FUNCTIONS III (COMPOSING)

ADMIN STUFF

- Reminder that HW2: Personality Quiz Project due Monday!
  - Presentations after Fall Break (but sign up by Monday!)
- Midterm 1 is on Oct 7 in class!

What are functions?

- Functions are named groups of statements/code
- **Function definitions** consist of the function's signature as well as a block of statements called its **body**
  - A **function signature** consists of:
    - the function's name
    - the list of parameters that it takes as input.
  - A function **body** contains the code that executes when you **call** the function

IMPORTANT CONCEPTS OF NOTE

return

- returned values are what a function call is *replaced* with when it is called

scope

- any value declared *inside* of a function is not accessible outside of the function, unless it is returned

EXAMPLE

```
def multiply_two_numbers(a, b):
    product = a * b

print(product)
```

🖨️👇

```
Error: name 'product' is not defined
```

Because the variable `product` no longer exists when we try to print it.
It is **out of scope**.

EXAMPLE

```
def multiply_two_numbers(a, b):
    product = a * b
    return product

print(product)
```

🖨️👇

```
Error: name 'product' is not defined
```

Because the variable `product` no longer exists when we try to print it.
It is **out of scope**.

EXAMPLE

```
def multiply_two_numbers(a, b):
    product = a * b
    return product

print(multiply_two_numbers(2, 3))
```

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```
6
```

Because we return the value of `product`, the **function call** to `multiply_two_numbers(2, 3)` is replaced by the value of `product` at the moment it is returned.

HOW DO I WRITE MY OWN FUNCTIONS?

Step 1: Identify what you want it to do

Step 2: Write some code that does what you want it to do

Step 3: Write a signature that describes what you want to do

Step 4: Combine!

LAST TIME: WRITING A FUNCTION

[C1] (on the left)

Write a function that accepts an integer and then prints out the text `"It's even!"` if the integer is even or `"It's not even!"` if the integer is odd

THEN **[C1] (on the right)**

Rewrite your function so that it **returns** `True` if the integer is even and `False` if the integer is odd

Reminder:
Step 1: Identify what you want it to do
Step 2: Write some code that does what you want it to do
Step 3: Write a signature that describes what you want to do
Step 4: Combine!

PRACTICE: WRITING A FUNCTION [C2]

Write a function called `is_valid` that checks if a string *starts* with a `T` or an `H`.

If it does, your function should return `True`, otherwise it should return `False`

PRACTICE: CALLING A FUNCTION [L2]

Complete the following code snippet that asks a user for a string, `message`, and a number, `num`. If `message` starts with a `T` or an `H` then it should print `message` `num` times, otherwise it should print `"whoops! not a valid string"`

Use your `is_valid` function :)

```
message = input("what is your message? ")
num = int(input("how many times should I print it? "))

# TODO: Finish this code
```

WE CAN CALL FUNCTIONS FROM OTHER FUNCTIONS

```
def count_vowels(to_count):
  counter = 0
  for char in to_count:
    if char in `aeiou`:
      counter += 1
    return counter
```

```
def max_vowels(str1, str2):
  if count_vowels(str1) > count_vowels(str2):
    return str1
  return str2
```

We can break down complex problems into multiple smaller problems using functions

LET'S TRY IT! SEE THE FRONT SIDE OF YOUR WORKSHEET

SOMETIMES IT IS HELPFUL TO SEND THE OUTPUT OF ONE FUNCTION CALL DIRECTLY INTO ANOTHER FUNCTION CALL AS INPUT.

We've done this before:

- range(len("hello"))
- print(mystery(15))

This idea of passing values from one function to another is called **function composition**

Really no different from saving a function into a variable and then using it again, but it's good to know!

EXAMPLE:

```
def count_vowels(to_count):
  counter = 0
  for char in to_count:
    if char in `aeiou`:
      counter += 1
    return counter
```

```
def ratio(num, denom):
  return num / denom
```

```
def vowels_to_len_ratio(my_string):
return ratio(count_vowels(my_string), len(my_string))
```

LET’S TRY IT! SEE THE BACK OF YOUR WORKSHEET