CL02:
Introduction to Functions

Housekeeping

- First quiz next Thursday
- Seat assignments will be beforehand!
- Tutoring
  - In FB007 (location subject to change)
  - Monday, Wednesday, and Thursday 5-7 pm
- Office Hours
  - Usual times (check website)
- Practice Problems
  - On course site soon
- Review Session
  - Info will be provided next week!

Review

Intro to Visual Studio Code…

Review: Data Types

- Data Types
  - float (decimal, e.g. 2.0)
  - int (whole number, e.g. 2)
  - str (string of characters, e.g. “Hello”)
  - bool (evaluates to True or False e.g. True, 2 >= 3)
- Check type
  - type()
- Change type
  - str(), float(), int()

Review: str operations

- Strings
  - `str`
  - A sequence (or *string*) of characters
  - Can be denoted using “ ”
- **Subscription** syntax uses square brackets and allows you to access an item in a sequence. **Index numbering starts from 0.**
- To get the length of a string, you can use the **len()** function

Review: Expressions

- Something that *evaluates* at runtime
- Every expression evaluates to a specific typed value
- Examples
  - 1 + 2 * 3
  - 1
  - 1.0 * 2.0
  - “Hello” + “ World!”
  - 1 > 3
- Follows PEMDAS

Simplify: “Hello”[0+1]

Simplify: 2 + 4 / 2 * 2

Simplify:

220 >= int((“1” + “1” + “0”) * 2)

Functions

A function is a sub-program that defines what happens when a function is called.

Lets you generalize problems for different inputs

Help you *abstract away* from certain processes

Can be:

- Built-in
- Imported in Libraries
- DIY - Define in your python file

Abstraction Example

- Ordering a pizza…
  - You order a large cheese pizza
  - You don’t need to think about how they make the crust, got the ingredients, how long they bake it for, etc.
- round(x)
  - You round 10.25 down to 10 by calling round(10.25)
  - You don’t think about line by line how the some program is making this rounding decision

Calling a Function

Function Call: expressions that result in (“return”) a specific type

Common expressions:

- “Making a function call”
- “Using a function”
- “Invoking a function”

Looks like function_name(<inputs>)

E.g. print(“Hello”) , round(10.25), etc.

Examples…

print()

len()

randint()

Defining Functions

- So far we've only used built-in functions or ones imported from other libraries, but you can define your own as well!

- Allows you define solutions in one place of your program and reuse them in other places of your program file.. and even in other program files!

Function Syntax

Syntax for Calling A Built-In Function

function_name(<argument list>)

Syntax for Calling A Built-In Function

function_name(<argument list>)

```
print(“hello”)
round(10.25)
randint(1,7)
randint(1,2+5)
```

Syntax for Defining A Function

```
def function_name(<parameter list>) -> <return type>:
    """Docstring describing function"""
    <what your function does>
```

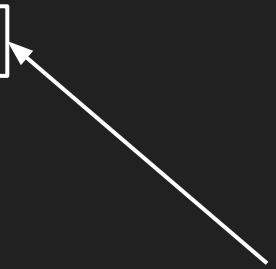
Syntax for Defining A Function

```
def function_name(<parameter list>) -> <return type>:
    """Docstring describing function"""
    <what your function does>
```

Generic inputs that you want your function to use (not specific values)

Syntax for Defining A Function

```
def function_name(<parameter list>) -> <return type>:
    """Docstring describing function"""
    <what your function does>
```



If your function *returns* something, this will be its type.
(You always return objects using the return keyword)

Syntax for Defining A Function

```
def function_name(<parameter list>) -> <return type>:
    """Docstring describing function"""
    <what your function does>
```

Practice: Write a function called sum
that takes two ints: num1 and num2 as inputs
and returns the **sum** of the two numbers.

function name

parameter list

return type

```
1   def sum(num1: int, num2: int) -> int:
2       """Add two numbers together."""
3       return num1 + num2
```

signature

```
1  def sum(num1: int, num2: int) -> int:
2      """Add two numbers together."""
3      return num1 + num2
```

Syntax for Calling A Defined Function

function_name(<parameter0> = <arg0>, <parameter1> = <arg1>, …)

sum(num1 = 11, num2 = 3)

Call vs. Signature

Signature (for defining a function) :

```
def function_name(<parameter list>) -> <return type>:
```

```
def sum(num1: int, num2: int) -> int:
```

Call (for calling a function):

```
function_name(<parameter0> = <arg0>, <parameter1> = <arg1>, …)
```

```
sum(num1 = 11, num2 = 3)
```

Call vs. Signature

```
def sum(num1: int, num2: int) -> int:


sum(num1 = 11, num2 = 3)
```

Call vs. Signature

```
def sum(num1: int, num2: int) -> int:
```

```
sum(num1 = 11, num2 = 3)
```

Call vs. Signature

```
def sum(num1: int, num2: int) -> int:
```

```
sum(num1 = 11, num2 = 3)
```

Call vs. Signature

```
def sum(num1: int, num2: int) -> int:
```

“parameters”

```
sum(num1 = 11, num2 = 3)
```

“arguments”

Call vs. Signature

```
def sum(num1: int, num2: int) -> int:
```

```
sum(num1 = 11, num2 = 3)
```

(evaluates to an int)