

Building our Own Functions

- We create a new function using the **def** keyword followed by optional parameters in parentheses
- We indent the body of the function
- This **defines** the function but **does not** execute the body of the function

```
def print_lyrics():  
    print("I'm a lumberjack, and I'm okay.")  
    print('I sleep all night and I work all day.')
```

`print_lyrics()`:

```
print "I'm a lumberjack, and I'm okay."  
print 'I sleep all night and I work all day.'
```

```
x = 5
```

```
print('Hello')
```

```
def print_lyrics():
```

```
    print("I'm a lumberjack, and I'm okay.")
```

```
    print('I sleep all night and I work all day.')
```

```
print('Yo')
```

```
x = x + 2
```

```
print(x)
```

Hello

Yo

7

Definitions and Uses

- Once we have **defined** a function, we can **call** (or **invoke**) it as many times as we like
- This is the **store** and **reuse** pattern

```
x = 5  
print('Hello')
```

```
def print_lyrics():  
    print("I'm a lumberjack, and I'm okay.")  
    print('I sleep all night and I work all day.')
```

```
print('Yo')  
print_lyrics()  
x = x + 2  
print(x)
```

Hello

Yo

I'm a lumberjack, and I'm okay.

I sleep all night and I work all day.

7

Arguments

- An **argument** is a value we pass into the **function** as its **input** when we call the function
- We use **arguments** so we can direct the **function** to do different kinds of work when we call it at **different** times
- We put the **arguments** in parentheses after the **name** of the function

```
big = max('Hello world')
```



Argument

Parameters

A **parameter** is a variable which we use **in** the function **definition**. It is a “handle” that allows the code in the function to access the **arguments** for a particular function invocation.

```
>>> def greet(lang):
...     if lang == 'es':
...         print('Hola')
...     elif lang == 'fr':
...         print('Bonjour')
...     else:
...         print('Hello')
...
>>> greet('en')
Hello
>>> greet('es')
Hola
>>> greet('fr')
Bonjour
>>>
```

Return Values

Often a function will take its arguments, do some computation, and **return** a value to be used as the value of the function call in the **calling expression**. The **return** keyword is used for this.

```
def greet():  
    return "Hello"  
  
print(greet(), "Glenn")  
print(greet(), "Sally")
```

```
Hello Glenn  
Hello Sally
```

Return Value

- A “fruitful” **function** is one that produces a **result** (or **return value**)
- The **return** statement ends the **function** execution and “sends back” the **result** of the **function**

```
>>> def greet(lang):  
...     if lang == 'es':  
...         return 'Hola'  
...     elif lang == 'fr':  
...         return 'Bonjour'  
...     else:  
...         return 'Hello'  
...  
>>> print(greet('en'), 'Glenn')  
Hello Glenn  
>>> print(greet('es'), 'Sally')  
Hola Sally  
>>> print(greet('fr'), 'Michael')  
Bonjour Michael  
>>>
```


Arguments, Parameters, and Results

```
>>> big = max('Hello world')  
>>> print(big)  
w
```

Argument → 'Hello world'

Parameter

```
def max(inp):  
    blah  
    blah  
    for x in inp:  
        blah  
        blah  
    return 'w'
```

→ 'w'
Result

Multiple Parameters / Arguments

- We can define more than one **parameter** in the **function definition**
- We simply add more **arguments** when we call the **function**
- We match the number and order of arguments and parameters

```
def addtwo(a, b):  
    added = a + b  
    return added
```

```
x = addtwo(3, 5)  
print(x)
```

8

Void (non-fruitful) Functions

- When a function does not return a value, we call it a “**void**” function
- Functions that return values are “fruitful” functions
- **Void** functions are “not fruitful”

To function or not to function...

- Organize your code into “paragraphs” - capture a complete thought and “name it”
- Don’t repeat yourself - make it work once and then reuse it
- If something gets too long or complex, break it up into logical chunks and put those chunks in functions
- Make a library of common stuff that you do over and over - perhaps share this with your friends...

Summary

- Arguments
- Results (fruitful functions)
- Void (non-fruitful) functions
- Why use functions?
- Functions
- Built-In Functions
 - Type conversion (int, float)
 - String conversions
- Parameters

Exercise

Rewrite your pay computation with time-and-a-half for overtime and create a function called `compute_pay` which takes two parameters (`hours` and `rate`).

Enter Hours: 45

Enter Rate: 10

Pay: 475.0

$$475 = 40 * 10 + 5 * 15$$



Acknowledgements / Contributions



These slides are Copyright 2010- Charles R. Severance
(www.dr-chuck.com) of the University of Michigan School of
Information and open.umich.edu and made available under a
Creative Commons Attribution 4.0 License. Please maintain this
last slide in all copies of the document to comply with the
attribution requirements of the license. If you make a change,
feel free to add your name and organization to the list of
contributors on this page as you republish the materials.

Initial Development: Charles Severance, University of Michigan
School of Information

... Insert new Contributors and Translators here

...