

Return values, multiple assignment

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Returning values from a function

```
import math
def distance(x, y):
    dist = math.sqrt(x**2 + y**2)

dist = 0
x = 3
y = 4
distance(x, y)
print(dist)
```

- What is printed at the end of the program?
- `dist` is not changed in the main symbol table and its value computed in the function "disappears"! How can we get the value to "live on"???

The return keyword

```
import math
def distance(x, y):
    dist = math.sqrt(x**2 + y**2)
    return dist
```

```
dist = 0
x = 3
y = 4
dist = distance(x, y)
print(dist)
```

- Let's make the changes and run the code.

None (1/3)

A **very** common error: attempting to assign a value from a function that DOES NOT return a value:

```
def distance(x, y):  
    dist = math.sqrt(x**2 + y**2)
```

```
# main code  
z = distance(x, y)
```

There is no return statement, so `distance` has nothing to assign to the variable `z` in the main symbol table.

- Python tries its best to avoid crashing and assigns `z` a special value called `None`.
- Python keeps executing the rest of the program.

None (2/3)

- You can assign variables of your own to None: `myVar = None`.
- You can checking if a variable is set to None:
 - `if z is None: ...`
 - or see it printed `print(z)`

None (3/3)

Same problem happens if you tried to assign a value to a function call that has an "empty" return statement, but doesn't return anything:

```
def distance(x, y):  
    return
```

```
# main code  
z = distance(x, y)
```

Example: Returning values to other functions

Let's write a program that prints the happy birthday song.

Simultaneous assignment

Python lets you return COPIES of more than one variable value from a function symbol table.

```
def distance(x, y):  
    dist = math.sqrt(x**2 + y**2)  
    absDiff = abs(x - y)  
    return absDiff, dist  
# main code  
d1, d2 = distance(3, 4)
```

What values are d1 and d2 assigned?

- What about dist and absDiff by the end of the program?

Symbol table and return values

Example: Calculating car's miles-per-gallon (MPG).