

Lecture 10, 9 September 2025

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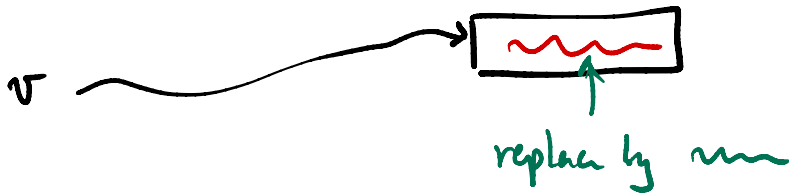
Programming and Data Structures with Python

Mutable & immutable values

Lists, dictionaries are mutable

Everything else is immutable

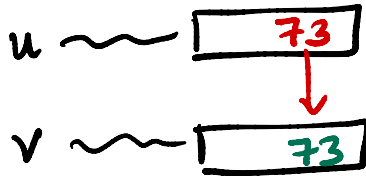
Can be modified "in place"



Assignment

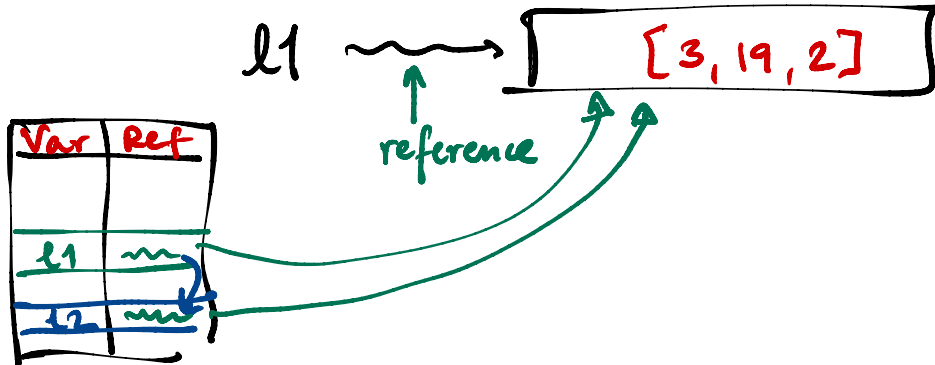
$v = u$

Immutable Value is copied

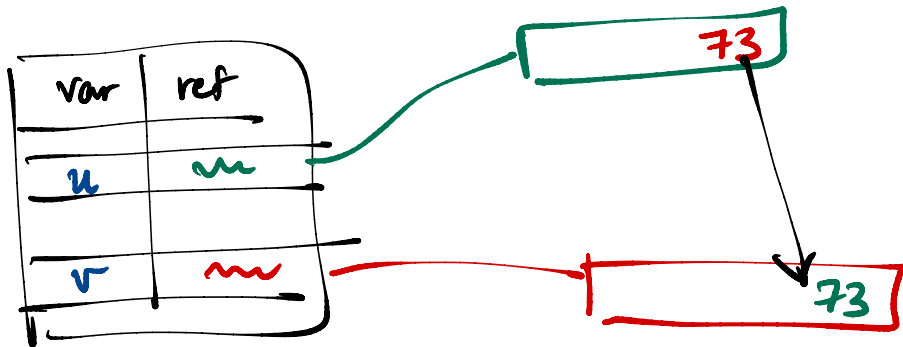


$l1 = l2$

"Reference" is copied



$v = u$ Immutable



"Call by value"

"Call by reference"

|| Transfer an argument
to a function

Garbage collection - reclaim unused
space in memory

zerorow = [0, 0, 0]

zeromat = [zerorow, zerorow, zerorow]

zerorow ~ [0, 0, ³³0]

zeromat ~ [zerorow, zerorow, zerorow]

Equality

$x == y$

means what?

values are equal

$l1 = [1, 2]$

$l2 = l1$

$l3 = l1[:]$

$l1 \sim [1, 2]$

$l2 \sim$

$l3 \sim [1, 2]$

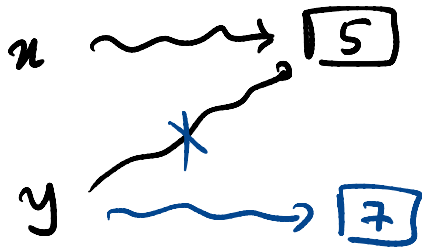
Distinguish this?

$l1 == l2 ? \checkmark$ $l1 == l3 ? \checkmark$

$$x = 5$$

$$y = x$$

$$y = 7$$



Mutability and dictionary keys

$d = \{ \}$

:

$d[k] = v$

↑

any k is allowed

Because
of computing
 $\text{hash}(k)$

Cannot use a list as a key
Can use tuple

$d[(\text{name}, \text{dob})] = v$ ✓

$d[[\text{name}, \text{dob}]] = v$ ✗

↑

so long as it is immutable