

LISTS

Lists

List is an ordered set of elements.

```
[1, 2, 3]
```

```
["Project", "Homework", "Test", "Exam"]
```

```
[8.15, 9.45]
```

```
[]
```

```
[1, "Homework", 8.15]
```

Indices

elements	→	1	-2	3	-4	5
indices	→	0	1	2	3	4

list[*index*]

```
alist = [1, -2, 3, -4, 5]
element = alist[1]
print(element)
```

→ -2

Negative indices

elements	→	1	-2	3	-4	5
indices	→	-5	-4	-3	-2	-1

list[*index*]

```
alist = [1, -2, 3, -4, 5]
element = alist[-2]
print(element)
```

→ -4

Length of a list

elements →	1	-2	3	-4	5
indices →	0	1	2	3	4

```
alist = [1, -2, 3, -4, 5]
length = len(alist)
print(length)
```

→ 5

Looping through a list

- Loop over indices

```
alist = [1, -2, 3, -4, 5]
for i in range(len(alist)):
    print(i, alist[i])
```

```
# i is an index
# alist[i] is an element
```

```
0 1
1 -2
2 3
3 -4
4 5
```

- Loop over elements

```
alist = [1, -2, 3, -4, 5]
for el in alist:
    print(el)
```

```
1
-2
3
-4
5
```

Operations with lists

- Concatenation +

```
>>> list1 = [1, 2, 3]
>>> list2 = [-4, -5]
>>> list1 + list2
[1, 2, 3, -4, -5]
```

- Multiplication *

```
>>> list1 = [1, 2, 3]
>>> list1 * 3
[1, 2, 3, 1, 2, 3, 1, 2, 3]
```

Logical expressions involving lists

- Checking existence

```
>>> 1 in [1, -2, 3]
```

```
True
```

```
>>> 2 in [1, -2, 3]
```

```
False
```

- Equality and inequality

```
>>> [1, -2, 3] == [3, -2, 1]
```

```
False
```

```
>>> [1, -2, 3] != [3, -4, 5]
```

```
True
```


Slicing

elements	→	1	-2	3	-4	5	-6	7	-8	9	-10	11
indices	→	0	1	2	3	4	5	6	7	8	9	10

```
>>> alist = [1, -2, 3, -4, 5, -6, 7, -8, 9, -10, 11]
>>> alist[3:8]
[-4, 5, -6, 7, -8]
>>> alist[4:]
[5, -6, 7, -8, 9, -10, 11]
>>> alist[:9]
[1, -2, 3, -4, 5, -6, 7, -8, 9]
>>> alist[:]
[1, -2, 3, -4, 5, -6, 7, -8, 9, -10, 11]
```

Lists are mutable

```
>>> alist = [1, -2, 3, -4, 5]
>>> alist[1] = 10
>>> print(alist)
[1, 10, 3, -4, 5]
```

The range () function

```
>>> list(range(4))  
[0, 1, 2, 3]
```

```
>>> list(range(2, 5))  
[2, 3, 4]
```

```
>>> list(range(3, 10, 2))  
[3, 5, 7, 9]
```

```
>>> list(range(10, 3, -2))  
[10, 8, 6, 4]
```

Methods and functions

- **Methods**

append	clear	copy	count	extend	index
insert	pop	remove	reverse	sort	

```
alist.sort()
```

- **Functions**

len	sum	max	min
-----	-----	-----	-----

```
sum(alist)
```

Splitting a string

```
>>> "Hi there!".split()  
['Hi', 'there!']
```

```
>>> date = "11.04.2019"  
>>> date.split(".")  
['11', '04', '2019']
```

Building a list

```
f = open("numbers.txt")

numbers = []

for line in f:
    number = int(line)
    numbers.append(number)

print(numbers)
```