

# Chapter 18: Multidimensional arrays

## Section 18.1: Lists in lists

A good way to visualize a 2d array is as a list of lists. Something like this:

```
lst=[[1,2,3],[4,5,6],[7,8,9]]
```

here the outer list `lst` has three things in it. each of those things is another list: The first one is: `[1, 2, 3]`, the second one is: `[4, 5, 6]` and the third one is: `[7, 8, 9]`. You can access these lists the same way you would access another other element of a list, like this:

```
print (lst[0])
#output: [1, 2, 3]

print (lst[1])
#output: [4, 5, 6]

print (lst[2])
#output: [7, 8, 9]
```

You can then access the different elements in each of those lists the same way:

```
print (lst[0][0])
#output: 1

print (lst[0][1])
#output: 2
```

Here the first number inside the `[]` brackets means get the list in that position. In the above example we used the number `0` to mean get the list in the `0`th position which is `[1, 2, 3]`. The second set of `[]` brackets means get the item in that position from the inner list. In this case we used both `0` and `1` the `0`th position in the list we got is the number `1` and in the `1`st position it is `2`

You can also set values inside these lists the same way:

```
lst[0]=[10,11,12]
```

Now the list is `[[10, 11, 12], [4, 5, 6], [7, 8, 9]]`. In this example we changed the whole first list to be a completely new list.

```
lst[1][2]=15
```

Now the list is `[[10, 11, 12], [4, 5, 15], [7, 8, 9]]`. In this example we changed a single element inside of one of the inner lists. First we went into the list at position `1` and changed the element within it at position `2`, which was `6` now it's `15`.

## Section 18.2: Lists in lists in lists in..

This behaviour can be extended. Here is a 3-dimensional array:

```
[[[111, 112, 113], [121, 122, 123], [131, 132, 133]], [[211, 212, 213], [221, 222, 223], [231, 232, 233]], [[311, 312, 313], [321, 322, 323], [331, 332, 333]]]
```

As is probably obvious, this gets a bit hard to read. Use backslashes to break up the different dimensions:

```
[[[111, 112, 113], [121, 122, 123], [131, 132, 133]], \
 [211, 212, 213], [221, 222, 223], [231, 232, 233]], \
 [311, 312, 313], [321, 322, 323], [331, 332, 333]]]
```

By nesting the lists like this, you can extend to arbitrarily high dimensions.

Accessing is similar to 2D arrays:

```
print(myarray)
print(myarray[1])
print(myarray[2][1])
print(myarray[1][0][2])
etc.
```

And editing is also similar:

```
myarray[1]=new_n-1_d_list
myarray[2][1]=new_n-2_d_list
myarray[1][0][2]=new_n-3_d_list #or a single number if you're dealing with 3D arrays
etc.
```