Python Basics!

scripting, logic, control

CS101 Lecture #6

2016-09-12

Administrivia

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- Homework #3 is due Friday Sep. 16.

Warmup Quiz

Question #1

```
s = ”74.125.21.147”
i = s.find( ”.” )
x = s[i+1:i+3]
x = x * 2
```

What is the value of x?

A ”125125”

B 250

C ”1212” ⋆

D 24

Composing Functions

Example: Defining functions

```
def pow(a, b):
    y = a ** b
    return y
```

Defining functions

- We define a function with the following:
  - the keyword **def**
  - the name of the function
  - a pair of parentheses
  - a **block** of code

Example: Defining functions

```
def greetings():
    print(”Bom dia!”)
    print(”Bonjour!”)
    print(”Ni hao!”)
    print(”Hello!”)
    print(”Shalom!”)
    print(”Guten tag!”)
    print(”Konichiwa!”)
    print(”As-salamu alaykum!”)
```

header

body

Block

- A section of code grouped together.
- Begins with a `:`.
- Contents of the block are indented:

```
def hello():
    print('hello')
```

Scope

- Variables defined inside of a block are independent of variables outside of the block.
- Variables inside a block do not exist outside of the block.
- Blocks are isolated from the rest of the code!

Example: Defining functions

```
a = 5
def fun():
    a = 3
    b = 4
    a = a + b  %
```

Example: Defining functions

```
a = 5
def fun():
    a = 3
    b = 4
    a = a + b  %
fun() %
```

Example: Defining functions

```
a = 5
def fun():
    a = 3
    b = 4
    a = a + b  %
fun() %
print(a)
```

return

- Functions can return values with the keyword `return`.

```
def three():
    return 3
```

- `return` immediately exits a function.

```
def zero():
  return 0
  print('0')
```

Parameters

- Functions can accept values as parameters (input, arguments).
- These variables are declared in the function header.
- Multiple parameters are separated by commas.

```
def print_message( msg ):
    print( msg )
```

Example

```
def fun(a):
    return a+2

x = fun(2) * fun(3)
```

What is the value of x?

A 6
B 8
C 24
D None of the above. ⋆

Example

```
def fun(m):
    return m.title().swapcase()

x = fun( ”abb”) + fun( ”acab” )
```

What is the value of x?

A ’AbbAcab’
B ’aBBaCAB’ ⋆
C ’abbacab’
D ’ABBACAB’

Example

```
def fun(a,b):
    c = ((a + ' ') * len(b)).title()

x = fun( "ab", "caa" )
```

What is the value of x?

A `'ab ab ab '`
B `'Ab Ab Ab '`
C `'AB AB AB '`
D None of the above. ⋆

Example

```
def fun(a,b):
    c = ((a + ' ') * len(b)).title()
    return c

x = fun( "ab", "caa" )
```

What is the value of x?

A 'ab ab ab '

B 'Ab Ab Ab ' ⋆

C 'AB AB AB '

Boolean Logic

Boolean

- `bool` is a type with two possible values:
  - `True`
  - `False`
- We use these to make decisions.
- Their logic is based on Boolean algebra.
- Operators:
  - `and`
  - `or`
  - `not`

Example: Boolean logic

$$0 < x \leq 10$$

```
(x > 0) and (x <= 10)
```

Boolean operators

and	True	False
True	True	False
False	False	False

True when BOTH inputs are true

or	True	False
True	True	True
False	True	False

True when EITHER input is true

Boolean operators

`not`	Result
`True`	`False`
`False`	`True`

Inverts truth-value

Example

```
def fun():
    return True and False

x = fun() and not (True or False)
```

What is the value of x?

A `True`

B `False` ⋆

Comparison operators

- These produce Boolean output.
  - less than, <
  - greater than, >
  - less than or equal to, <=
  - greater than or equal to, >=
  - equal to, ==
  - not equal to, !=

Example

```
a = 5
b = 3

x = (a < 5) and ((b <= 5) or (a != b))
```

What is the value of x?

A `True`

B `False` ⋆

Example

```
a = 'URSA MAJOR'
b = 'GEMINI'

x = a < b and a[1] != b[-2]
```

What is the value of x?

A `True`

B `False` ⋆

Example

```
def fun(a,b):
    return a<b
a = 3
b = 4
x = fun(b,a)
```

What is the value of x?

A `True`

B `False` ⋆

Conditional Execution

Control flow

- Control flow represents actual sequence of lines executed by processor.
- Conditional execution lets you execute (or not) a block of code based on logical comparison.

Example: *if* statement

```
ans = input( ”Enter a number:” )
if float(ans) < 0:
    print( ”The number was negative.” )
```

`if` statement

- We create an `if` statement as follows:
  - the keyword `if`
  - a logical comparison (results in `bool`)
  - a **block** of code

Alternative execution

- This lets us make decisions in the program!
- We can change program behavior as it executes.

Example: *if* statements

```
ans = input( ”Enter a number:” )
if float(ans) < 0:
    print( ”The number was negative.” )
if float(ans) > 0:
    print( ”The number was positive.” )
if float(ans) == 0:
    print( ”The number was zero.” )
```

Reminders

Reminders

- Homework #3 is due Friday Sep. 16.
- Labs resume next week.