Introdução à programação para ciência e engenharia em *Python*

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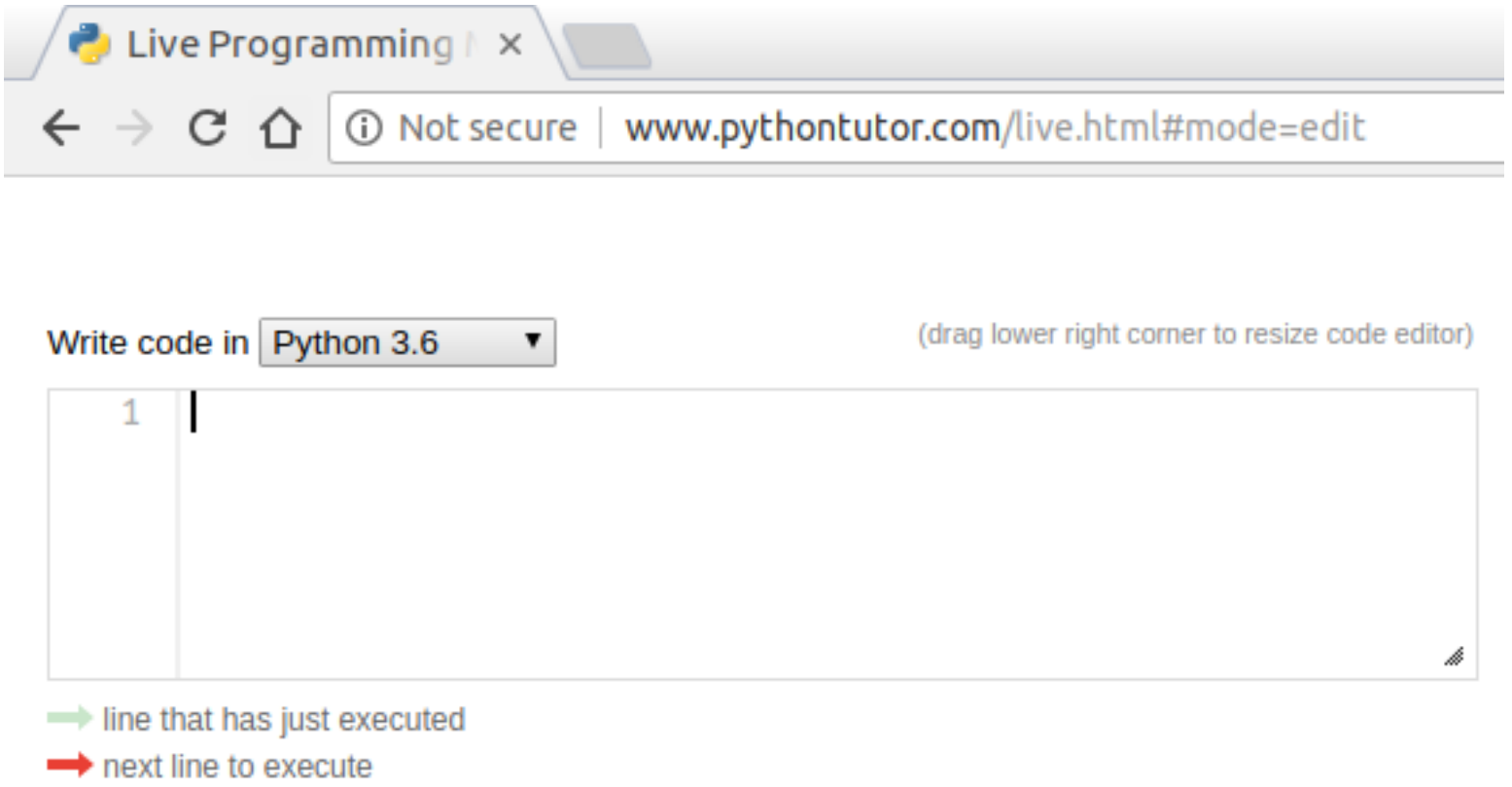
Parte 2: Lógica e Sintaxe

Tipos coleção e iterações `(tuple, list, set, dict, for, while)`

python tutor

www.pythontutor.com/

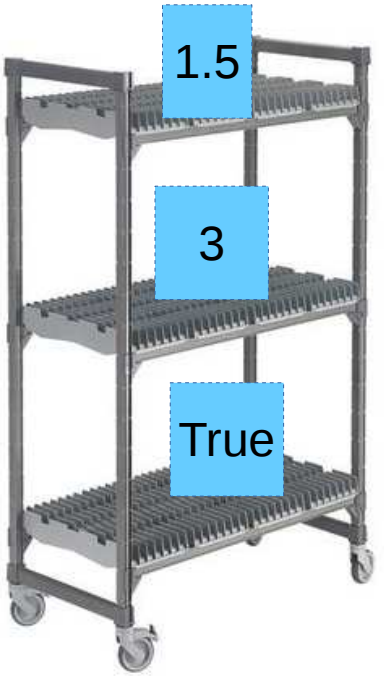
live.html#mode=edit

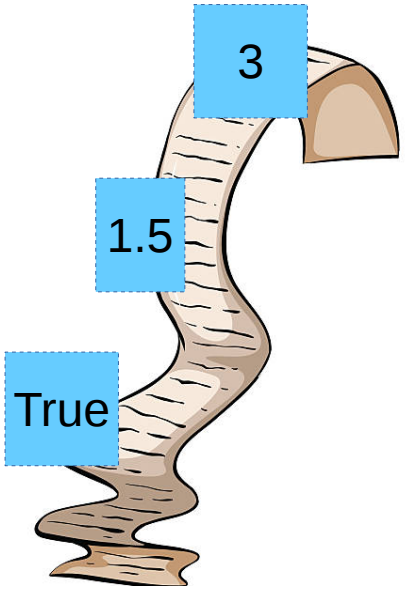


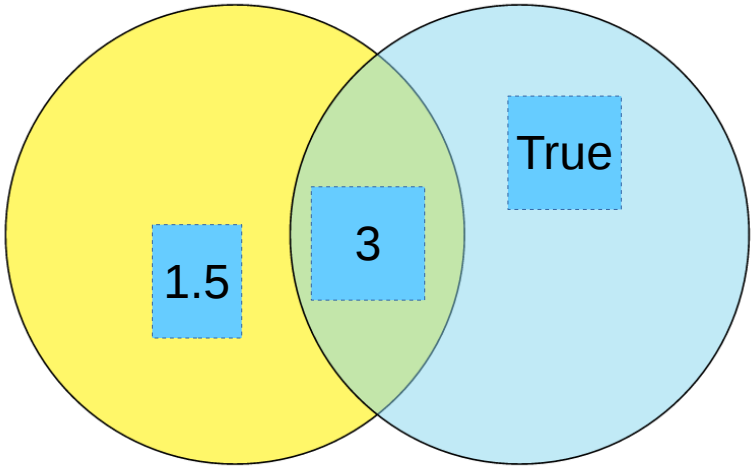
mais tipos

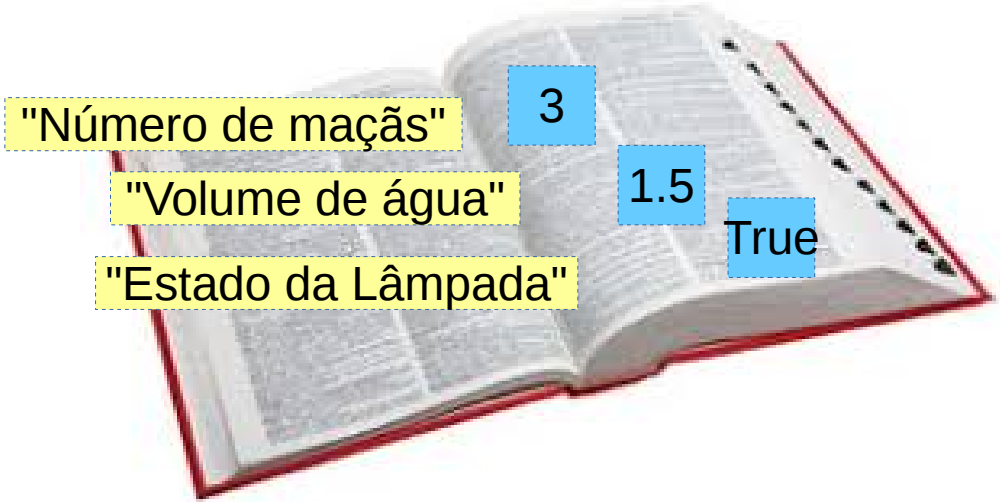
Containers / Collections

- tuple
- list
- set
- dictionary



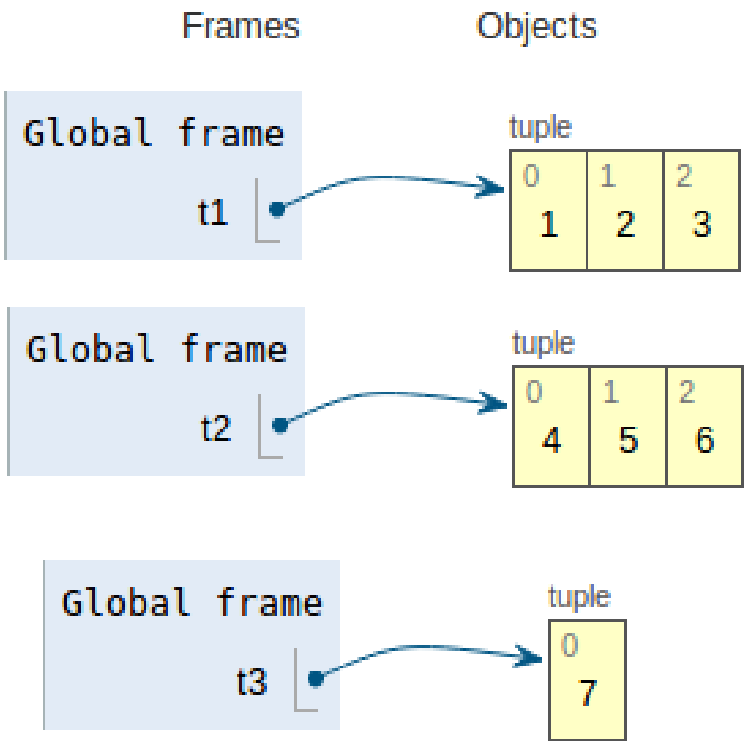






tuple

```
1  t1 = ( 1, 2, 3 )
2  t2 = 4, 5, 6
3  t3 = (7,)
```

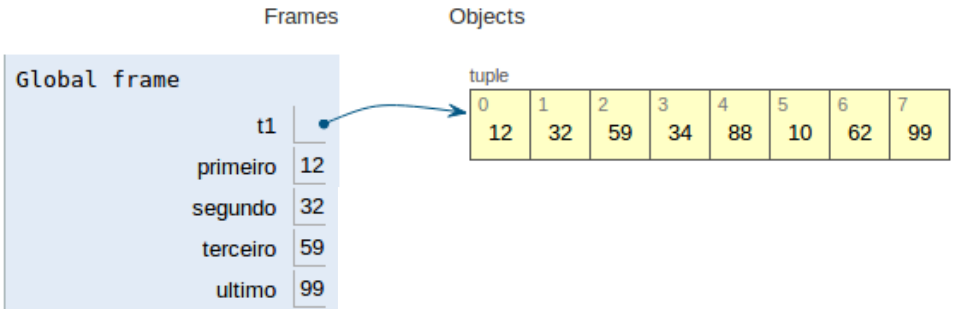


- Expressão literal
  - vírgulas e parênteses, opcionalmente

Indexing

acessar elementos por índice

```
1  t1 = (12, 32, 59, 34, 88, 10, 62, 99)
2  primeiro = t1[0]
3  segundo = t1[1]
4  terceiro = t1[2]
5
6  ultimo = t1[-1]
7
```



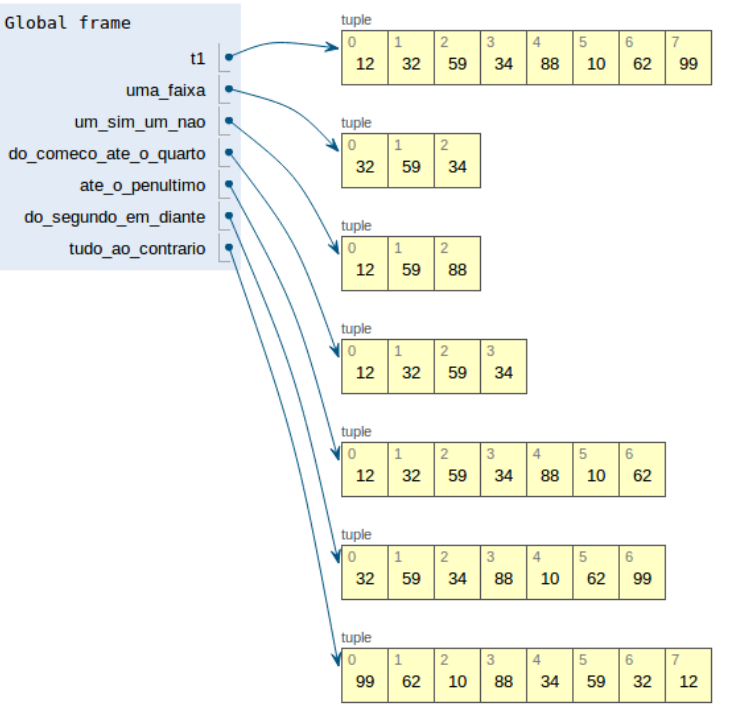
- Começa no zero
- -1 significa último

```
Index from rear:    -6  -5  -4  -3  -2  -1
Index from front:    0   1   2   3   4   5
                   +---+---+---+---+---+---+
                   | a | b | c | d | e | f |
                   +---+---+---+---+---+---+
```

Slicing

fatiar, cria cópias de seções

```
1  t1 = (12, 32, 59, 34, 88, 10, 62, 99)
2
3  uma_faixa = t1[1:4]
4  #começa no 1 e pára antes do 4
5
6  um_sim_um_nao = t1[0:5:2]
7  #começa no zero e pára antes do 5, com passo de 2
8
9  do_comeco_ate_o_quarto = t1[:4]
10 #primeiro argumento vazio, começa do começo
11
12 ate_o_penultimo = t1[:-1]
13 #pára antes do último
14
15 do_segundo_em_diante = t1[1:]
16 #segundo argumento vazio, vai até o final
17
18 tudo_ao_contrario = t1[::-1]
19 #do final ao começo com passo de -1
```

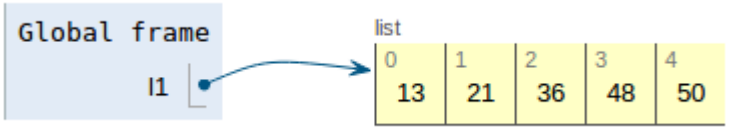


- Argumento vazio segue um comportamento padrão

```
Index from rear:    -6  -5  -4  -3  -2  -1
Index from front:    0   1   2   3   4   5
                   +---+---+---+---+---+---+
                   | a | b | c | d | e | f |
                   +---+---+---+---+---+---+
Slice from front:  :   1   2   3   4   5   :
Slice from rear:   :  -5  -4  -3  -2  -1   :
```

list

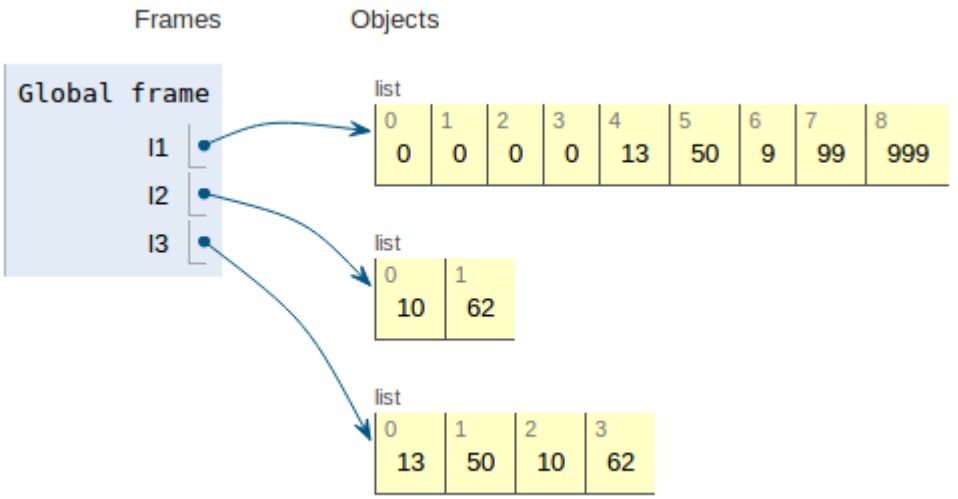
```
1  l1 = [13,21,36,48,50]
```



- Expressão literal – vírgulas e colchetes

list

```
1  l1 = [13,50]
2  l2 = [10,62]
3
4  l3 = l1+l2 #concatenation
5
6  l1+=[9] #extend
7  l1.extend([99]) #extend
8  l1*=2 #extend
9
10 l1.append(999) #append
11
12 l1[0]=0 #rebind item
13 l1[1:4]=3*[0] #rebind items
```



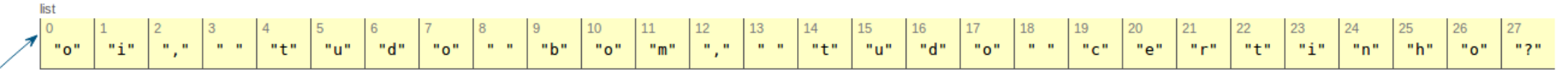
- Append (apensar)
- Extend (extender)
- Rebind item (re vincular elemento)

Slicing Strings

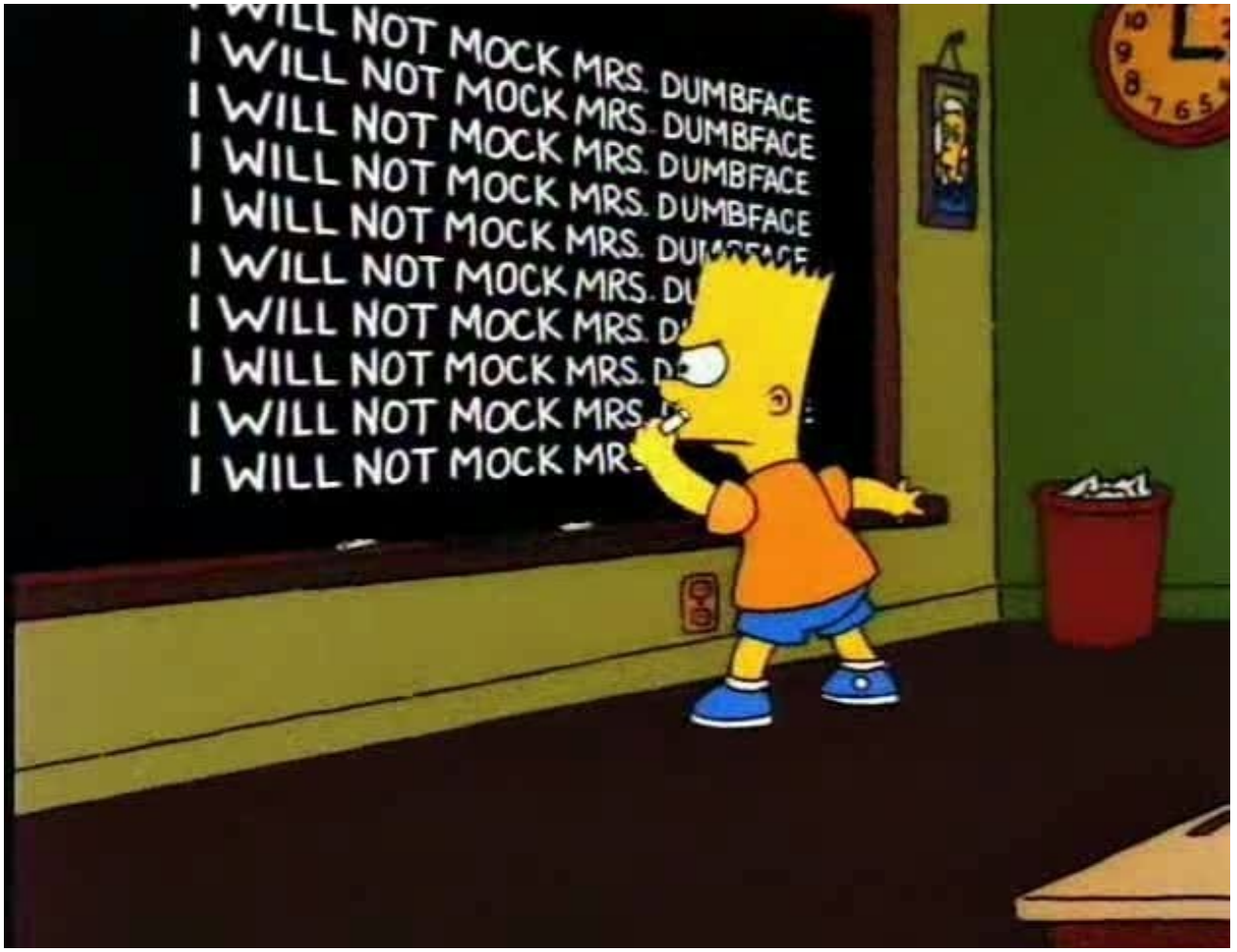
```
1  mensagem="oi, tudo bom, tudo certinho?"
2  comeco=mensagem[:4]
3  meio=mensagem[4:14]
4  fim=mensagem[14:]
5
6  caracteres=list(mensagem)
```

Global frame

mensagem	"oi, tudo bom, tudo certinho?"
comeco	"oi, "
meio	"tudo bom, "
fim	"tudo certinho?"
caracteres	



Iterações


I WILL NOT MOCK MRS. DUMBFACE
I WILL NOT MOCK MRS. DUMBFACE
I WILL NOT MOCK MRS. DUMBFACE
I WILL NOT MOCK MRS. DUMBFACE

for

```
1  n=8
2
3  for i in range(n):
4      print("I WILL NOT MOCK MRS. DUMBFACE")
```

```
I WILL NOT MOCK MRS. DUMBFACE
I WILL NOT MOCK MRS. DUMBFACE
I WILL NOT MOCK MRS. DUMBFACE
I WILL NOT MOCK MRS. DUMBFACE
I WILL NOT MOCK MRS. DUMBFACE
I WILL NOT MOCK MRS. DUMBFACE
I WILL NOT MOCK MRS. DUMBFACE
I WILL NOT MOCK MRS. DUMBFACE
```

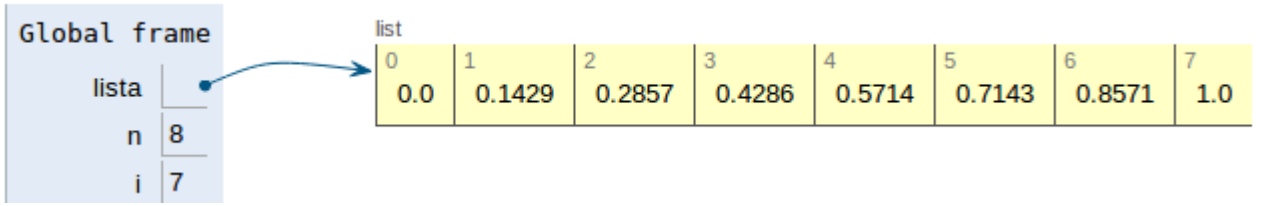
- Dois pontos
- Identação

- Função range

Operações com o contador

```
1  lista=[] #vazia
2  n=8
3
4  for i in range(n):
5      print("i: ", i)
6      lista.append(i/7)
```

```
i:  0
i:  1
i:  2
i:  3
i:  4
i:  5
i:  6
i:  7
```



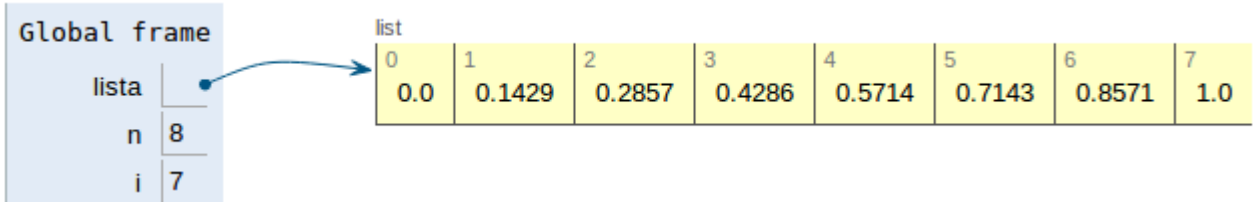
somatório

FAZER O SOMATÓRIO DA LISTA
[2,4,6,8,10,12]

Nested for

```
1  k=1
2  for i in range(3):
3      for j in range(4):
4          print(i,j,k)
5          k+=1
```

Iteraçao ao longo dos elementos de uma lista




```
8  for i in range(n):
9      print("item: ",lista[i])
```

```
item:  0.0
item:  0.14285714285714285
item:  0.2857142857142857
item:  0.42857142857142855
item:  0.5714285714285714
item:  0.7142857142857143
item:  0.8571428571428571
item:  1.0
```

```
11 for item in lista:
12     print("item: ",item)
13
```

```
item:  0.0
item:  0.14285714285714285
item:  0.2857142857142857
item:  0.42857142857142855
item:  0.5714285714285714
item:  0.7142857142857143
item:  0.8571428571428571
item:  1.0
```

- In - iteração sobre Cada elemento de uma lista

while

```
1  n=8
2  for i in range(n):
3      print("for:",i)
4
5  n=8
6  i=0
7  while i<n:
8      print("while:",i)
9      i+=1
```

```
for: 0
for: 1
for: 2
for: 3
for: 4
for: 5
for: 6
for: 7
while: 0
while: 1
while: 2
while: 3
while: 4
while: 5
while: 6
while: 7
```

- While (predicate)
- Loop infinito

Exemplo: achar maximo

Achar o maximo em [1,346432,68,1223,5,47,678]

Exemplo: Fatorial

$0 ! = 1$

$n ! = n * (n-1)!$ para $n > 0$

Exemplo: Ordenar (sort)

Colocar a lista [1,346432,68,1223,5,47,678] em ordem crescente

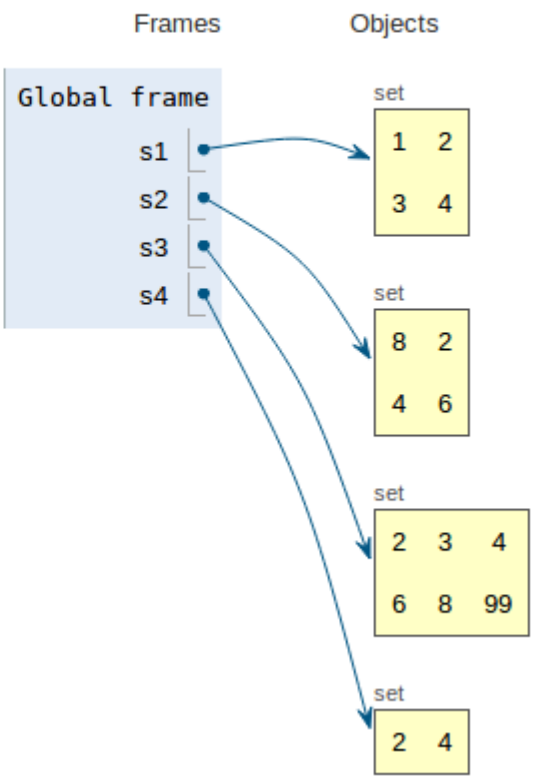
(1 < 5 < 47 < 68 < 678 < 1223 < 346432)

set

```
1  s1={1,2,3,4}
2  s2={2,4,6,8}
3
4  print(1 in s1)
5
6  s3=s1|s2 #union
7  s4=s1&s2 #intersection
8
9  s3|={99} #insertion
10 s3-={1} #removal
11
```

Print output (drag lower right corner to resize)

```
True
```



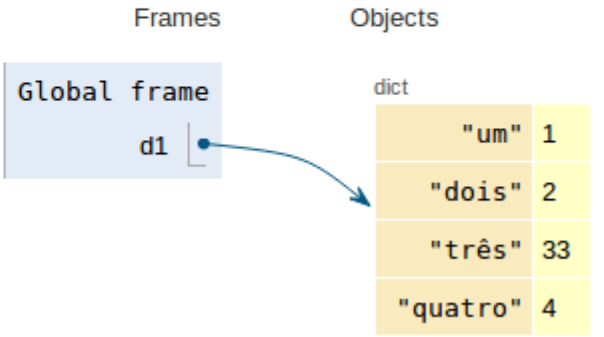
- União
- Interseção
- Adição / Remoção

dict

```
1  d1={"um":1,"dois":2,"três":3}
2  print(d1.keys())
3  print(d1.values())
4
5  d1["três"]=33 #modificação
6  d1["quatro"]=4 #nova entrada
7
```

Print output (drag lower right corner to resize)

```
dict_keys(['um', 'dois', 'três'])
dict_values([1, 2, 3])
```



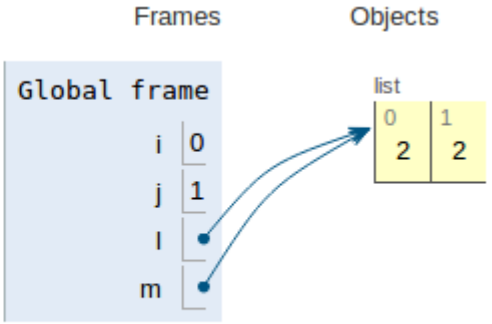
- Indexação por palavra-chave

Mutability

- IMMUTABLE
  - Numbers
  - String
  - Bool
  - Tuple
- MUTABLE
  - List
  - Set
  - Dictionary

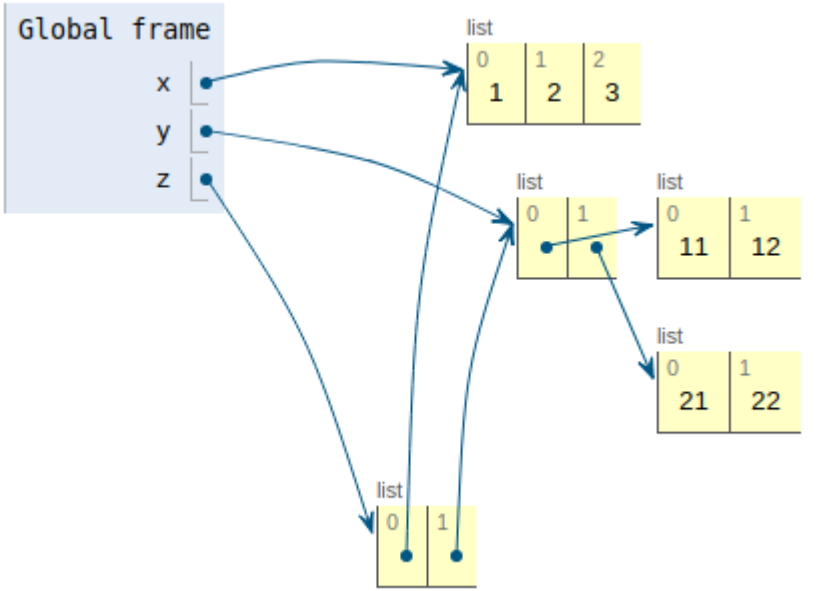
Mutability

```
1  i=0
2  j=i
3  j+=1 #j agora   dá nome a um novo objeto
4
5  l=[1,2]
6  m=l
7  m[0]+=1 #modificamos o objeto lista ao qual l e m dão nome
```



listas de listas

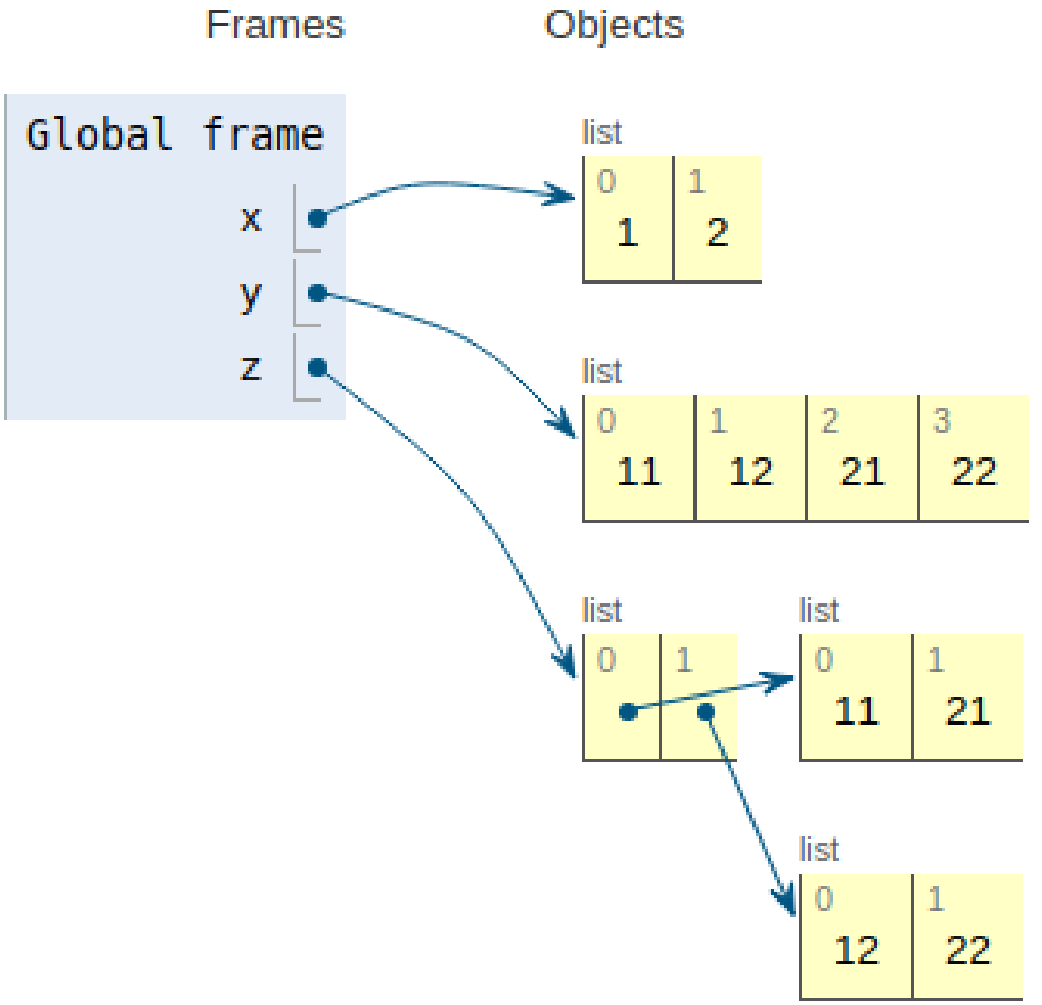
```
1  x=[1,2,3]
2
3  y=[[11,12],[21,22]]
4
5  z=[x,y]
```




```
7  print('x0',x[0])
8  print('y0',y[0])
9  print('y00',y[0][0])
10 print('z0',z[0])
11 print('z00',z[0][0])
12 print('z1',z[1])
13 print('z10',z[1][0])
14 print('z100',z[1][0][0])
```

```
x0 1
y0 [11, 12]
y00 11
z0 [1, 2, 3]
z00 1
z1 [[11, 12], [21, 22]]
z10 [11, 12]
z100 11
```

Comprehension



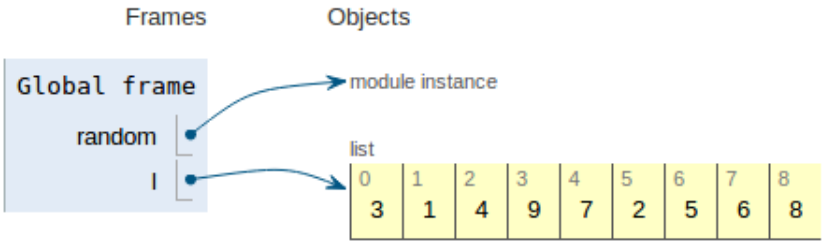

```
x=[i for i in range(1,3)]

y=[10*i+j for i in range(1,3) for j in range(1,3)]

z=[[10*i+j for i in range(1,3)] for j in range(1,3)]
```

module random

```
1  import random
2  l=[1,2,3,4,5,6,7,8,9]
3  print(random.choice(l))
4  print(random.choice(l))
5  print(random.choice(l))
6  print(random.choice(l))
7
8  print(random.random())
9  print(random.random())
10 print(random.random())
11 print(random.random())
12
13 random.shuffle(l)
```

Print output (drag lower right corner to resize)

```
5
0.9654648863619172
0.48592769656281265
0.9182343317851318
0.8298529036589914
```



Referências principais

https://www.tutorialspoint.com/

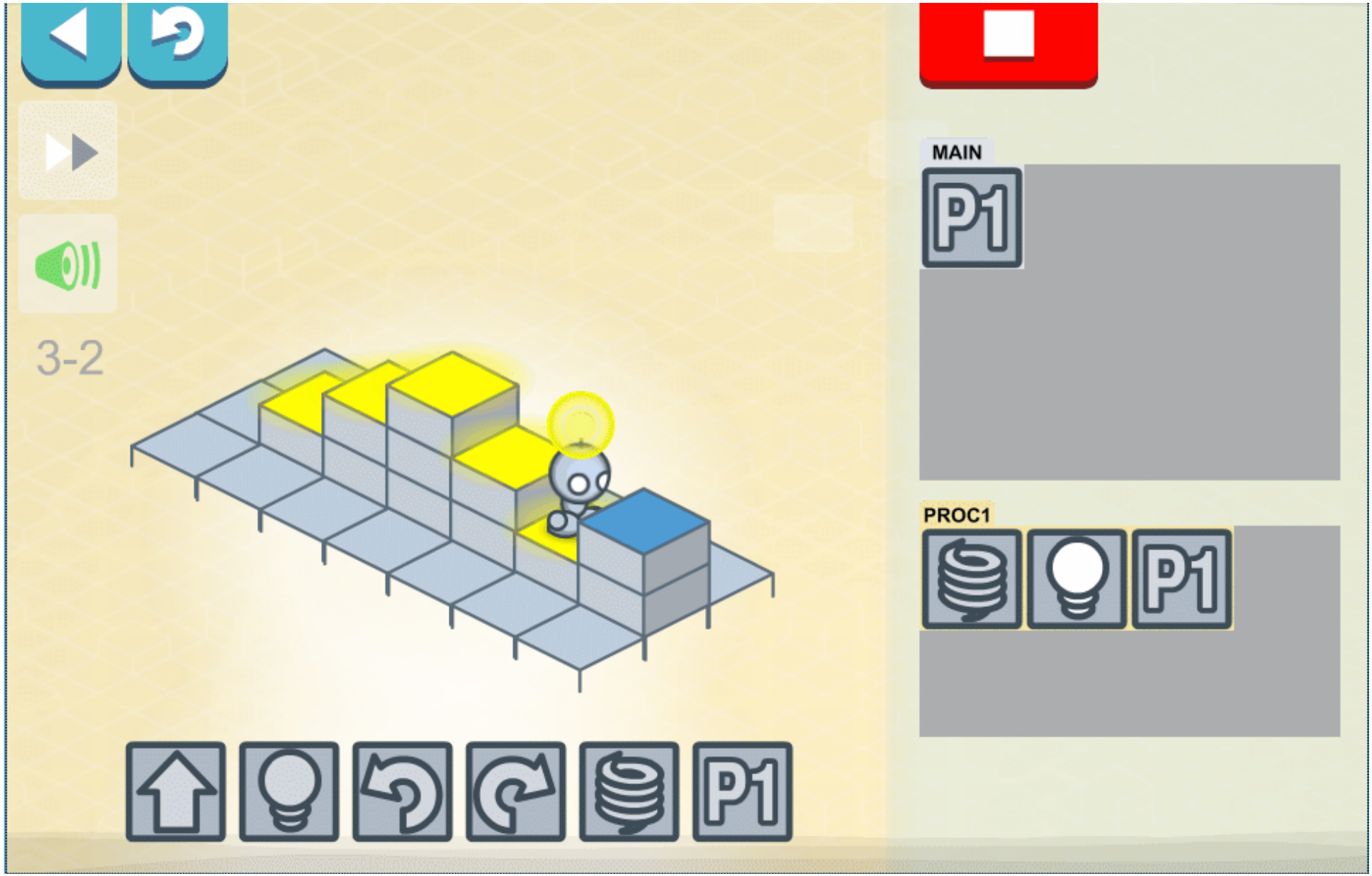
python3/

python_basic_syntax.htm

https://stackoverflow.com/

search

EXERCÍCIO DE lógica DE PROGRAMAÇÃO



perguntas