- ## Creating 2D array in Python
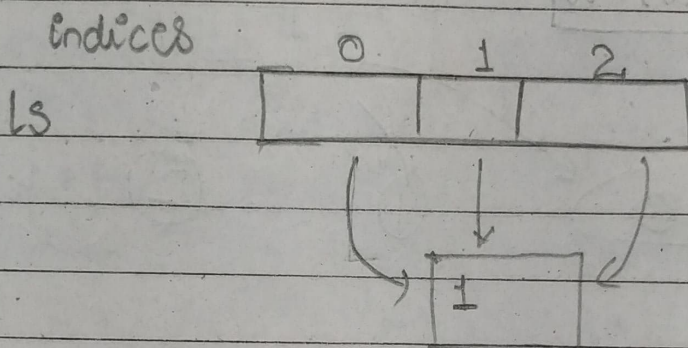
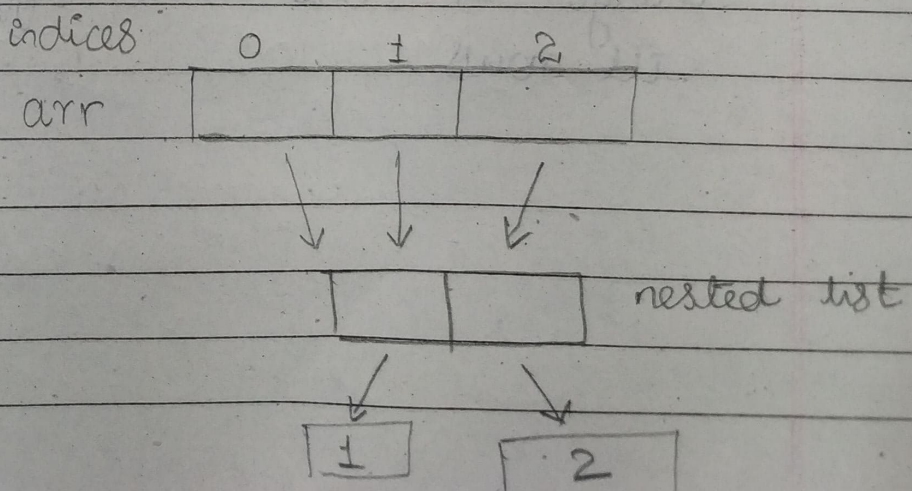When we have a list in python
ls = [1, 1, 1]. Python does not
create 3 integer objects,
seperately. Instead only one object
is created.

indices

0   1   2

ls
```
[    |    |    ]
```

```
      ↓
    [ 1 ]
```

(In python
if content
is same
address
is same)

arr = [[1,2]] * 3
    = [[1,2], [1,2], [1,2]]

(This will create a hollow list)

indices   0   1   2

arr
```
[    |    |    ]
```

```
  ↓    ↓    ↓
  [    |    ]      nested list
```

```
    ↓        ↓
  [ 1 ]    [ 2 ]
```

All the indices of arr are pointing towards 'same nested list'.

$$id(arr[0]) = id(arr[1]) = id(arr[2])$$

arr

| 0 | 1 | 2 |

$arr[0][0] = 10$

| 0 | 1 |

10   1   2
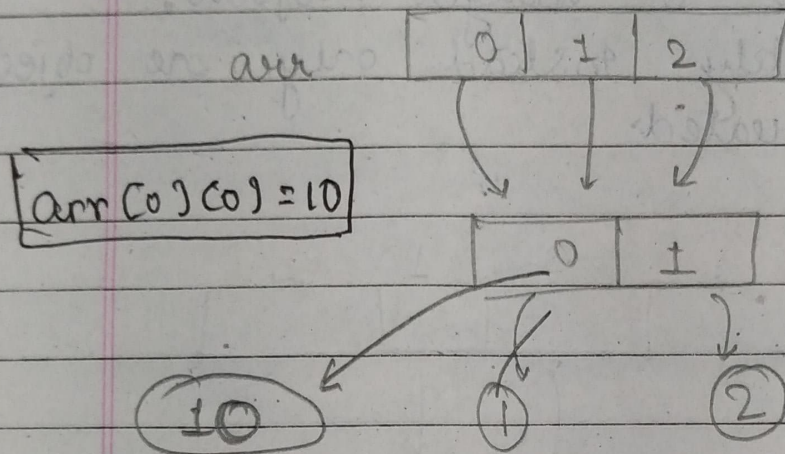
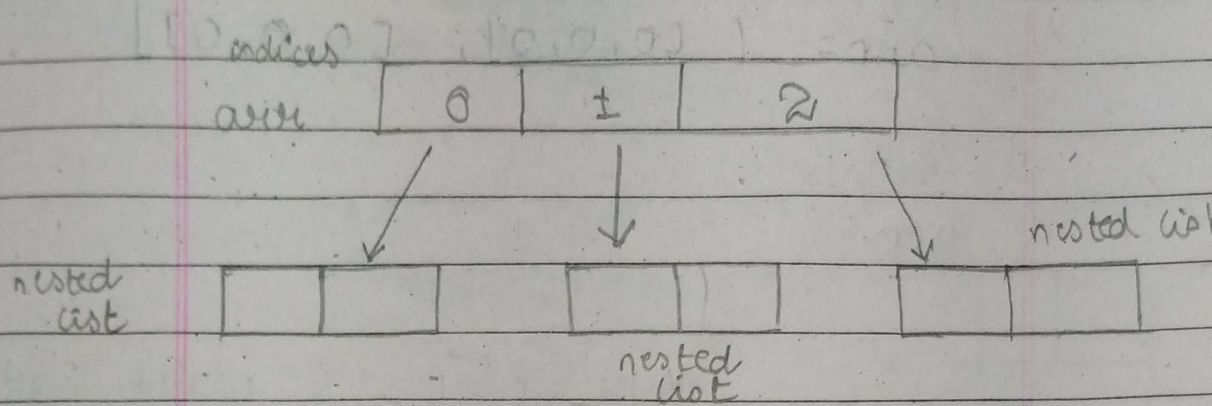$$arr = [[10,2], [10,2], [10,2]]$$

we changed only one element.
why did this happen? Because
there was 'one common list'.
For all the indices.

change in one row affected
all rows

- $arr = [[j \text{ for } j \text{ in range } (1,3)] \text{ for } i \text{ in range}(3)]$

  $arr = [[1,2], [1,2], [1,2]]$

indices

arr	0	1	2	

nested list

All the indices of 'arr' are pointing towards different nested lists.

$id(arr[0]) != id(arr[1]) != id(arr[2])$

$arr[0][0] = 10$

$arr = [[10,2], [1,2], [1,2]]$

Modifying one row (list) did not affect other rows. As, all the lists were unique.