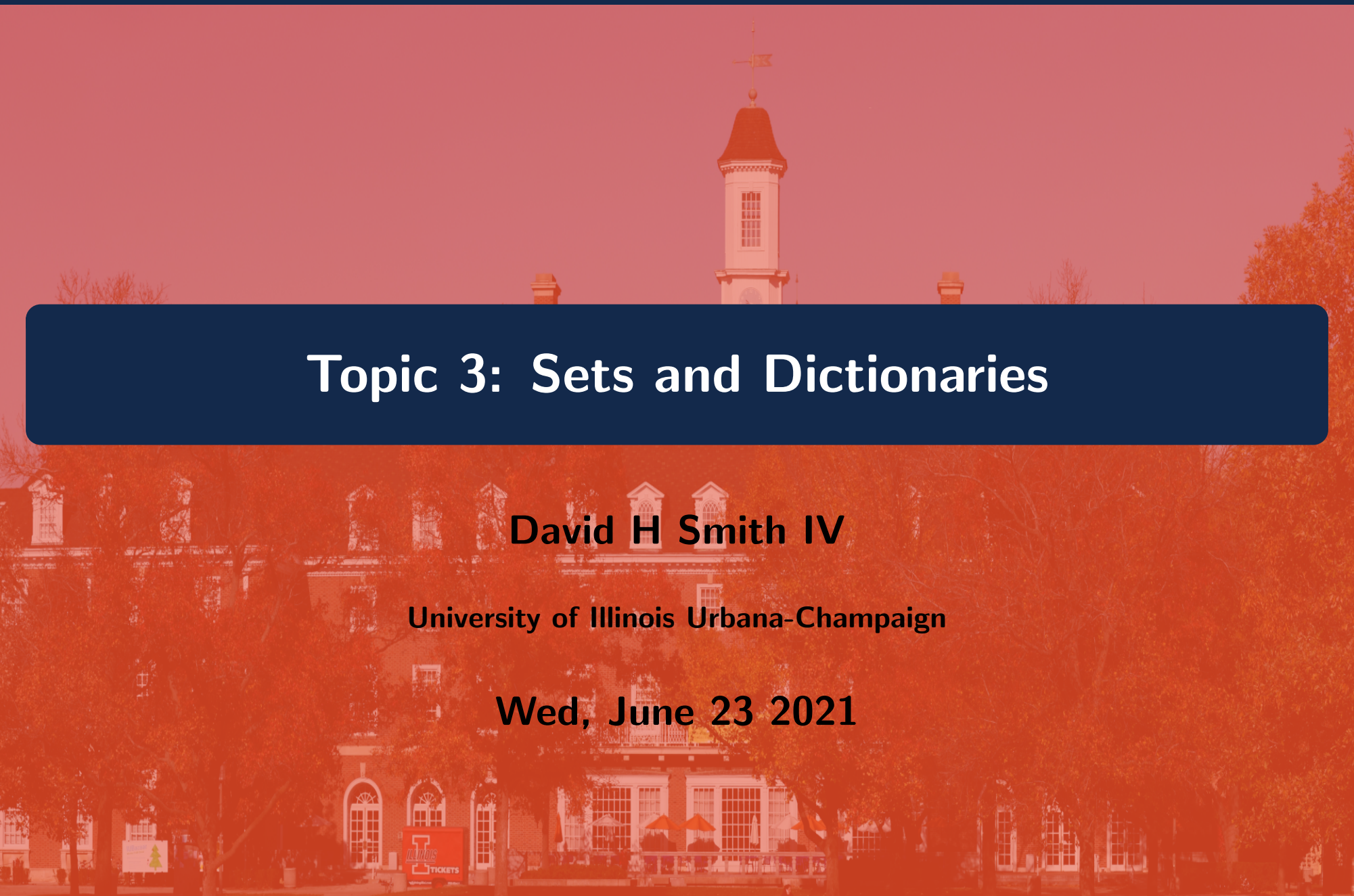

Topic 3: Sets and Dictionaries

David H Smith IV

University of Illinois Urbana-Champaign

Wed, June 23 2021

Announcements

Announcements

1.

Poll Question: Appending

What is the the value of `x` after the following code runs?

```
1 x = [1, 2, 3]
2 x = x.append(4)
```

A. `[1, 2, 3, 4]`
B. AttributeError
C. `[1, 2, 3, [4]]`
D. `None`

Poll Question: Appending

What is the the type of `x` after the following code runs?

```
1 x = (1, 2, 3)
```

A. Set
B. Dictionary
C. List
D. Tuple

Poll Question: Appending

What is the the type of `x` after the following code runs?

```
1 x = [1, 2, 3]
```

A. Set
B. Dictionary
C. List
D. Tuple

Sets

Poll Question: Making Sets

Which of the following is an invalid way of making a set?

A. `x = set(1, 2, 3)`

B. `x = set([1, 2, 3])`

C. `x = {1, 2, 3, 4}`

D. `x = set()`

Poll Question: Making Sets

Which of the following is an invalid way of making a set?

A. `x = set(1, 2, 3)`

B. `x = set([1, 2, 3])`

C. `x = {1, 2, 3, 4}`

D. `x = set()`

1. **set()** →Creates either a new set by either accepting and converting another sequence type (e.g., list, tuple) or creates an empty list if it's not given anything.
2. **set literal** →Written using the `{}` with comma separated elements inside (e.g., `{1, 2, 3}`).

Poll Question: Set Tracing

What is the value of `x` after this code has been run?

```
1 x = {1, 2, 3}
2 y = {4, 5}
3 x.union(y)
```

A. None

B. `{1, 2, 3, 4, 5}`

C. `{}`

D. `{1, 2, 3}`

Poll Question: Updating Sets

```
1 x = {1, 2, 3}
2 y = set("aeiou")
3 x.append(4)
4 z = x + y
5 print(z)
```

- A {1, 2, 3, 4, "aeiou"}
- B {1, 2, 3, 4, "a", "e", "i", "o", "u"}
- C ValueError
- D AttributeError

Poll Question: Updating Sets

```
1 x = {1, 2, 3}
2 y = set("aeiou")
3 x.add(4)
4 z = x + y
```

- A {1, 2, 3, 4, "aeiou"}
- B {1, 2, 3, 4, "a", "e", "i", "o", "u"}
- C ValueError
- D AttributeError

Poll Question: Updating Sets

```
1 x = {1, 2, 3}
2 y = set("aeiou")
3 x.add(4)
4 z = x.union(y)
```

A. {1, 2, 3, 4, "aeiou"}

B. {1, 2, 3, 4, "a", "e", "i", "o", "u"}

Poll Question: Set Tracing

How many total unique set objects are created throughout the duration of this codes runtime?

```
x = {1, 2, 3}
y = {4, 5}
x = x.union(y)
z = set("test")
x.update(z)
```

A. 1
B. 3
C. 4
D. 5

Poll Question: Set Tracing

What is the final value of set1 after the following code finish's executing?

```
1 set1 = {"hi", 2, 3}
2
3 set2 = set([2, 3, 4])
4 set2.add("hi")
5
6 set1.update(set2)
```

A. {"hi", 2, 3, 4}

B. {"hi", 2, 2, 3, 3, 4}

C. {2, 3, 4}

D. AttributeError

Useful Set Functions

1. **a.add(element)** $\rightarrow$ Adds a single element to a set.
2. **a.update(b)** $\rightarrow$ Adds all the elements from `b` to `a`. This function does not return anything.
3. **c = a.union(b)** $\rightarrow$ Creates a **new** set containing all of the elements from `a` and `b` and stores it in `c`.
4. **c = a.intersection(b)** $\rightarrow$ Creates a **new** set containing the intersection of `a` and `b` and stores it in `c`.
5. **c = a.difference(b)** $\rightarrow$ Creates a **new** set containing the intersection of `a` and `b` and stores it in `c`.

Dictionaries

Poll Question: Accessing Element in Dictionary

What is the resulting value of `d` after the following code is executed?

```
1 d = {}
2 d["foo"] = 1
3 d["bar"] = 2
4 d["baz"] = 3
```

A. SyntaxError
B. TypeError
C. `{"foo": 1, "bar": 2, "baz": 3}`
D. `{"baz": 3}`

Poll Question: Accessing Element in Dictionary

Given the following dictionary, what is the correct way to access the value with the key `"foo"`?

```
1 d = {"foo": 5, "bar": 10, "baz": 2}
```

A. You can't. Dictionaries are unordered.

B. `d[0]`

C. `d("foo")`

D. `d["foo"]`

Poll Question: Accessing Element in Dictionary

What is the resulting value of `d` after the following code is executed?

```
1 d = {"foo": 5, "bar": 10, "baz": 2}
2 d["foo"] = 2
3 del d["baz"]
```

A. You can't. Dictionaries are unordered.

B. `{"foo": 2, "bar": 10}`

C. `{"foo": 5, "foo": 2, "bar": 10, "baz": 2}`

D. `{"foo": 5, "foo": 2, "bar": 10}`

E. `{"foo": 2, "bar": 10, "baz": }`

New Dictionary Functions

What is the resulting value of `d` and `x` after the following code is executed?

```
1 d = {"Washington": 5, "California": 10, "Oregon": 2}
2 x = d.pop("Washington")
```

A. AttributeError
B. `d={"Washington": 5, "California": 10, "Oregon": 2}` and `x=5`
C. `d={"Washington": 5, "California": 10, "Oregon": 2}` and `x="Washington"`
D. `d={"California": 10, "Oregon": 2}` and `x=5`
E. `d={"California": 10, "Oregon": 2}` and `x={"Washington": 5}`

New Dictionary Functions

What is the resulting value of `x` after the following code is executed?

```
1 x = {"hello": 5, "world": 10}
2 y = {"world": 11, "!": 12}
3 x.update(y)
```

A. AttributeError
B. `{'hello': 5, 'world': 10, '!': 12}`
C. `{'hello': 5, 'world': 11, '!': 12}`
D. `{'hello': 5, 'world': 12, '!': 12}`

Dictionaries

A. Consists of key:value pairs.

B. `{key1:value1, key2:value2, key3:value3}`

C. All keys must be unique.

D. Access method is similar to lists but we use keys instead of indices (i.e., list[0] vs dict[key]).

String Formatting

Poll Question: String Formatting

What is the value of x after the following code executes:

```
1 x = "{1} {0} {1}".format("S", "O", "Y")
```

A. "S O Y"

B. "SOY"

C. "O S O"

D. "Y O Y"

E. "OSO"

Poll Question: String Formatting

What is the value of x after the following code executes:

```
1 import math
2 x = "{1:.3f} {0:.2f} {2:.4f}".format(math.pi, math.e, math.
      tau)
```

A. SyntaxError

B. `"2.718 3.14 6.2832"`

C. `"2.71 3.1 6.283"`

D. `"3.142 2.72 6.2832"`

Data Types Conclusion

Poll Question: Set Tracing

What is the type of `x`?

```
1 x = {1, 2, 3}
```

A. 1
B. 3
C. 4
D. 5

Syntax for creation:

1. $\{\} \rightarrow$ For creating sets **only if there are elements in between**.
2. $\{\} \rightarrow$ Creating dictionaries when left blank.

Conversion/creation functions:

1. **set()** $\rightarrow$ Either converts a sequence type to a set or creates a blank set.
2. **dict()** Creates a blank dict or converts a list of tuples (where each tuple has **exactly** two elements) to a dictionary.

Order and Mutability

	Ordered	Mutable
String		
List		
Tuple		
Set		
Dict		

Order and Mutability

	Ordered	Mutable
String		
List		
Tuple		
Set		
Dict		

This is a lot to remember. So memorize it through practice rather than through standard memorization.

Final Reminders

Announcements