FUNCTIONS:

INTRODUCTION

Overview:

- learn how to define and use functions
- distinguish local and global scope

Functions

```
def mult_div(a, b):
    """ multiply & divide two numbers """
    result = a * b, a / b
    return result
```

- *def* keyword, name and parameters
- *doctring* - describes function
- statement(s) to compute
- optional *return* statement

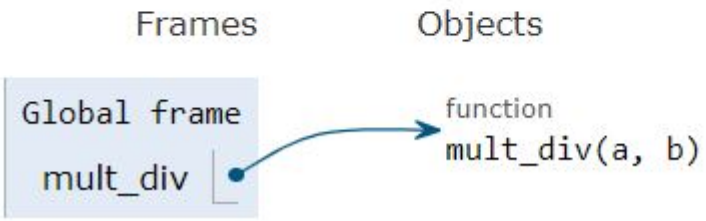
Docstring

```
def mult_div(a, b):
    """ multiply & divide two numbers """
    result = a * b, a / b
    return result

print(mult_div)
print(mult_div.__doc__)
```

Print output (drag lower right corner to resize)

```
<function mult_div at 0x7f76bd624f28>
 multiply & divide two numbers
```

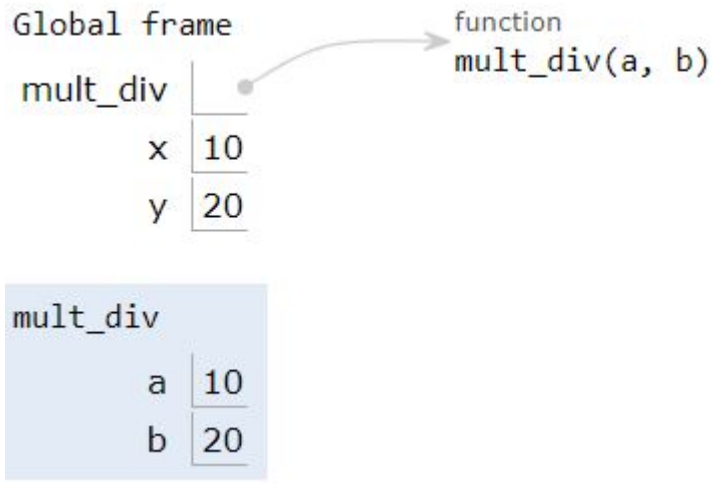


- use *__doc__* method

Parameter Binding

```
def mult_div(a, b):
    """ multiply & divide two numbers """
    result = a * b, a / b
    return result

x = 10; y = 20
result = mult_div(x, y)
```

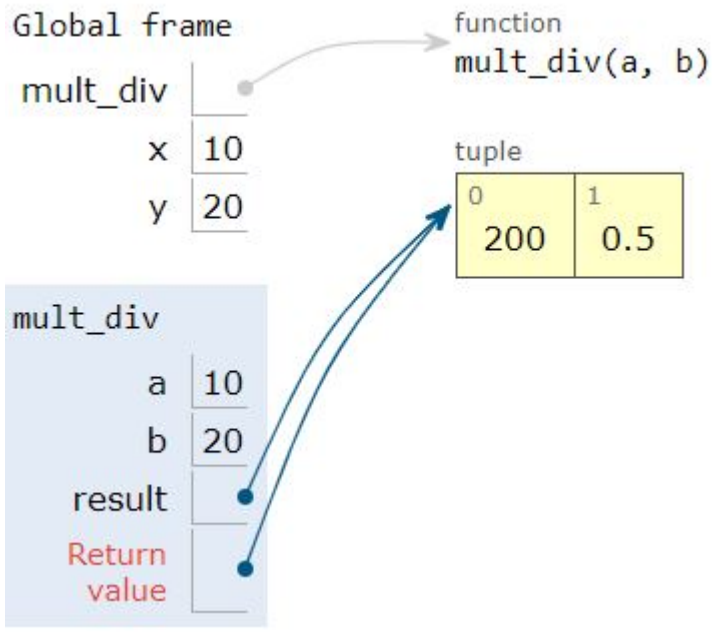


- inputs passed via a tuple

Local Scope

```
def mult_div(a, b):
    """ multiply & divide two numbers """
    result = a * b, a / b
    return result

x = 10; y = 20
result = mult_div(x, y)
```

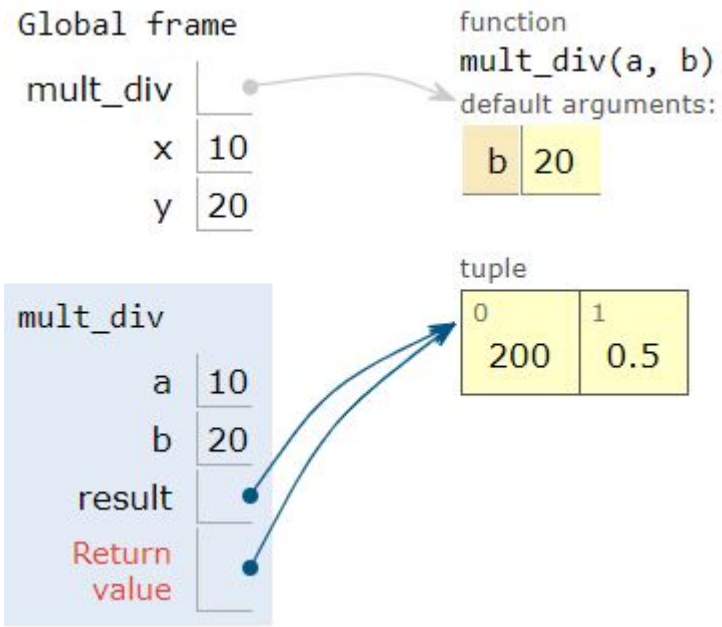


- *result* inside function

Returning Results

```
def mult_div(a, b):
    """ multiply & divide two numbers """
    result = a * b, a / b
    return result

x = 10; y = 20
result = mult_div(x, y)
```

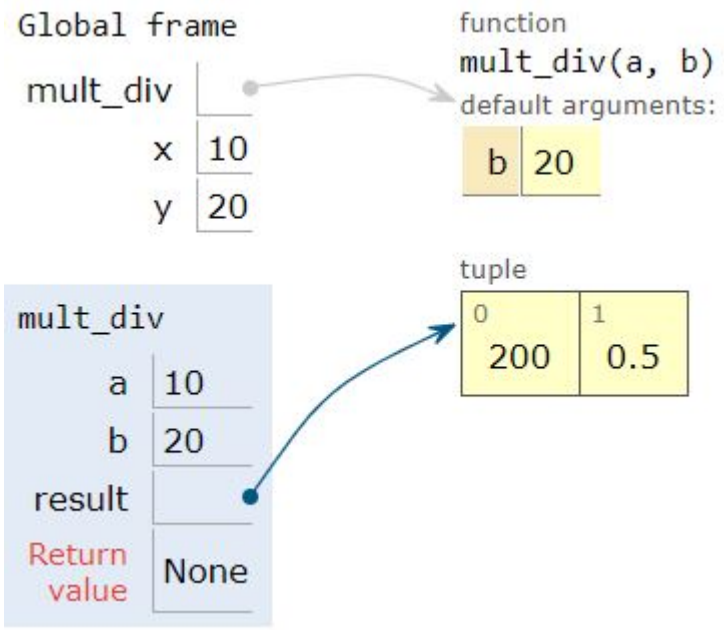


- results passed via a tuple

Missing *return*

```
def mult_div(a, b):
    """ multiply & divide two numbers """
    result = a * b, a / b

x = 10; y = 20
result = mult_div(x, y)
```



- result is always *None*

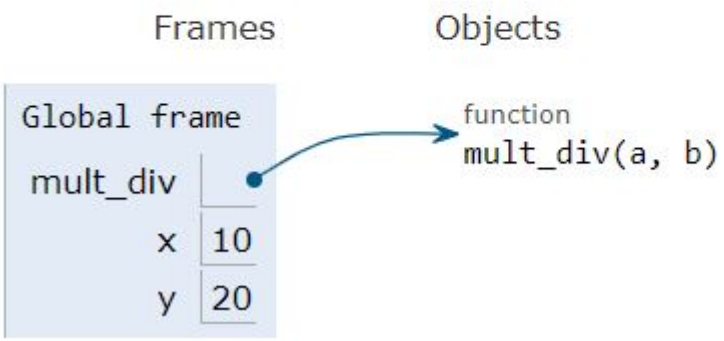
Functions as Objects

```
def mult_div(a, b):
    """ multiply & divide two numbers """
    result = a * b, a / b
    return result

x = 10; y = 20
print(mult_div)
print(mult_div(x, y))
```

Print output (drag lower right corner to resize)

```
<function mult_div at 0x7fb4d5999f28>
(200, 0.5)
```



- pass functions as arguments

Exercise(s):

- an arithmetic progression $A(a, d)$ is a sequence of numbers:

$$x_1 = a$$
$$x_2 = x_1 + d = a + d$$
$$\ldots\ldots$$
$$x_n = x_{n-1} + d = a + (n-1)d$$

- write a function $f(a, d, n)$ to return a list of first n values in $A(a, d)$
- generate a list of first 10 values for $a = 5$ and $d = 2$

Exercise(s):

- a geometric progression $G(b, q)$ is a sequence of numbers:

$$y_1 = b$$
$$y_2 = y_1 \cdot q = b \cdot q$$
$$\ldots\ldots$$
$$y_n = y_{n-1} \cdot q = b \cdot q^{n-1}$$

- write a function $g(b, q, n)$ to return a list of first n values in $G(b, q)$
- generate a list of first 10 values for $b = 5$ and $d = 2$