

Python Functions

Introduction to Computer Science!



Functioning in Python

```
# my own function!
```

```
def dbl( x ):
```

```
    """ returns double its input, x """
```

```
    return 2x
```

This doesn't look quite right...



Functioning in Python

```
# my own function!
```

```
def dbl( x ) :
```

```
    """ returns double its input, x """
```

```
    return 2*x
```

Some of Python's *baggage*...

Docstrings

They become part of python's **built-in help system**!

With each function be sure to include one that

- (1) describes overall what the function does, and
- (2) explains what the inputs mean/are

keywords

def starts the function
return stops it immediately
and sends back the return value

Comments

They begin with **#**

Essential Definitions and Rules (*do memorize*)

parameter (also called argument)

```
# my own function!
```

comment

```
def dbl ( x ) :
```

function header

docstring

```
""" returns double its input, x """
```

Function
body

```
print "Doubling input ", x
```

```
return 2*x
```

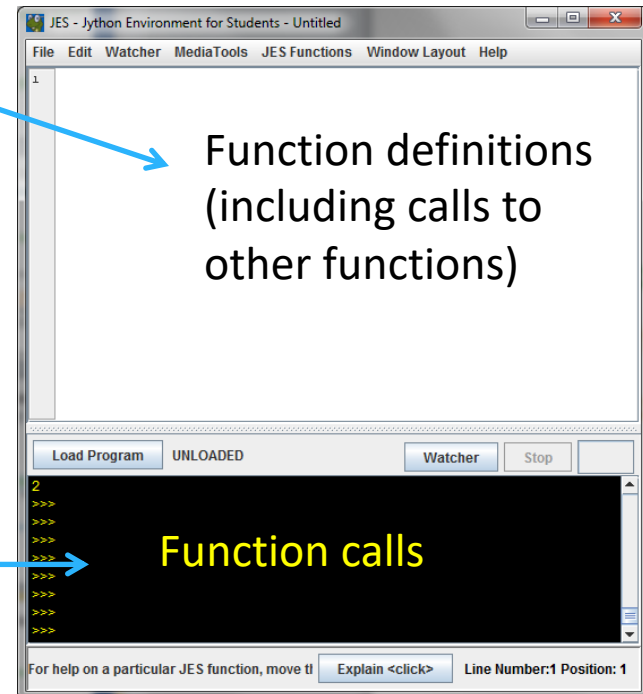
Indentation: All the lines in the function body are indented from the function header, and all to the same degree

Flow of Execution

```
# my own function!
```

```
def dbl( x ):  
    """ returns double its input, x """  
    print("Doubling input ", x)  
    return 2*x
```

```
>>> dbl( 21 )
```



When you call a function, Python executes the function starting at the first line in its body, and carries out each line in order (though some instructions cause the order to change... more soon)

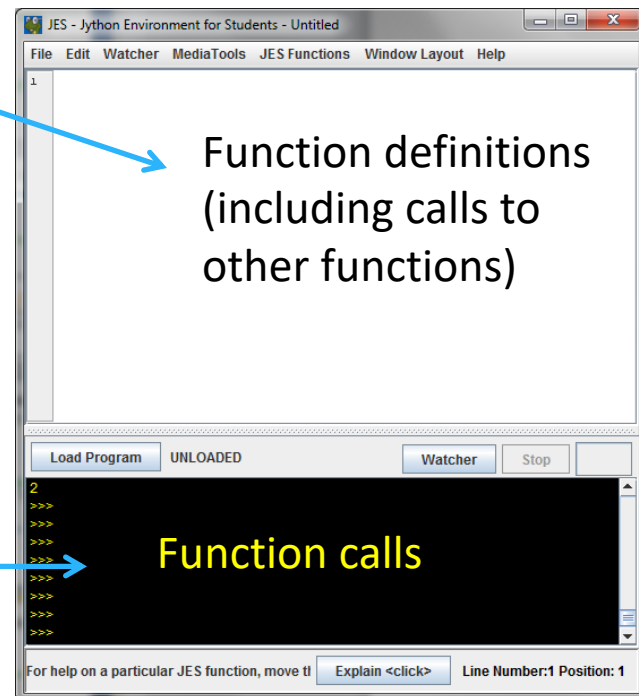
Parameters are special variables

```
# my own function!
```

```
def dbl( x ) :  
    """ returns double its input, x """  
    print("Doubling input ", x)  
    return 2*x
```

x

```
>>> dbl( 21 )
```



When you call a function, the value you put in parenthesis gets put into the “box” labeled with the name of the parameter and is available for use within the function.

Multiple parameters are allowed

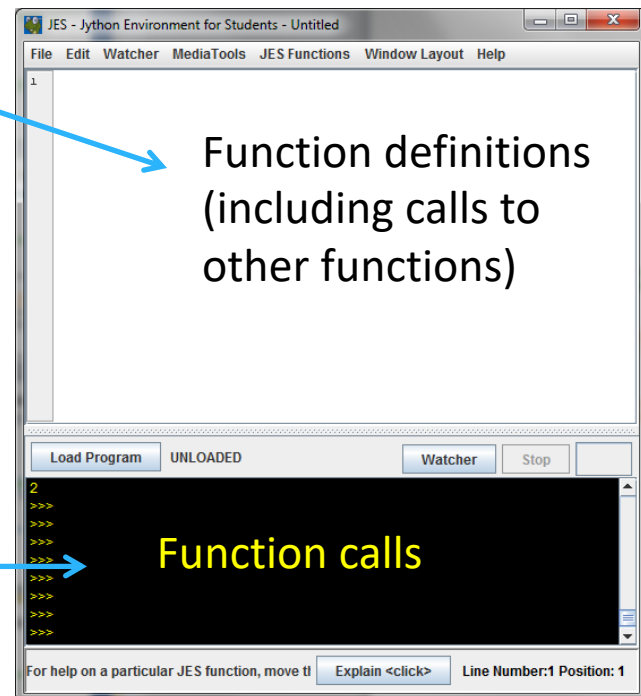
```
# my own function!
```

```
def times( x, y ):  
    """ returns x times y """  
    print("Multiplying ", x, "and", y)  
    return x*y
```

x

y

```
>>> times( 21, 2 )
```



When you call a function, the values you put in parenthesis gets put into the “boxes” labeled with the names of the parameters (in the order in which they are listed)

Which of the following contains a function call?

(1) `type(4.5)`

(2) `def dbl(x):
 return 2*x`

(3) `area(2, 9)`

(4) `print("Hello")`

- A. (3) only
- B. (2) and (3)
- C. (1), (3), and (4)
- D. All of (1), (2), (3), and (4) include a function call

No parameters is also allowed

```
# my own function!
```

```
def fortyTwo( ):  
    """ returns 42 """  
    return 42
```

```
>>> fortyTwo
```



As much as I like 42, I
don't quite like this...

(But you still need parentheses)

```
# my own function!
```

```
def fortyTwo( ):  
    """ returns 42 """  
    return 42
```

```
>>> fortyTwo()
```

Ahh(), much better



No return statement is also allowed

```
# my own function!
```

```
def printName( ):
```

```
    """ prints a message, no return statement"""
```

```
    print("My name is Turtle")
```

```
>>> printName()
```

Functions can call Functions!!



When in doubt, draw it out!

```
def halve( x ):
    """ returns half its input, x """
    return div(x, 2)

def div( y, x ):
    """ returns y / x """
    return y / x

>>> halve( 84 )
```

Functions can call Functions!!

```
def halve( x ):  
    """ returns half its input, x """  
    return div(x, 2)
```

```
def div( y, x ):  
    """ returns y / x """  
    return y / x
```

```
>>> halve( 85 )
```

What does halve(85) return?

- A. 42
- B. 42.5
- C. 0
- D. 0.02352 (i.e., 2 divided by 85)

Print vs. return

Definition "A"

```
def squared(x):  
    return (x * x)
```

Definition "B"

```
def squared(x):  
    print (x * x)
```

Your job: In the following function calls decide which version of squared was used—or whether it is impossible to tell from the output given.

Code	Circle one answer
<pre>>>> squared(7) 49 >>></pre>	<div>A</div> <div>B</div> <div>can't tell</div>

Print vs. return

Definition "A"

```
def squared(x):  
    return (x * x)
```

Definition "B"

```
def squared(x):  
    print (x * x)
```

Your job: In the following function calls decide which version of squared was used—or whether it is impossible to tell from the output given.

```
>>> 2 * squared(3)  
18  
>>>
```

A

B

can't tell

Functions can call Functions!!

```
def halve( x ):  
    """ returns half its input, x """  
    return div(x, 2)  
  
def div( y, x ):  
    """ returns y / x """  
    print y / x  
  
>>> halve( 85 )
```

What does halve(85) return?

- A. 42
- B. 42.5
- C. 0
- D. None

Testing

- You must follow good defensive coding strategies, including testing your code extensively
- In class we will explore using the pytest framework, refer to code written in lecture for more information