[220] Using Functions

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Learning Objectives Today

How to call functions
- input/output

Modules:
- import styles
- attribute operator (the ".")
- math module

Inspection:
- discover functions in a module
- learn what function does

Please read Ch 3 of Think Python

make a battleship game!

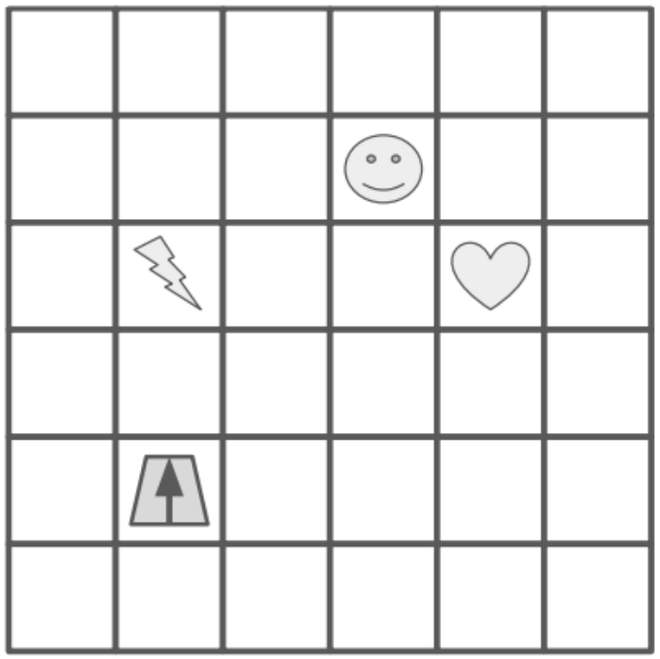
Main Code:

1. Put 2 in the “moves” box
2. Perform the steps under “Move Code”, then continue to step 3
3. Rotate the robot 90 degrees to the right (so arrow points to right)
4. Put 3 in the “moves” box
5. Perform the steps under “Move Code”, then continue to step 6
6. Whatever symbol the robot is sitting on, write that symbol in the “resut” box

Move Code:

A. If “moves” is 0, stop performing these steps in “Move Code”, and go back to where you last were in “Main Code” to complete more steps
B. Move the robot forward one square, in the direction the arrow is pointing
C. Decrease the value in “moves” by one
D. Go back to step A

Functions are like “mini programs”, as in our robot worksheet problem



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“Move Code” is a function

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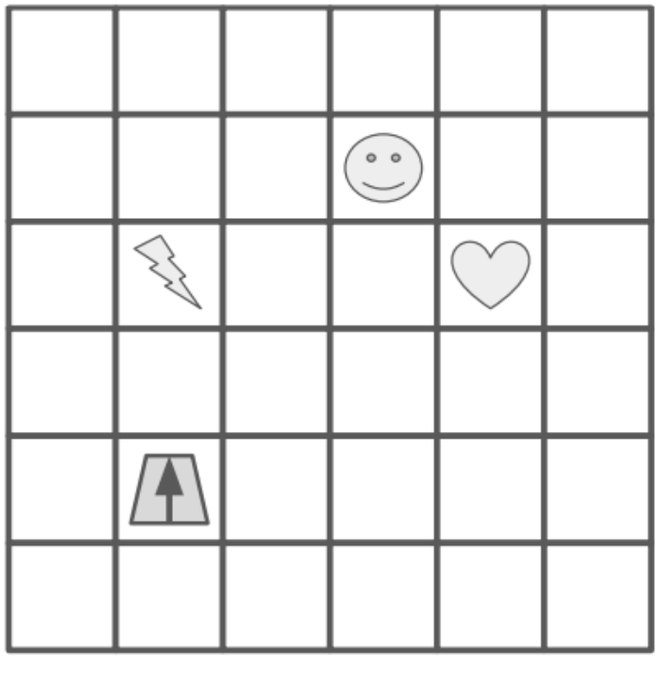

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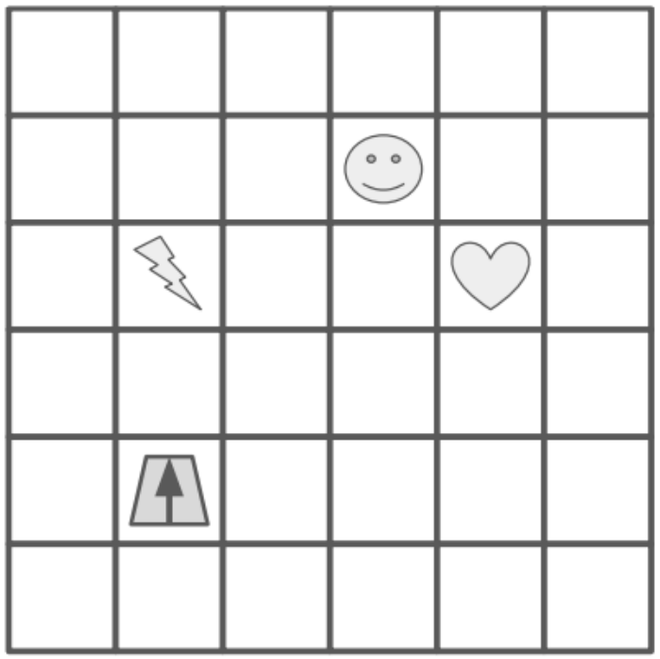

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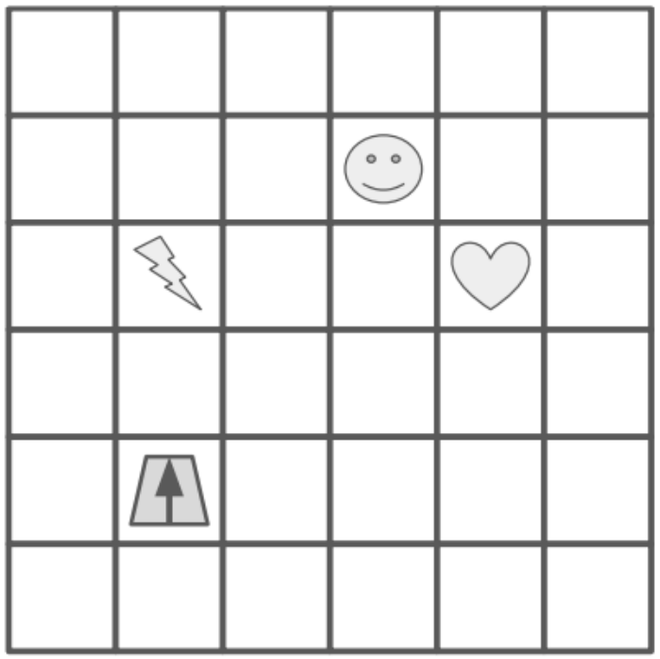

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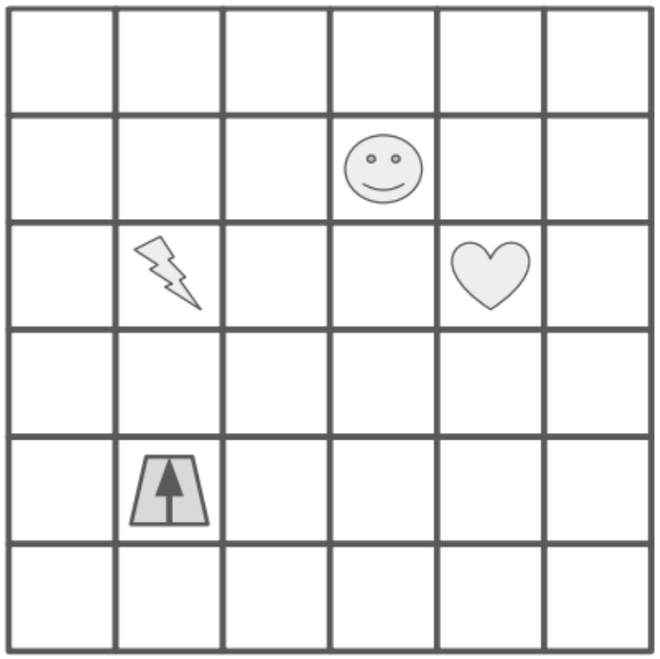

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next lecture, we'll learn how to write our own new functions

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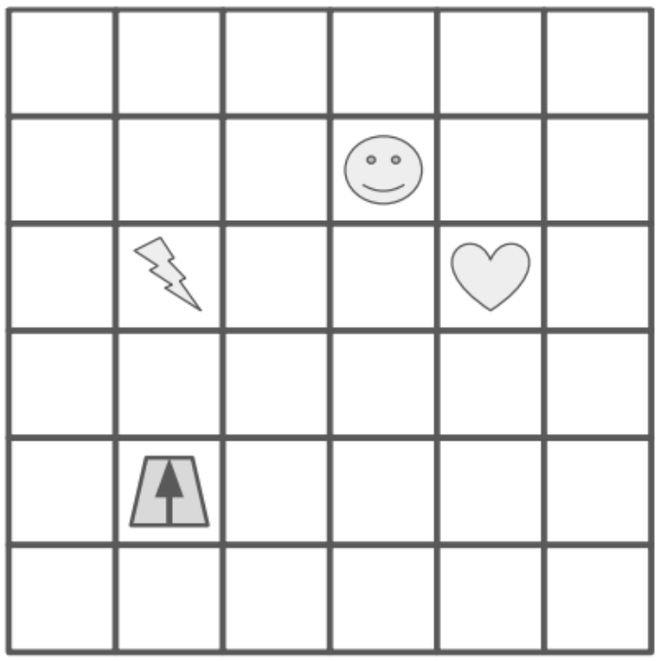


Vocabulary

- ...

General Function Concepts

Some Code

...

code

...

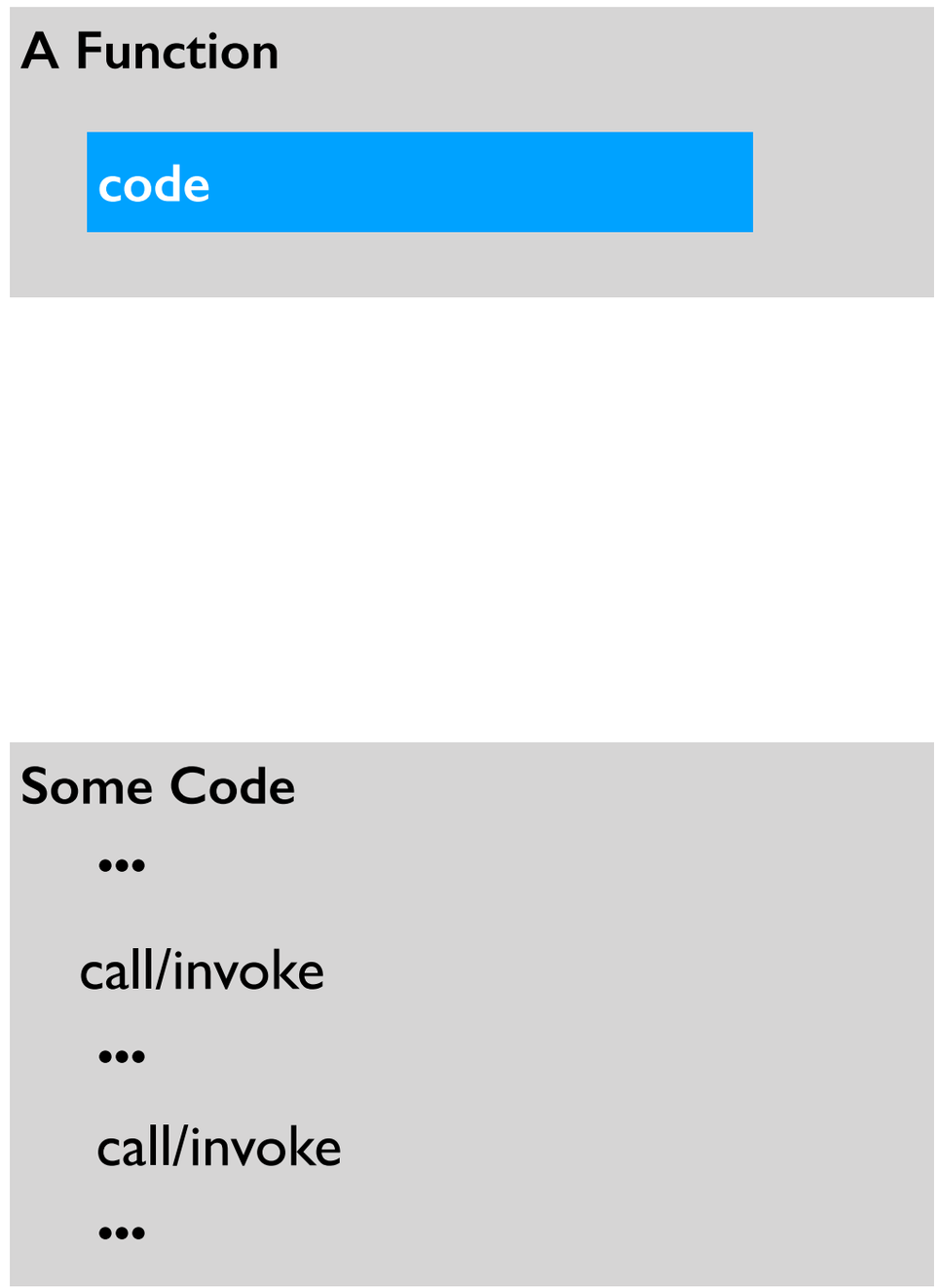
code

...

Yikes, copied code!

Vocabulary

- **refactor**: change organization of code (e.g., to avoid repetition)



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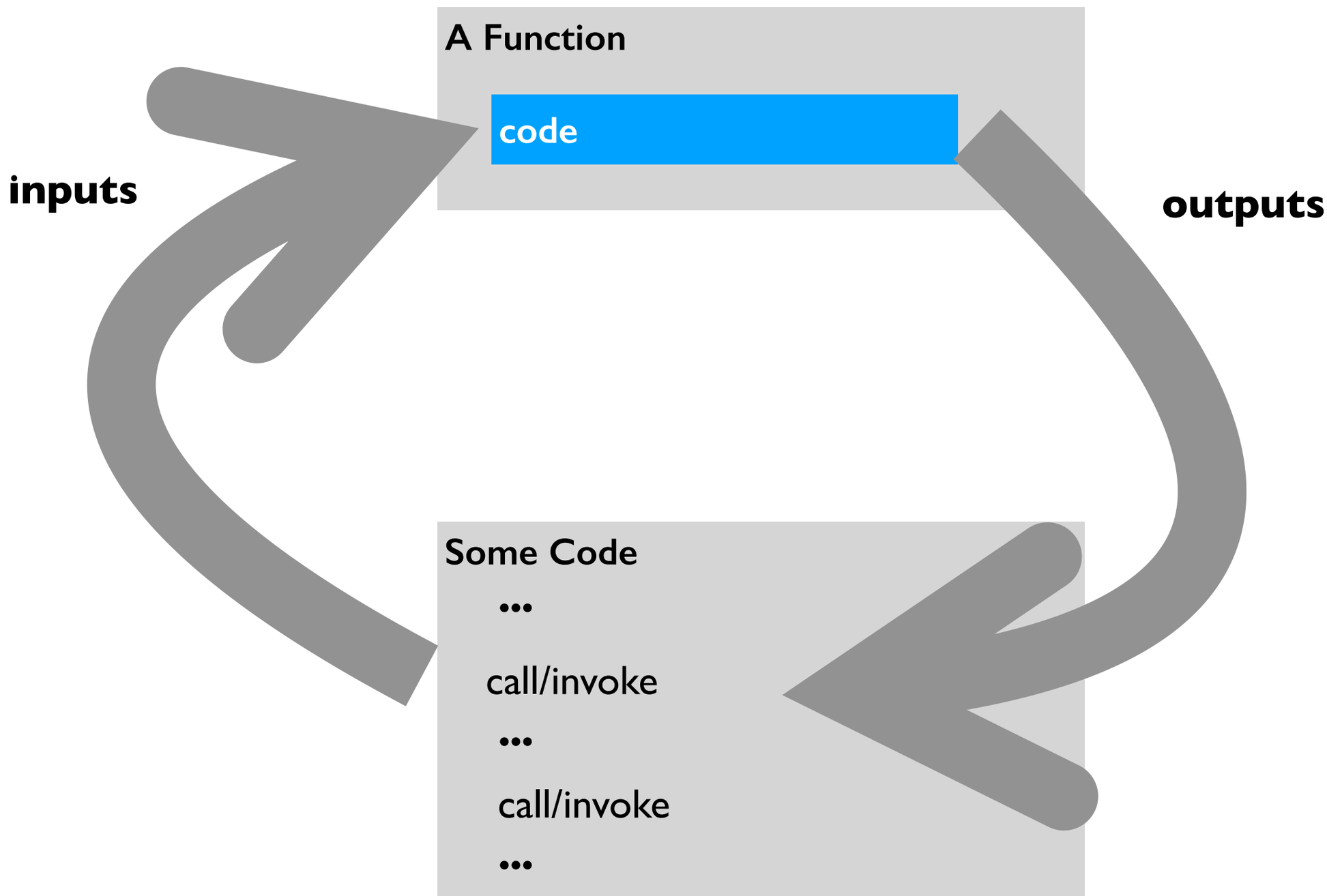

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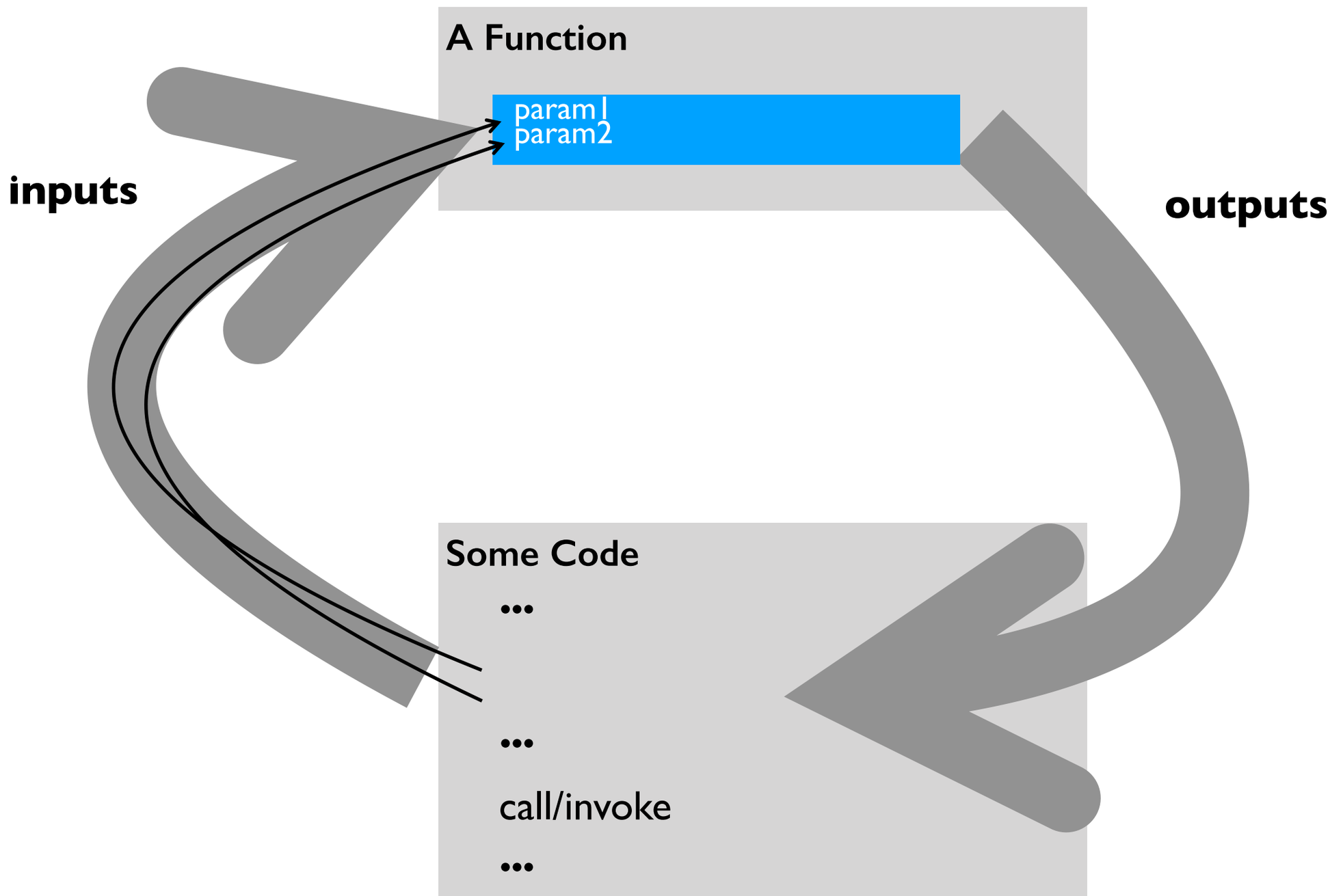

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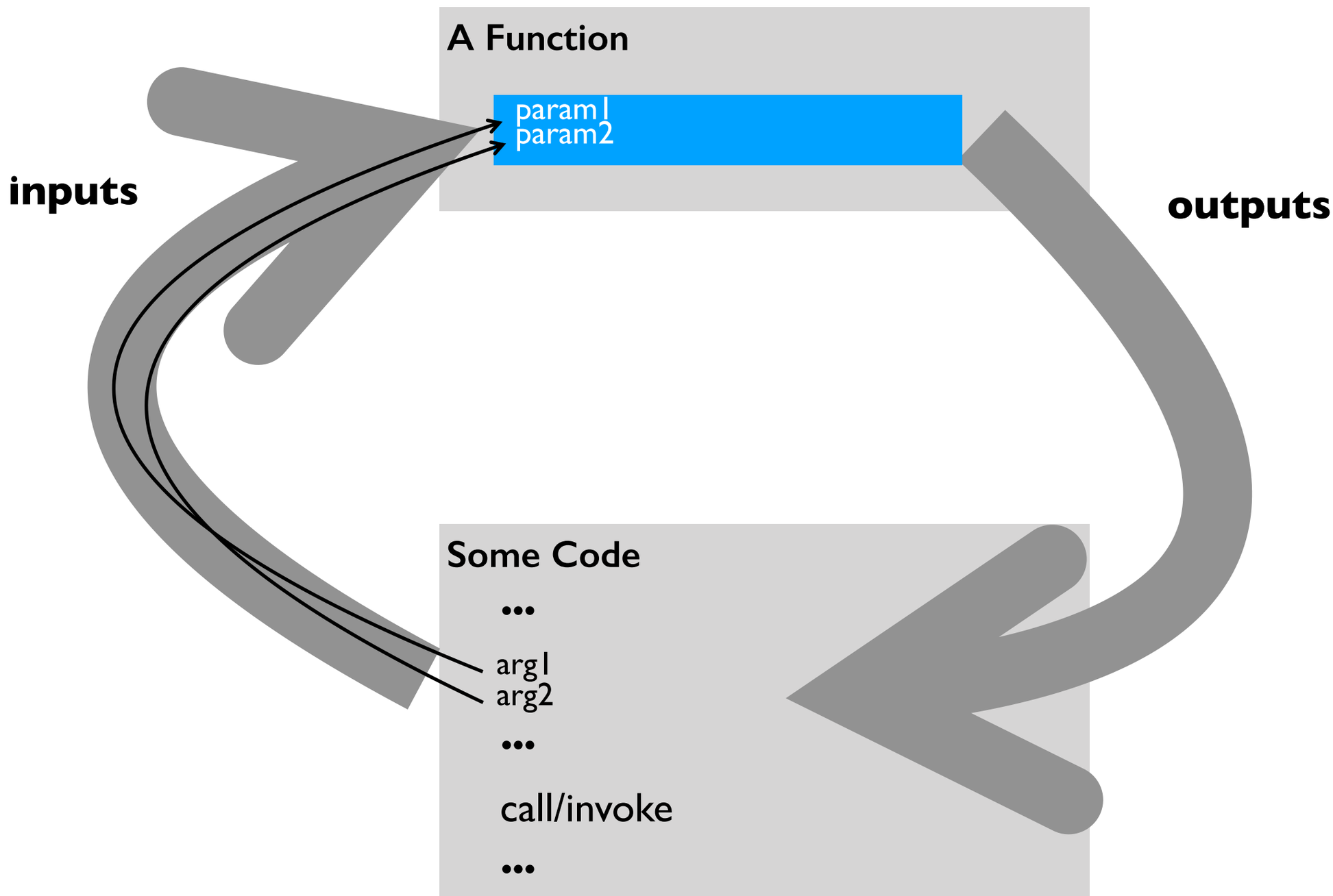

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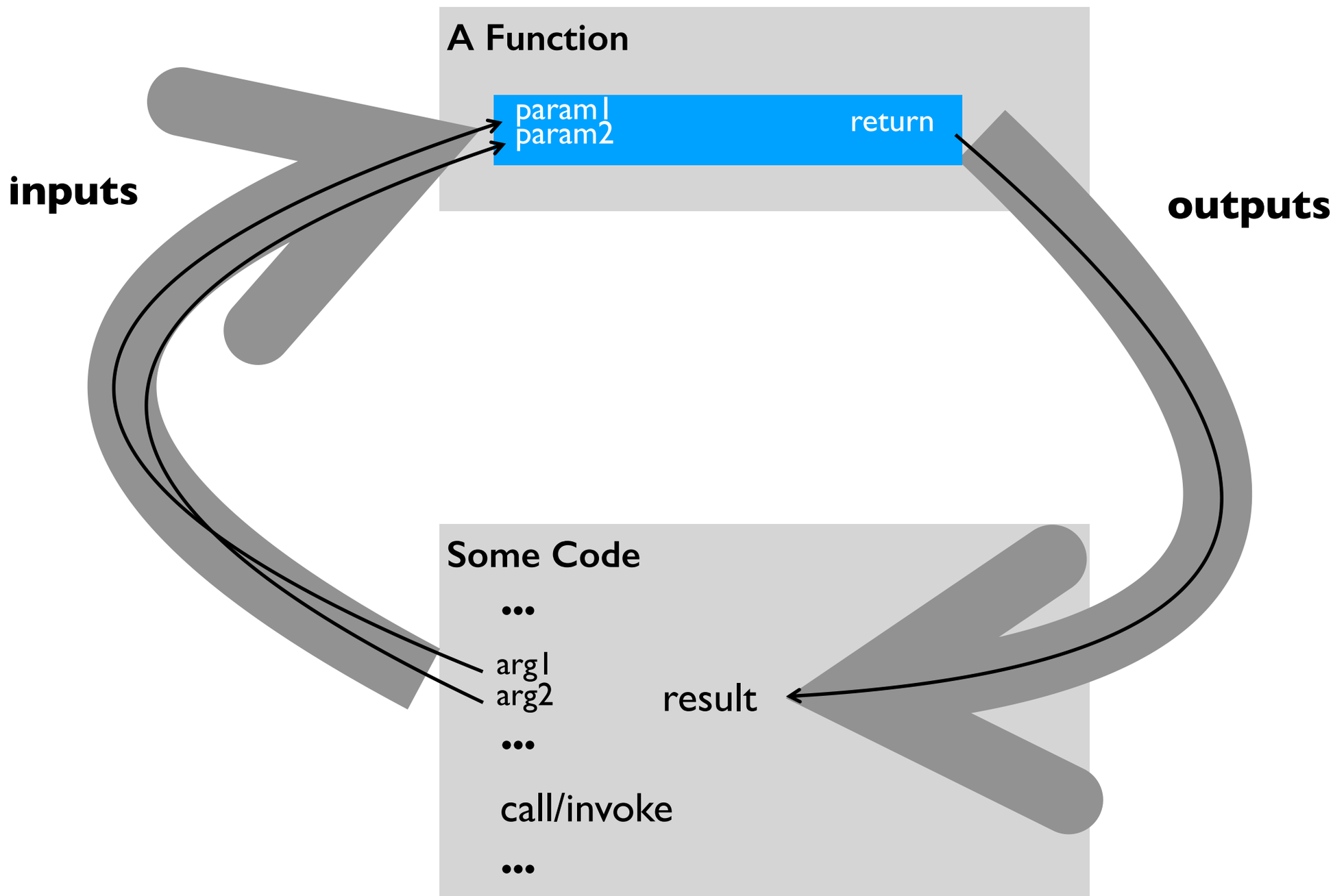

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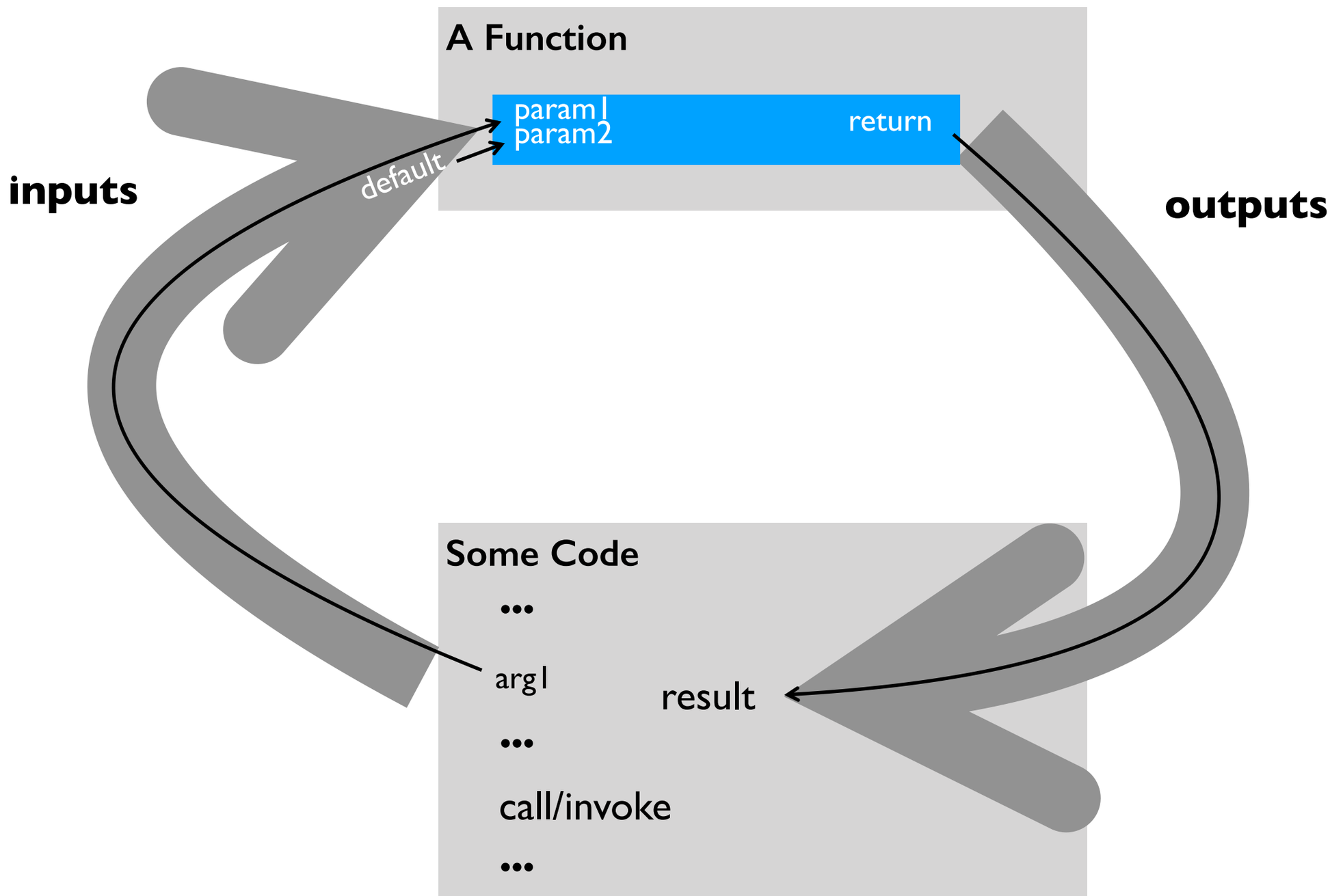

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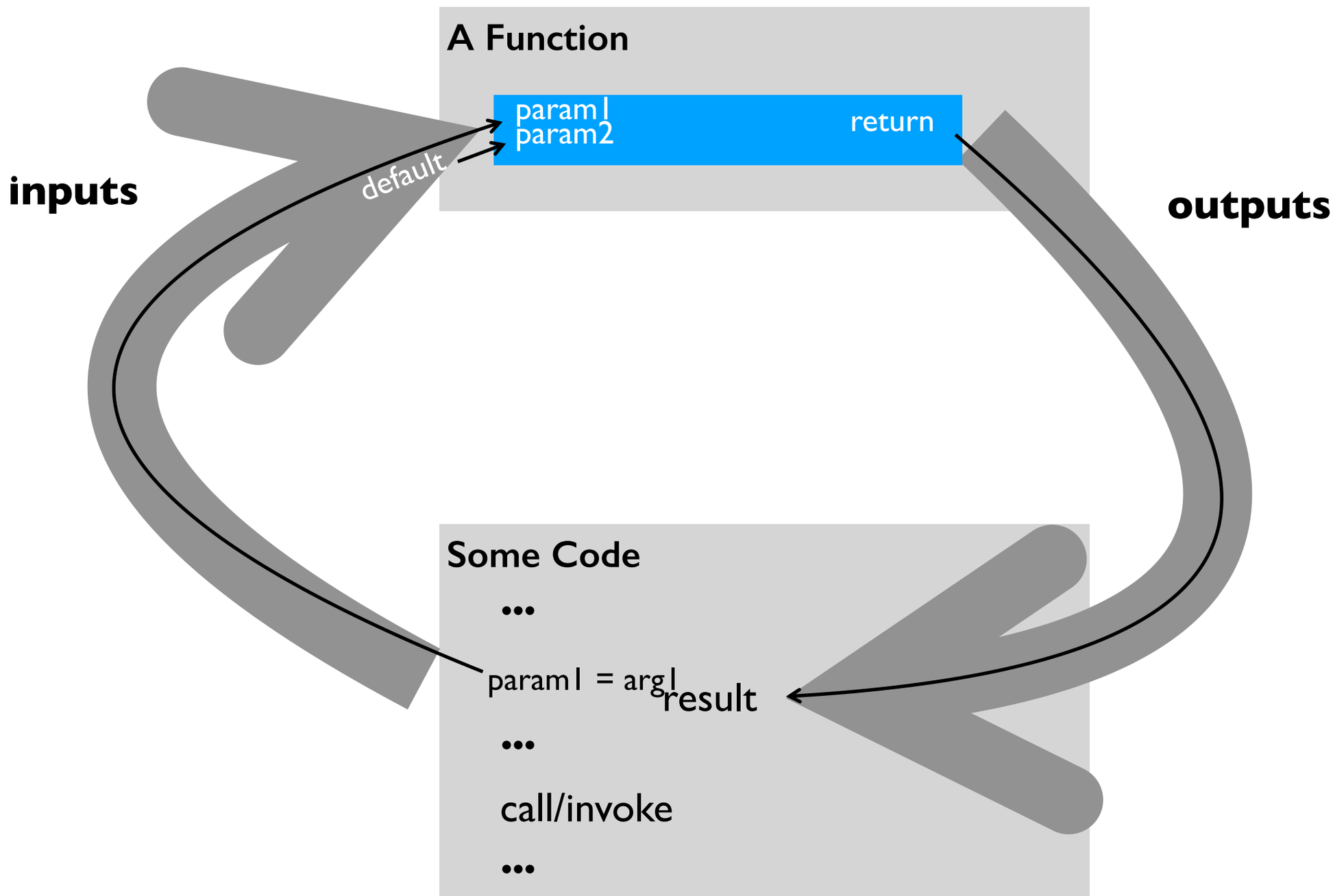
- **named/keyword argument**: argument explicitly tied to a parameter



Calling/Invoking a Function in Python

```
print(“hello”)
result = f(x)
```

Calling/Invoking a Function in Python

```
print("hello")
result = f(x)
```

ALWAYS: function's name

Calling/Invoking a Function in Python

```
print(“hello”)
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```

ALWAYS: function’s name

ALWAYS: followed by parentheses

Calling/Invoking a Function in Python

arguments

print(“hello”)

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ALWAYS: function’s name

ALWAYS: followed by parentheses

SOMETIMES: with one or more arguments

Calling/Invoking a Function in Python

print(“hello”)

result = f(x)

return value

ALWAYS: function’s name

ALWAYS: followed by parentheses

SOMETIMES: with one or more arguments

SOMETIMES: producing a result

Calling/Invoking a Function in Python

```
print(“hello”, “world”)
x = input()
```

ALWAYS: function’s name

ALWAYS: followed by parentheses

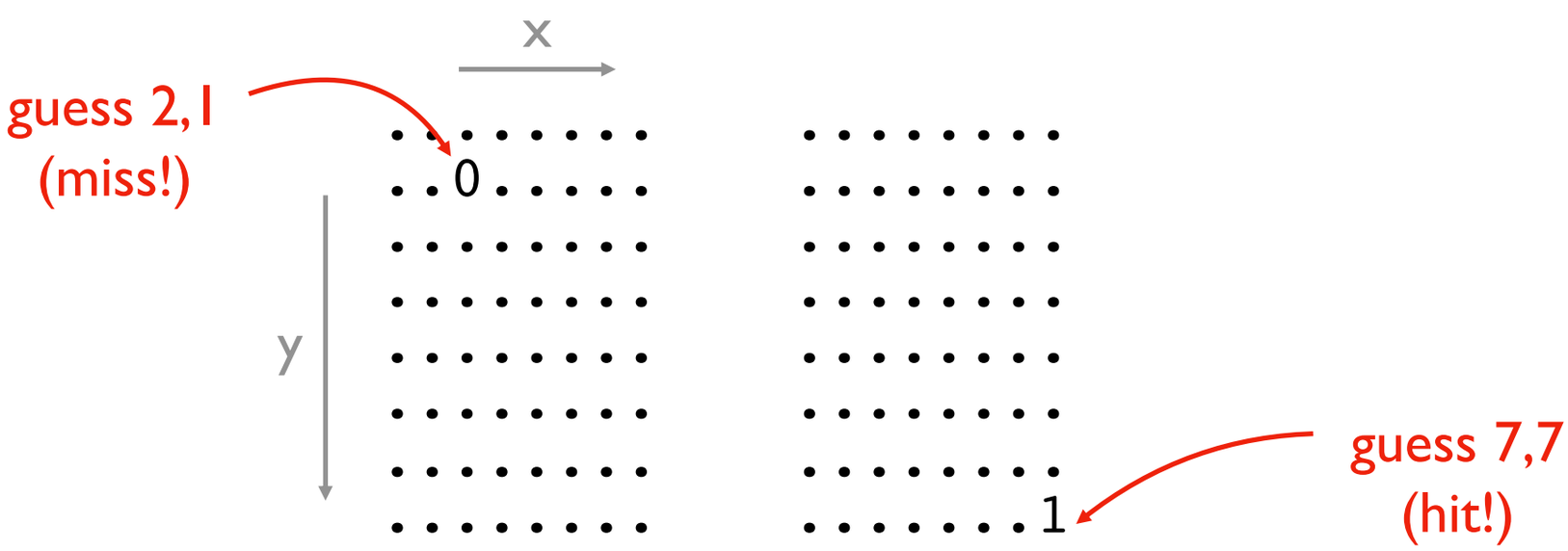
SOMETIMES: with one or more arguments

SOMETIMES: producing a result

demos

Battleship Demo (Version 1)

https://boardgamegeek.com/image/288374/battleship



Version 1 (MVP)

- 1 ship, 1 guess
- ship is 1 space
- fixed position
- top/left is 0,0
- horrible graphics

Types of modules (collections of functions)

1. built into Python (__builtins__ module). print(), type(), ...
2. pre-installed with Python (e.g., math). sin, log, max, ...
3. installed with pip (e.g. jupyter)
4. written yourself (a .py file)

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```
from math import *
```

OR

```
from math import log
```

OR

```
import math
```

demos

Battleship Demo (Version 2)

https://boardgamegeek.com/image/288374/battleship

Version 1 (MVP)

- 1 ship, 1 guess
- ship is 1 space
- fixed position
- top/left is 0,0
- horrible graphics

Version 2

- larger ship
- multiple ships
- random locations

guess 2,1
(miss!)

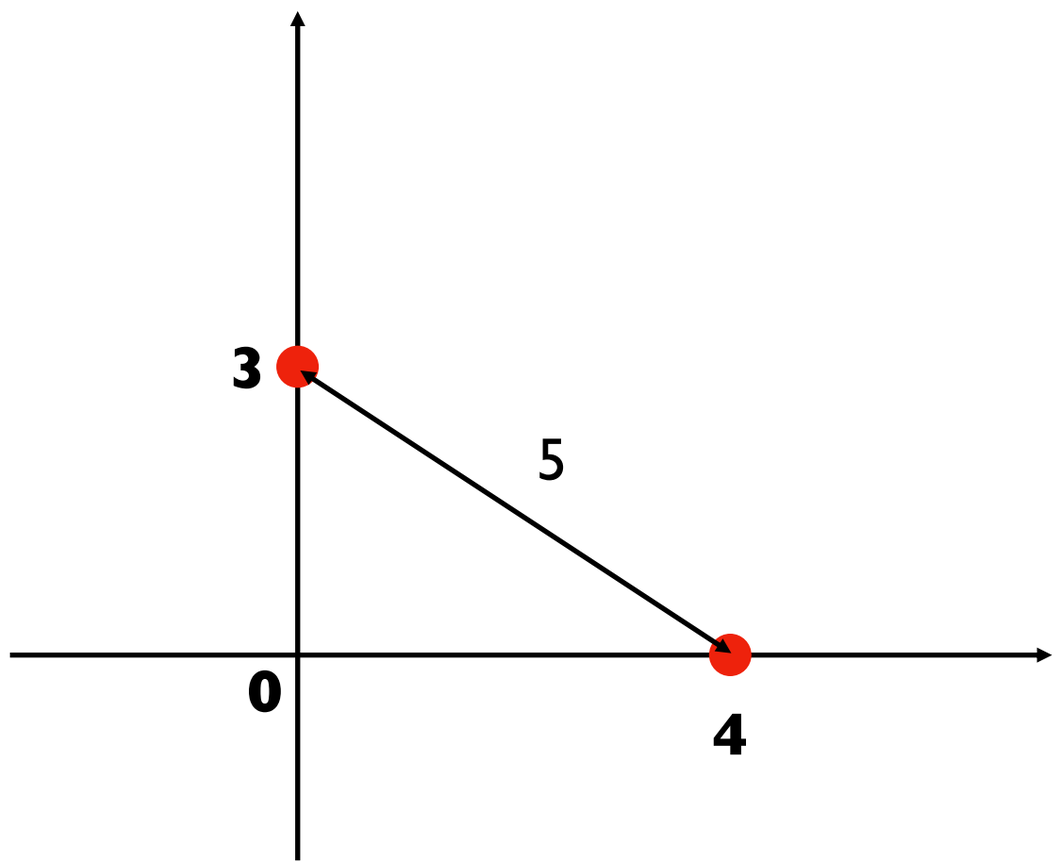
```
. . . . . . . .
. . 0 . . . . .
. . . . . . . .
. . . . . . . .
. . . . . . . .
. . . . . . . .
. . . . . . . .
. . . . . . . .
```

```
. . . . . . . .
. . . . . . . .
. . . . . . . .
. . . . . . . .
. . . . . . . .
. . . . . . . .
. . . . . . . .
. . . . . . 1 .
```

guess 7,7
(hit!)

time permitting

Demo: Polar Coords Distance



point 1: distance 3 at angle 90°

point 2: distance 4 at angle 0°

distance: 5

time permitting