

Lists

List Creation

```
num_list = [1,3,7,8,9]
```

```
str_list = ["How", "are", "you?"]
```

```
mix_list = ["Mike", 29, "Male", "Student", 1.83]
```

```
a_list = ["b"] # a list of one item
```

```
empty = [] # an empty list
```

```
name_of_list = [ item1, item2, ... ]
```



List items separated by ,

Box-and-pointer notation

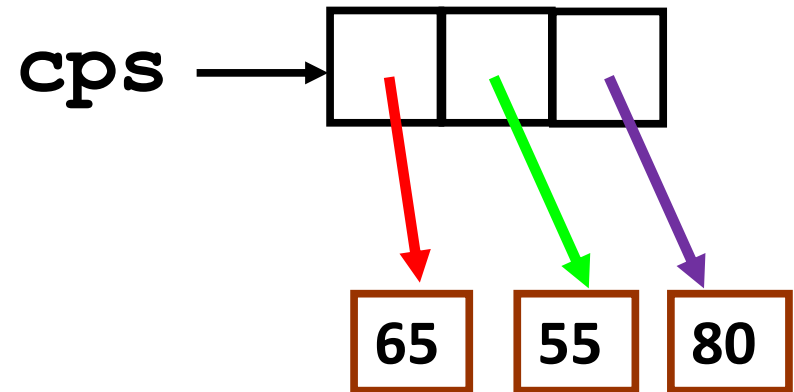
A way to visualize list

`cps = [65, 55, 80]`

is drawn:

Variable `cps` points to list

Numbers are outside the list, not inside

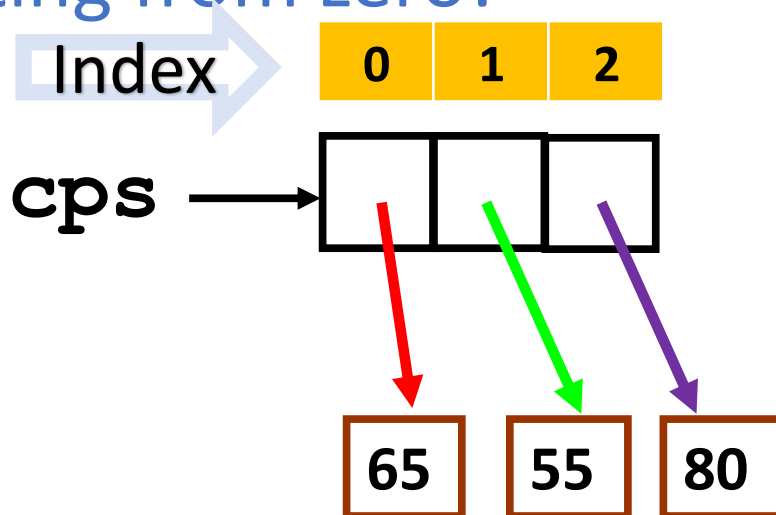


Selecting a Element of a List

```
>>> cps = [65, 55, 80]
>>> cps[0]
65
>>> cps[2]
80
>>> cps[3]
..... IndexError: list index out of range
```

Index is used to select a element from a List

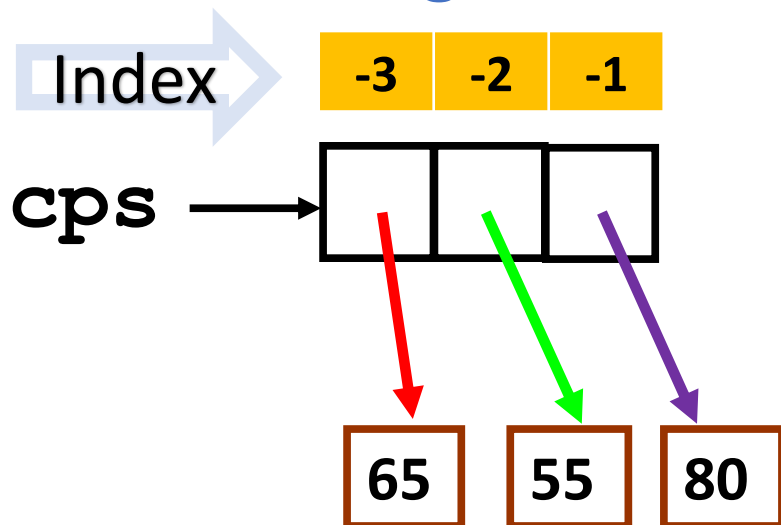
Start counting from zero!



Negative Index

```
>>> cps = [65, 55, 80]
>>> cps[-1]
80
>>> cps[-2]
55
```

Negative Index: count from the end
Start counting from -1



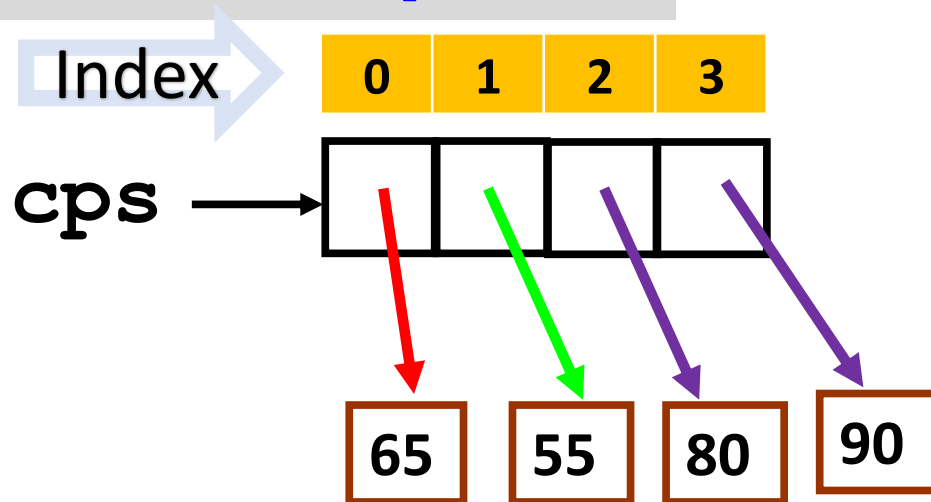
Select part of a List (Extra)

```
>>> cps = [65,55,80,90]
>>> cps[0:2]
[65, 55]
>>> cps[1:-1]
[55, 80]
>>> cps[2:]
[80, 90]
>>> cps[:3]
[65, 55, 80]
>>> cps[:]
[65, 55, 80, 90]
```

Format:

list_name[n:m]

Return part of the list starting from position **n** and up to, *but not including*, position **m**



Size of a String/List

```
>>> len("Mike")
4
>>> len("123")
3
>>> a_list = ["a", "b", "c"]
>>> len(a_list)
3
>>> b_list = []
>>> len(b_list)
0
```

returns the number
of **characters** in a
string

returns the number
of **items** in a **list**

Join a list with another list

```
>>> cp1 = [65, 55, 80, 90]
>>> cp2 = [20, 30]
>>> cp3 = cp1 + cp2
>>> cp3
[65, 55, 80, 90, 20, 30]
>>> cp4 = cp3[2:] + [10,5]
>>> cp4
[80, 90, 20, 30, 10, 5]
>>> cp5 = cp3[:3] + cp4[4:]
>>> cp5
[65, 55, 80, 10, 5]
>>> cp6 = cp2 + [5] + cp5[:3]
>>> cp6
[20, 30, 5, 65, 55, 80]
```

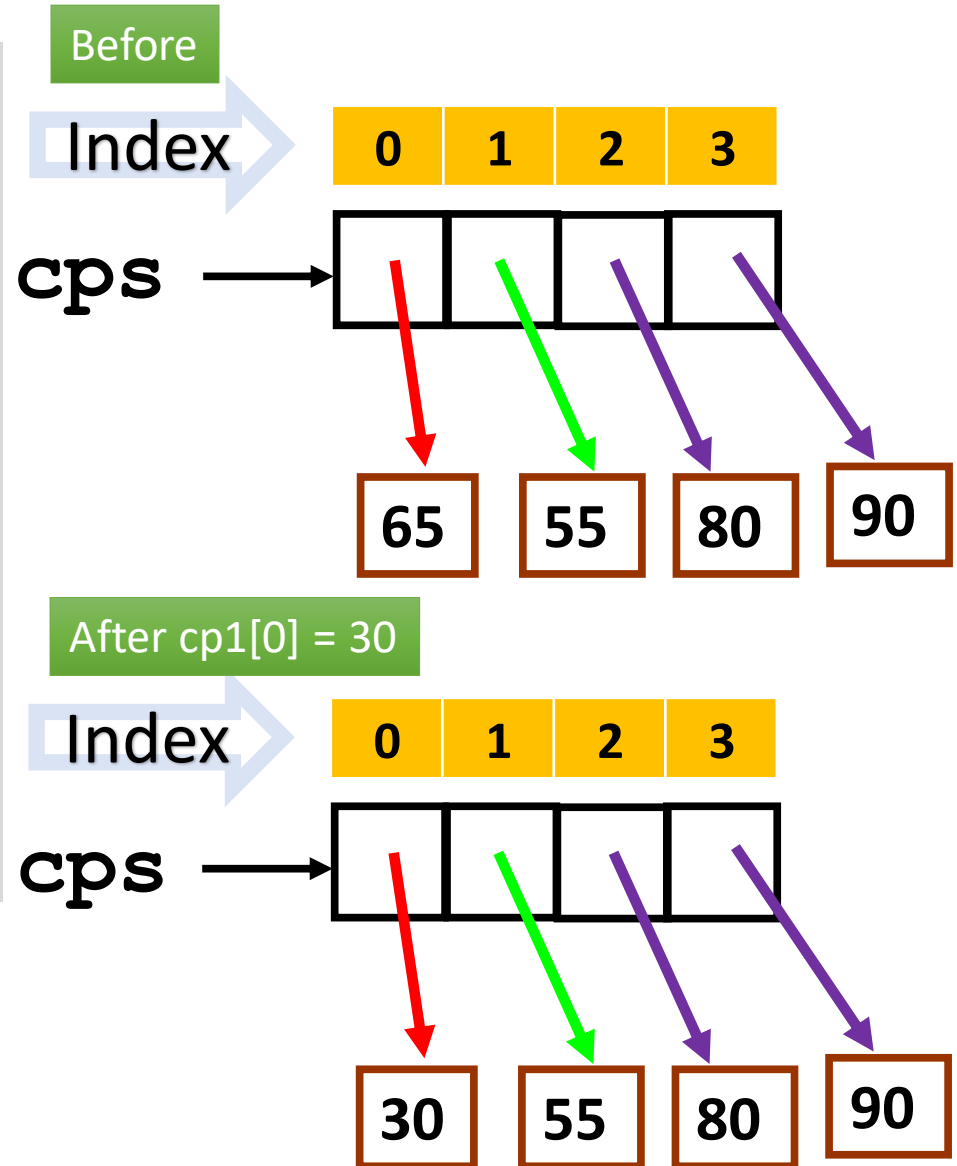


List of 1 item

More List Operations

Changing value of items in a list

```
>>> cp1 = [65, 55, 80, 90]
>>> cp1[0] = 30
>>> cp1
[30, 55, 80, 90]
>>> cp1[-1] = 40
>>> cp1[-1]
40
>>> cp1
[30, 55, 80, 40]
>>> cp1[10] = 100
..... IndexError: list
assignment index out of
range
```



Item update is
allowed!

How to add new item into a list?

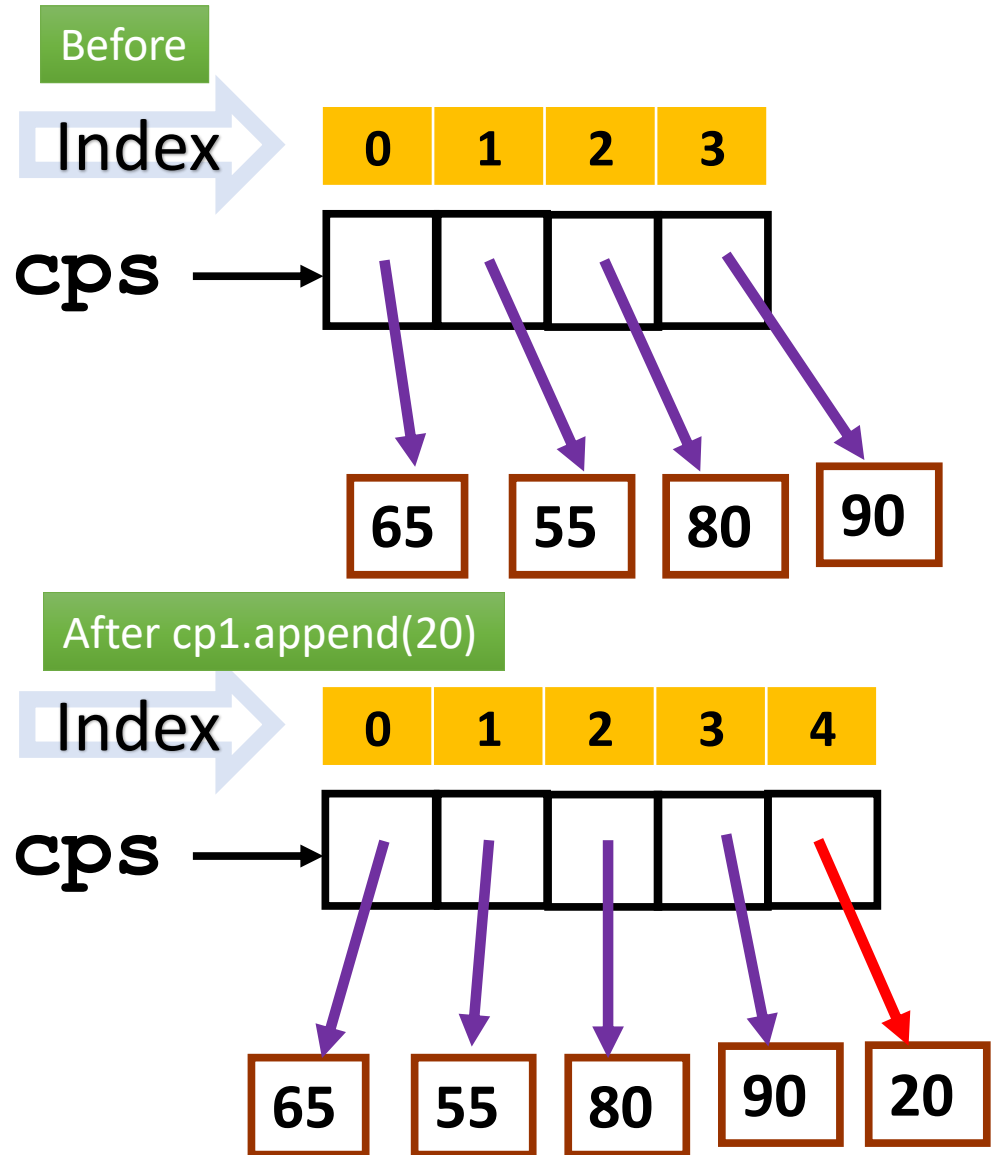
Regardless of
position/index ?

At a specific
position/index ?



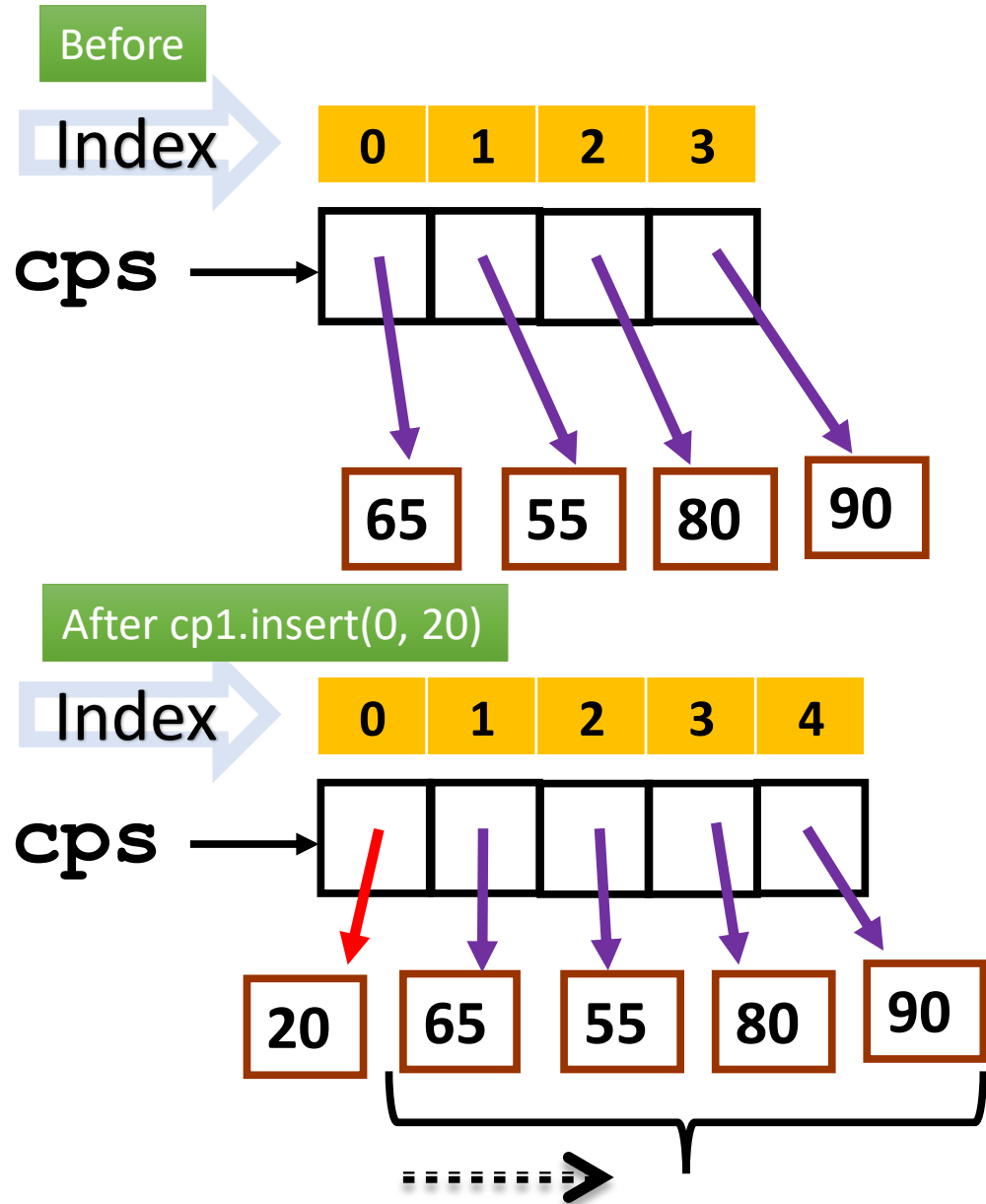
Add to the end of a list

```
>>> cp1 = [65, 55, 80, 90]
>>> cp1.append(20)
>>> cp1
[65, 55, 80, 90, 20]
>>> cp1.append(40)
>>> cp1
[65, 55, 80, 90, 20, 40]
```



Insert Item at a Specific Index

```
>>> cp1 = [65, 55, 80, 90]
>>> cp1.insert(0, 20)
>>> cp1
[20, 65, 55, 80, 90]
>>> cp1.insert(-1, 100)
>>> cp1
[20, 65, 55, 80, 90, 100]
```



How to remove a item from a list?

By
position/index ?

By value?

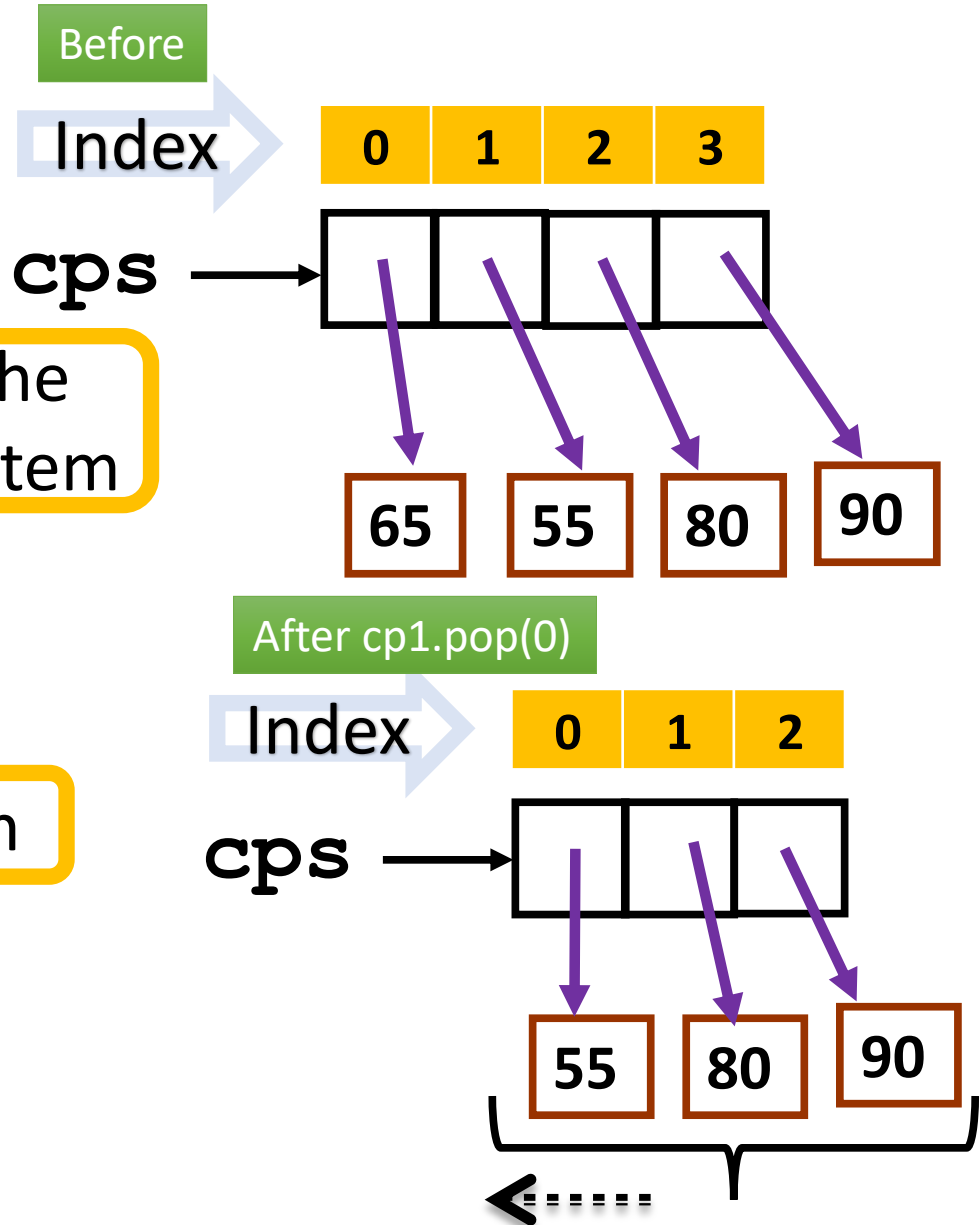


Remove Item at a Specific Index

```
>>> cp1 = [65, 55, 80, 90]
>>> cp1.pop(0)
65
>>> cp1
[55, 80, 90]
>>> cp1.pop(-1)
90
>>> cp1
[55, 80]
>>> cp1.pop()
80
>>> cp1
[55]
>>> cp1.pop(2)
..... IndexError: pop index
out of range
```

Return the removed item

Pop last item

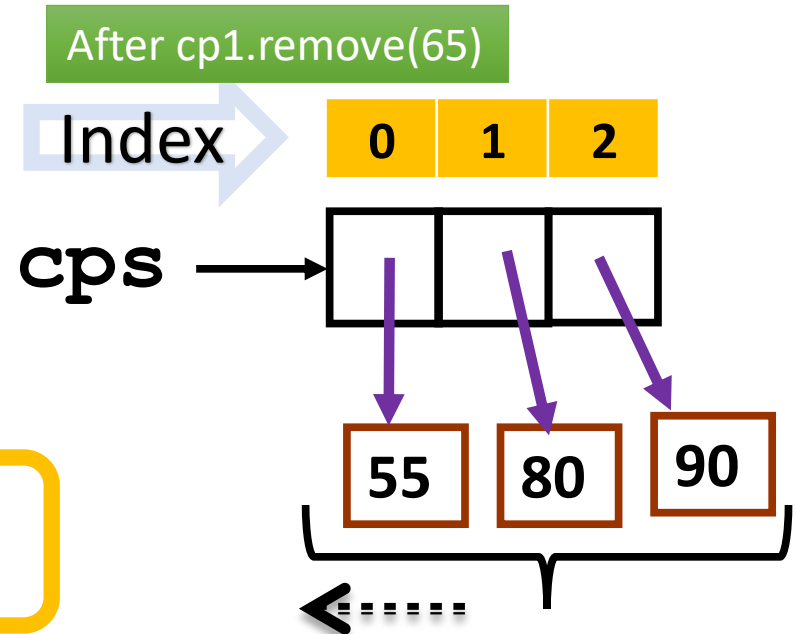
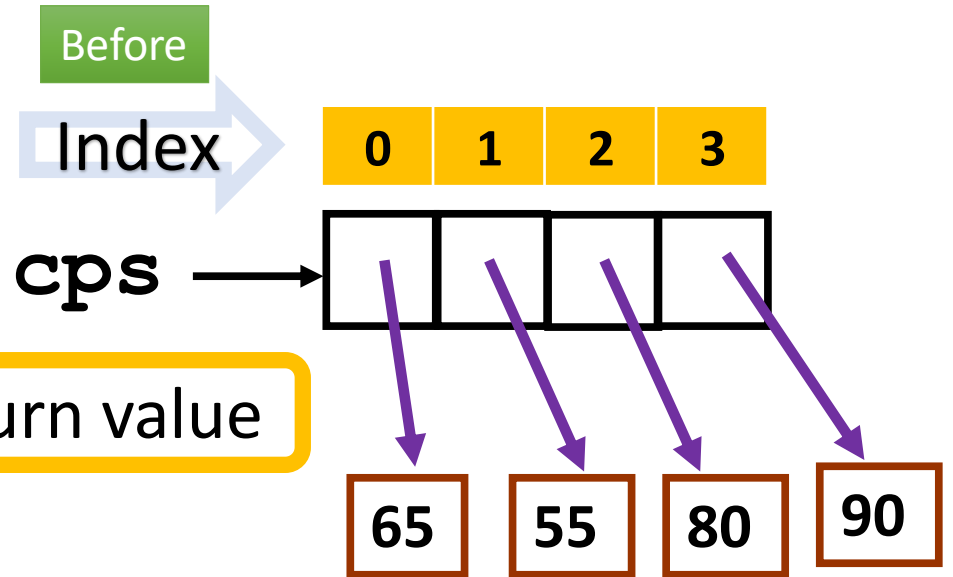


Remove Item by Value

```
>>> cp1 = [65, 55, 80, 90]
>>> cp1.remove(65)
>>> cp1
[55, 80, 90]
>>> cp1.remove(90)
>>> cp1
[55, 80]
>>> cp1.remove(100)
..... ValueError:
list.remove(x): x not in
list
>>> cp2 = [65, 55, 65, 70]
>>> cp1.remove(65)
>>> cp1
[55, 65, 70]
```

No return value

More than 1 match => remove
the one with lowest index



Summary

Create a list

Get list item by index

Get part of a list

Get size of list

Join two lists

Modify list item by index

Add item to a list

`append()`, `insert()`

Remove item from a list

`pop()`, `remove()`

Up next...

Trainings

Start to work on it now!

Next lecture

List Examples and Exercises