

return

Statements



The return Statement

- General form:

return <expression>

- Every function definition with a return type other than None must have at least one **return** statement

- The return expression's data type must match the return type of its function

```
def max2(x: int, y: int) -> int:  
    if x > y:  
        return x  
    else:  
        return y
```

The `return` Statement

- **IMPORTANT:** When control reaches *any* `return` statement in the function definition, then the function call is complete.
- The computer evaluates the expression and sends the **Return Value** immediately back to the **Return Address**.
- Control jumps back to the Return Address and no additional statements in the function will evaluate in this call.
- ***This is ALWAYS, ALWAYS, ALWAYS true!***

Return Semantics: Consider the following function

- Consider an alternate implementation of the `max` function
- *Is it still correct?*
What happens when `y` is greater than `x`?
- Notice there is no else branch.

```
def max2(x: int, y: int) -> int:  
    if x > y:  
        return x  
  
    return y
```

Returning from a function

L1. result: int = max2(10, 5);

1

4

1. The `max` function is called with arguments: `10, 5`
2. The processor jumps to `max` function.
 - if `x > y` evaluates to `True`, enters `then block`
3. `return` Statement encountered. Expression `a` evaluates to `10`. The function call is complete!
4. Control sends Return Value (`9`) back to Return Address (`L1`).
5. `max(10, 5)` evaluates to `10` and is assigned to `result`.

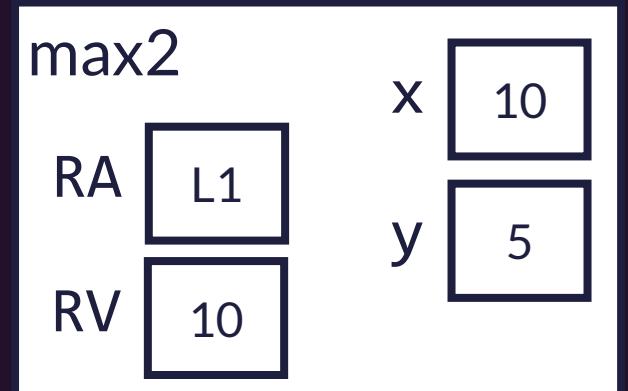
```
def max2(x: int, y: int) -> int:
```

```
    2 if x > y:
```

```
        return x 3
```

```
    return y
```

Stack Memory:



Every **function call** *returns only once*

- A function definition *may* have many **return** statements, however, for any given call only one return statement will evaluate
- A function *may* contain a **return** statement inside of a loop, however, as soon as control encounters it, it will stop and return immediately
- Generally: as soon as the computer reaches *any* return statement within a function, that function call completes