Lists
Lists

[1, 2, 3]
["Project", "Homework", "Test", "Exam"]
[8.15, 9.45]
[]

[1, "Homework", 8.15]
List[index]

ourlist = [1,-2,3,-4,5]
element = ourlist[1]
print(element)
Negative index

\[ \text{ourlist} = [1, -2, 3, -4, 5] \]
\[ \text{element} = \text{ourlist}[-2] \]
\[ \text{print(element)} \]

\[-4\]
Number of elements (or length)

\[
\begin{array}{ccccc}
  1 & -2 & 3 & -4 & 5 \\
  0 & 1 & 2 & 3 & 4 \\
\end{array}
\]

\textbf{len(list)}

ourlist = [1,-2,3,-4,5]  
print(len(ourlist))

5
Slicing

ourlist = [1, -2, 3, -4, 5, -6, 7, 8, -9, 1, 1]
print(ourlist[3:8])  
[-4, 5, -6, 7, 8]

print(ourlist[4:])  
[5, -6, 7, 8, -9, 1, 1]

print(ourlist[:9])  
[1, -2, 3, -4, 5, -6, 7, 8, -9]

print(ourlist[:])  
[1, -2, 3, -4, 5, -6, 7, 8, -9, 1, 1]
Operations with lists

• Concatenation +
list1 = [1,2,3]
list2 = [-4,-5]
print(list1+list2)

[1, 2, 3, -4, -5]

• Multiplication *
print([1,2,3]*3)

[1, 2, 3, 1, 2, 3, 1, 2, 3]
Function `range`

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

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

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

`print(list(range(10,3,-2)))`  
[10, 8, 6, 4]
Looping through lists

ourlist = [-1, 2, -3, 4, -5]
for el in ourlist: #el is element
    print(el)

for i in range(len(ourlist)): #i is index
    print(ourlist[i]) #outlist[i] is element
Logical expressions with lists

```python
>>> 1 in [1,2,3]
True
>>> -2 in [1,2,3]
False
>>> 5 not in [1,2,3]
True
>>> [1,2,3] == [3,2,1]
False
>>> [1,2,3] != [3,4,5]
True
```
Lists are mutable

ourlist = [1,-2,3,-4,5]
ourlist[1] = 10
print(ourlist)

[1, 10, 3, -4, 5]
<table>
<thead>
<tr>
<th>Methods</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>append</td>
<td>insert</td>
</tr>
<tr>
<td>clear</td>
<td>pop</td>
</tr>
<tr>
<td>copy</td>
<td>remove</td>
</tr>
<tr>
<td>count</td>
<td>reverse</td>
</tr>
<tr>
<td>extend</td>
<td>sort</td>
</tr>
<tr>
<td>index</td>
<td></td>
</tr>
</tbody>
</table>

```python
doctest
ourlist.sort()
sum(ourlist)
```

https://docs.python.org/3.6/tutorial/datastructures.html
https://docs.python.org/3.6/library/functions.html
Building a list

```python
ffile = open("numbers.txt")

numbers = []

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

print(numbers)
```
List from a string (\texttt{split})

```python
>>> "Hello world".split()
['Hello', 'world']
```

```python
>>> date = "26.10.2018"
>>> date.split("."")
['26', '10', '2018']
```
Test 7

Questions?
Homework (Celsius and Fahrenheit, Number of days in months)

Questions?
Exercises

https://courses.cs.ut.ee/2018/nkp/fall/Main/During7