Homework #3 is due Friday Sep. 16.
Warmup Quiz
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
def pow(a, b):
    y = a ** b
    return y
We define a function with the following:
- the keyword `def`
- the name of the function
- a pair of parentheses
- a `block` of code
def greetings():
    print("Bom dia!")
    print("Bonjour!")
    print("Ni hao!")
    print("Hello!")
    print("Shalom!")
    print("Guten tag!")
    print("Konichiwa!")
    print("As-salamu alaykum!")
A section of code grouped together. Begins with a `:`. Contents of the block are indented:

```python
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!
```python
a = 5
def fun():
    a = 3
    b = 4
    a = a + b
    fun()  # print(a)
```
Functions can return values with the keyword `return`.

```python
def three():
    return 3

def zero():
    return 0
    print('0')
```
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 )
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. *
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'
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. ★
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
- `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

\[0 < x \leq 10\]

\[(x > 0) \text{ and } (x \leq 10)\]
## Boolean operators

<table>
<thead>
<tr>
<th>and</th>
<th>True</th>
<th>False</th>
</tr>
</thead>
<tbody>
<tr>
<td>True</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>False</td>
<td>False</td>
<td>False</td>
</tr>
</tbody>
</table>

- **True when BOTH inputs are true**

<table>
<thead>
<tr>
<th>or</th>
<th>True</th>
<th>False</th>
</tr>
</thead>
<tbody>
<tr>
<td>True</td>
<td>True</td>
<td>True</td>
</tr>
<tr>
<td>False</td>
<td>True</td>
<td>False</td>
</tr>
</tbody>
</table>

- **True when EITHER input is true**
## Boolean operators

<table>
<thead>
<tr>
<th>not</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>False</td>
<td>True</td>
</tr>
</tbody>
</table>

Inverts truth-value
def fun():
    return True and False

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

What is the value of $x$?
A True
B False
These produce Boolean output.

- less than, <
- greater than, >
- less than or equal to, <=
- greater than or equal to, >=
- equal to, ==
- not equal to, !=
a = 5
b = 3

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

What is the value of x?
A True
B False ★
**Example**

```python
a = 'URSA MAJOR'
b = 'GEMINI'
x = a < b and a[1] != b[-2]
```

What is the value of $x$?

A True

B False

★
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 ★
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

```python
ans = input( "Enter a number:" )
if float(ans) < 0:
    print( "The number was negative." )
```
We create an `if` statement as follows:
- the keyword `if`
- a logical comparison (results in `bool`)
- a `block` of code
This lets us make decisions in the program!
We can change program behavior as it executes.
Example: *if* statements

```python
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
Homework #3 is due Friday Sep. 16.