Return Statements !

in Function Calls

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

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

    return y
```

Returning from a function

①

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

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 max(x: int, y: int) -> int:
②  if x > y:
        return x ③

    return y
```

Stack Memory:

max		
		x | 10
RA | L1		
		y | 5
RV | 9		
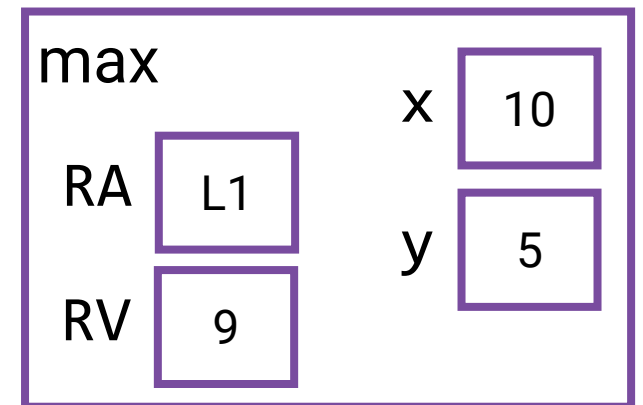
Every function call *returns only one value*

- A function definition *may* have many `return` statements, however, for any given call only one return statement will be evaluated

- 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 is completed.