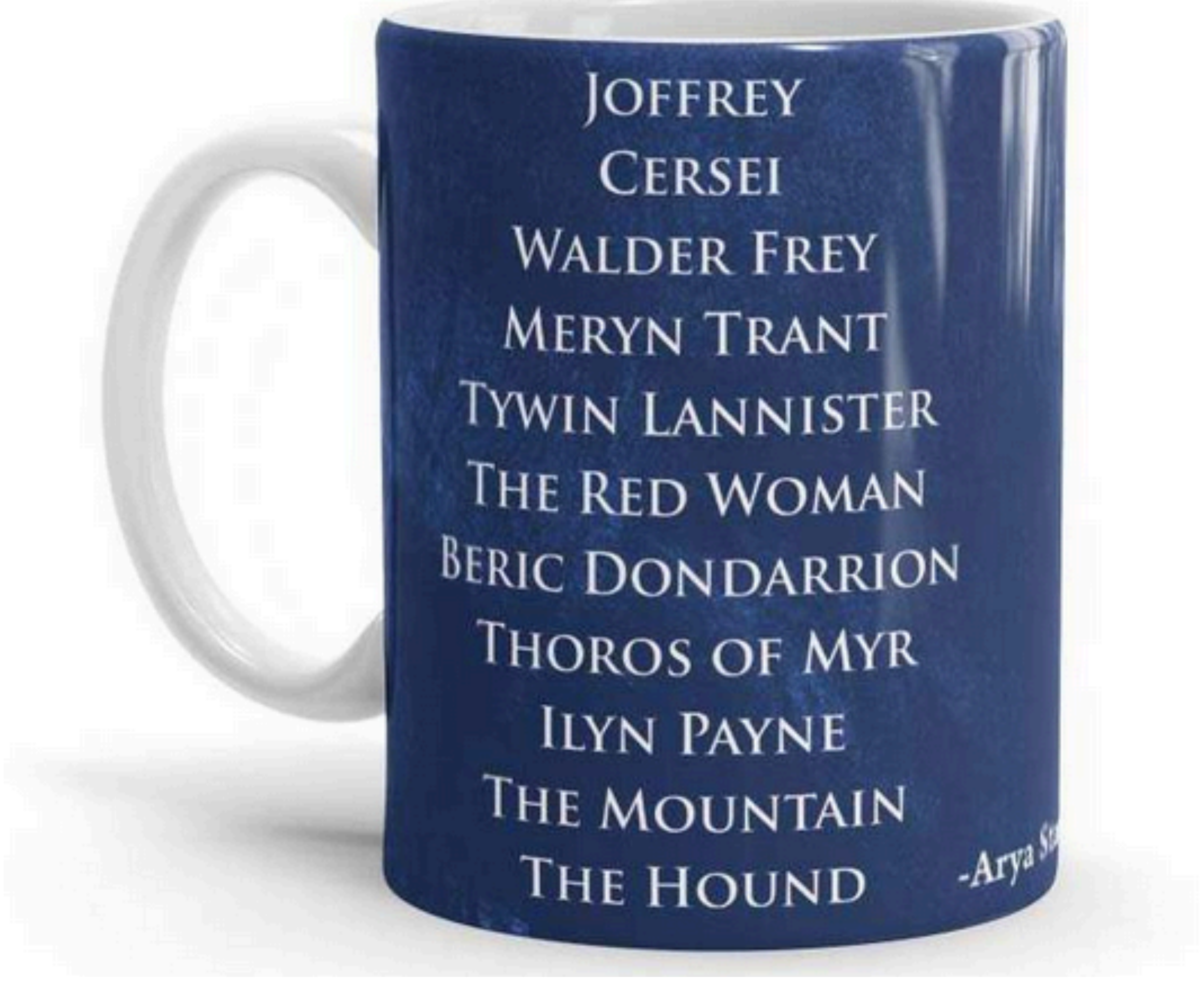


CSCI 141

Scott Wehrwein

List Methods
Mutability

Goals

- Know how to use the assignment operator on list elements and slices
- Know how to use the list methods `append`, and `extend`
- Know the definition of mutability, and which sequence types are mutable (lists) and immutable (strings, tuples)

Lists vs Strings: What's the difference?

1. Strings hold only characters, while lists can hold values of any type(s).

...haven't we seen this before?

Tuples are also objects that hold a sequence of values of any type(s).

```
("alpaca", 14, 27.6)
```

Lists vs Tuples: What's the difference?

Tuples are *also* objects that hold a sequence of values of any type(s).

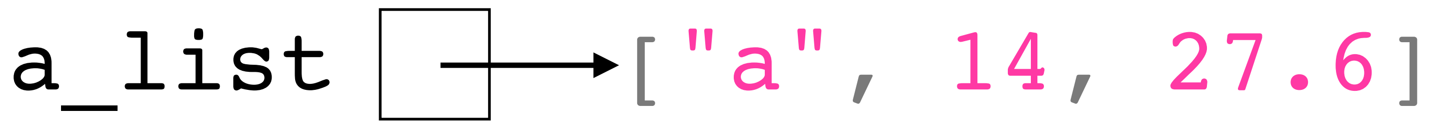
Tuples are immutable: their contents **cannot** be changed.

Lists are mutable: their contents **can** be changed.

```
a_tuple = ("a", 14, 27.6)
a_list = ["a", 14, 27.6]

a_tuple[1] # => 14
a_list[1] # => 14

a_tuple[1] = 0 # causes an error
a_list[1] = 0 # a_list is now ["a", 0, 27.6]
```

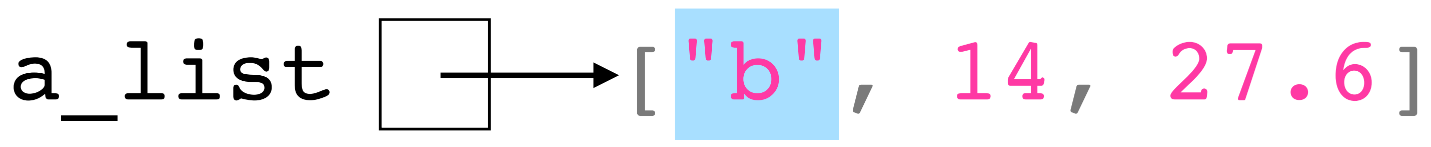
Lists are mutable

```
a_list = ["a", 14, 27.6]
```



Lists are mutable

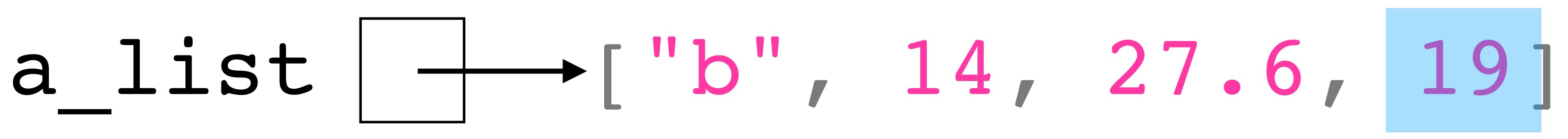
```
a_list = ["a", 14, 27.6]

a_list[0] = "b"
```



Lists are mutable

```
a_list = ["a", 14, 27.6]

a_list[0] = "b"

a_list.append(19)
```

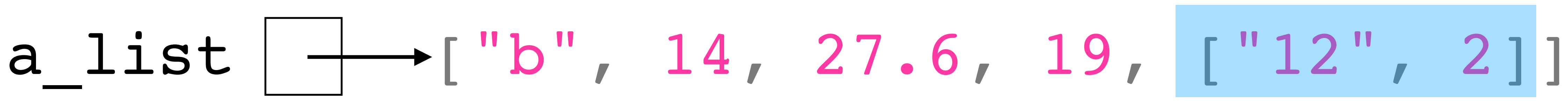
`append` takes a **single** value and adds it to the end of the list.



Lists are mutable

```
a_list = ["a", 14, 27.6]

a_list[0] = "b"

a_list.append(19)

a_list.append(["12", 2])
```

notice: still a single argument (happens to be a list)

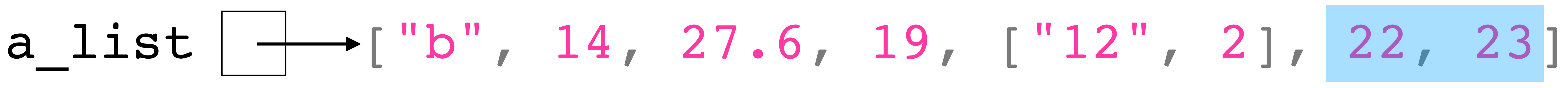


```
a_list → ["b", 14, 27.6, 19, ["12", 2]]
```

Lists are mutable

```
a_list = ["a", 14, 27.6]

a_list[0] = "b"

a_list.append(19)

a_list.append(["12", 2])

a_list.extend([22, 33])
```

`extend` takes a **sequence** and adds **each** value to the list.

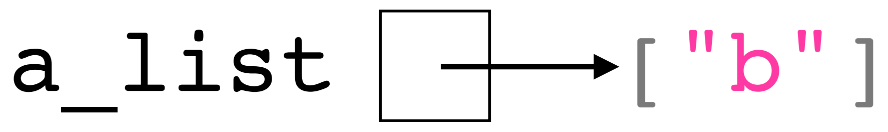


```
a_list → ["b", 14, 27.6, 19, ["12", 2], 22, 23]
```

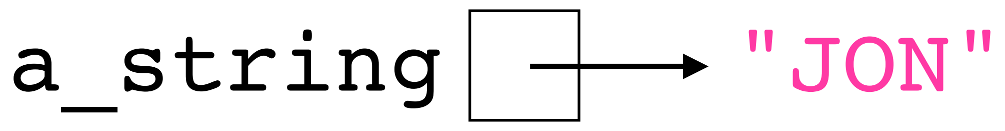
Lists are mutable

Notice the difference between string methods and list methods:

```
a_list.append(19)
```



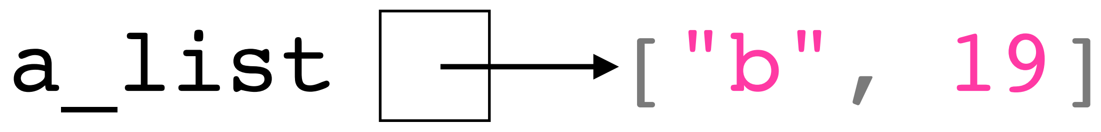
```
new_string = a_string.lower()
```



Lists are mutable

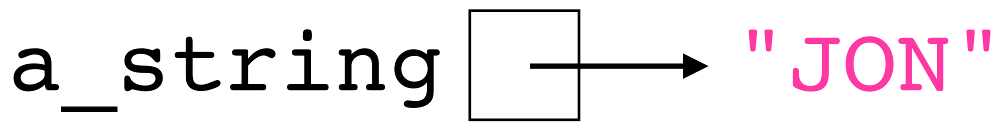
Notice the difference between string methods and list methods:

```
a_list.append(19)
```



- **modifies** the list in-place
- has **no** return value

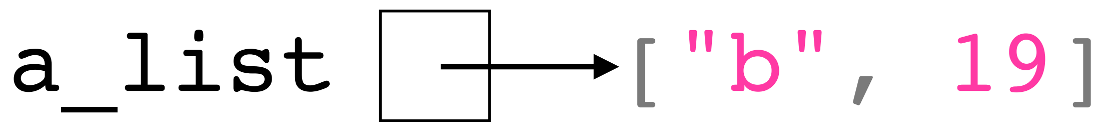
```
new_string = a_string.lower()
```



Lists are mutable

Notice the difference between string methods and list methods:

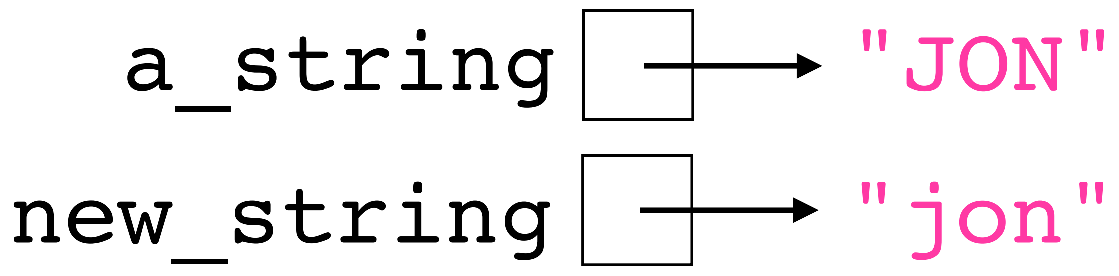
```
a_list.append(19)
```



- **modifies** the list in-place
- has **no** return value

```
new_string = a_string.lower()
```

- **does not modify** a_string
- **returns** a lower-case copy



Slicing, Revisited

```
a = [5, 6, 7, 8]
```

Unlike list methods, slicing yields a new list.
It *does not* modify the list.

```
a[0:3] # => [5, 6, 7]

a # => [5, 6, 7, 8]
```

Indexing yields a list *element*; slicing yields a *sublist*:

```
a[1] # => 6        ⟵ indexing yields a list element

a[1:2] # => [6]    ⟵ a list of length 1!

a[1:1] # => []     ⟵ a list of length 0!
```

List assignment + slicing

We can **assign** to indices:

```
a = [5, 6, 7, 8]
a[0] = 10
```

We can **slice** out sublists:

```
a[0:3] # => [10, 6, 7]
```

Can we **assign** to **slices**?

You betcha! (demo)

List assignment + slicing: Demo

```
a = [5, 6, 7, 8]
a[:2] = [3, 4]

a = [5, 6, 7, 8]
a[:3] = a[1:]

a = [5, 6, 7, 8]
a[:2] = a[1:]
```

Demo: What are lists good for?

- Generate a list of the fibonacci sequence
    - fib_list.py
- Make a deck of cards and deal a blackjack hand
    - blackjack.py
- Make a *bale* of turtles do some crazy stuff.
    - bale.py

Demo: a *bale* of turtles

- bale.py