Section VII: Листы

Section VII: Листы

Лист – это последовательность. Инициализация

```
>>> cheeses = ['Cheddar', 'Edam', 'Gouda']
```

```
>>> numbers = [17, 123]
```

```
>>> mixed = ['spam', 2.0, 5, [10, 20]]
```

```
>>> empty = []
```

```
>>> print(cheeses, numbers, mixed, empty)
['Cheddar', 'Edam', 'Gouda'] [17, 123] ['spam', 2.0, 5, [10, 20]] []
```

Section VII: Листы

Лист – изменяемый тип данных

```
>>> cheeses = ['Cheddar', 'Edam', 'Gouda']
>>> print(cheeses[0])
Cheddar
```

```
>>> numbers = [17, 123]
>>> numbers[1] = 5
>>> print(numbers)
[17, 5]
```

Листы, как и строки:

- Имеют целочисленные индексы
- При обращении по несуществующему индексу – IndexError
- Отрицательные индексы начинаются с конца

Section VII: Листы

Итерации по листам

```
>>> cheeses = ['Cheddar', 'Edam', 'Gouda']
>>> for cheese in cheeses:
...     print(cheese)
```

```
>>> for idx in range(len(numbers)):
...     numbers[idx] = numbers[idx] * 2
```

```
>>> for x in []:
...     print('Will this ever happen?')
```

Section VII: Листы

Итерации по листам

```
>>> data = ['spam', 1, ['Brie', 'Roquefort', 'Pol le Veq'], [1, 2, 3]])
>>> for element in data:
...     print(element)
```

```
spam
1
['Brie', 'Roquefort', 'Pol le Veq']
[1, 2, 3]
```

Section VII: Листы

Операции, слайсы

```
>>> a = [1, 2, 3]
>>> b = [4, 5, 6]
>>> c = a + b
>>> print(c)
[1, 2, 3, 4, 5, 6]
```

```
>>> [0] * 4
[0, 0, 0, 0]
>>> [1, 2, 3] * 3
[1, 2, 3, 1, 2, 3, 1, 2, 3]
```

Section VII: Листы

Операции, слайсы

```
>>> t = ['a', 'b', 'c', 'd', 'e', 'f']
>>> t[1:3]
['b', 'c']
>>> t[:4]
['a', 'b', 'c', 'd']
>>> t[3:]
['d', 'e', 'f']
```

```
>>> t[:]
['a', 'b', 'c', 'd', 'e', 'f']
```

```
>>> t = ['a', 'b', 'c', 'd', 'e', 'f']
>>> t[1:3] = ['x', 'y']
>>> print(t)
['a', 'x', 'y', 'd', 'e', 'f']
```

Section VII: Листы

Удаление элементов

```
>>> t = ['a', 'b', 'c']
>>> x = t.pop(1)
>>> print(t)
['a', 'c']
>>> print(x)
b
```

```
>>> t = ['a', 'b', 'c']
>>> del t[1]
>>> print(t)
['a', 'c']
```

```
>>> t = ['a', 'b', 'c']
>>> t.remove('b')
>>> print(t)
['a', 'c']
```

```
>>> t = ['a', 'b', 'c', 'd', 'e', 'f']
>>> del t[1:5]
>>> print t()
['a', 'f']
```

Section VII: Листы

Листы и строки

```
>>> s = 'spam'
>>> t = list(s)
>>> print(t)
['s', 'p', 'a', 'm']
```

```
>>> s = 'pining for the fjords'
>>> t = s.split()
>>> print(t)
['pining', 'for', 'the', 'fjords']
```

```
>>> s = 'spam-spam-spam'
>>> delimiter = '-'
>>> s.split(delimiter)
['spam', 'spam', 'spam']
```

```
>>> t = ['pining', 'for', 'the', 'fjords']
>>> delimiter = ' '
>>> delimiter.join(t)
'pining for the fjords'
```

Section VII: Листы

Методы

append()	Adds an element at the end of the list
clear()	Removes all the elements from the list
copy()	Returns a copy of the list
count()	Returns the number of elements with the specified value
extend()	Add the elements of a list (or any iterable), to the end of the current list
index()	Returns the index of the first element with the specified value
insert()	Adds an element at the specified position
pop()	Removes the element at the specified position
remove()	Removes the first item with the specified value
reverse()	Reverses the order of the list
sort()	Sorts the list

https://www.w3schools.com/python/python_ref_list.asp

Section VII: Листы

Операции `map`, `reduce`, `filter`

```python
def only_upper(t):
    res = []
    for s in t:
        if s.isupper():
            res.append(s)
    return res

s = ['Cheddar', 'EDAM', 'Gouda']
print(only_upper(s))
```

```
['EDAM']
```

Section VII: Листы

Операции `map`, `reduce`, `filter`

```python
def isupper(s):
    if s.isupper() == True:
        return True
    else:
        return False
```

```python
s_upper = list(filter(isupper, s))
print(s_upper)
```

```python
s = ['Cheddar', 'EDAM', 'Gouda']
s_upper = list(filter(str.isupper, s))
print(s_upper)
```

`list()` – преобразование к листу (инициализация)

Section VII: Листы

Операции `map`, `reduce`, `filter`

```python
def capitalize_all(t):
    res = []
    for s in t:
        res.append(s.capitalize())
    return res

s = ['cheddar', 'edam', 'gouda']
print(capitalize_all(s))
```

```
['Cheddar', 'Edam', 'Gouda']
```

```python
s_cap = list(map(str.capitalize, s))
print(s_cap)
```

```
['Cheddar', 'Edam', 'Gouda']
```

Section VII: Листы

Операции `map`, `reduce`, `filter`

```python
def capitalize_all(t):
    res = []
    for s in t:
        res.append(s.capitalize())
    return res
```

```python
s_cap = list(map(capitalize_all, s))
print(s_cap)
```

```
[['C', 'H', 'E', 'D', 'D', 'A', 'R'], ['E', 'D', 'A', 'M'], ['G', 'O', 'U', 'D', 'A']]
```

Section VII: Листы

Операции `map`, `reduce`, `filter`

```
1   circle_areas = [3.56773, 5.57668, 4.00914, 56.24241, 9.01344, 32.00013]
2
3   result = list(map(round, circle_areas, 2))
4
5   print(result)
```

Section VII: Листы

Операции `map`, `reduce`, `filter`

```
1   circle_areas = [3.56773, 5.57668, 4.00914, 56.24241, 9.01344, 32.00013]
2
3   result = list(map(round, circle_areas, 2))
4
5   print(result)
```

```
TypeError: 'int' [illegible] able
```

Section VII: Листы

Операции `map`, `reduce`, `filter`

```
1   circle_areas = [3.56773, 5.57668, 4.00914, 56.24241, 9.01344, 32.00013]
2
3   result = list(map(round, circle_areas, 2))
4
5   print(result)
```

```
TypeError: 'int' object is not iterable
```

Section VII: Листы

Операции `map`, `reduce`, `filter`

```
1   circle_areas = [3.56773, 5.57668, 4.00914, 56.24241, 9.01344, 32.00013]
2
3   result = list(map(round, circle_areas, 2))
4
5   print(result)
```

```
TypeError: 'int' object is not iterable
```

```
1   circle_areas = [3.56773, 5.57668, 4.00914, 56.24241, 9.01344, 32.00013]
2   decimal_points = [2, 2, 2, 2, 2, 2]
3
4   result = list(map(round, circle_areas, decimal_points))
5
6   print(result)
```

```
[3.57, 5.58, 4.01, 56.24, 9.01, 32.0]
```

Section VII: Листы

Операции `map`, `reduce`, `filter`

```python
def add_all(t):
    total = 0
    for x in t:
        total += x
    return total
```

```python
t = [1, 2, 3]
print(sum(t))
```

```
6
```

```python
from functools import reduce

def custom_sum(a, b):
    return a + b

t = [1, 2, 3]
print(reduce(custom_sum, t))
```

Section VII: Листы

Объекты и значения

```
a = 'banana'
b = 'banana'
```

```
>>> a = 'banana'
>>> b = 'banana'
>>> a is b
```

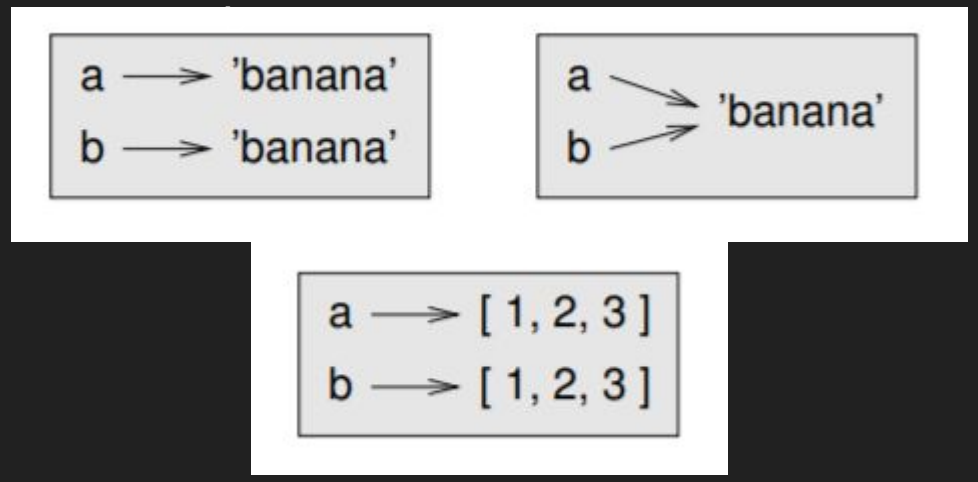
```
True
```

```
>>> a = [1, 2, 3]
>>> b = [1, 2, 3]
>>> a is b
```

```
False
```

Эквивалентност

Идентичность



Почему?

Section VII: Листы

Алиасы

```
>>> a = [1, 2, 3]
>>> b = [1, 2, 3]
>>> a is b
```

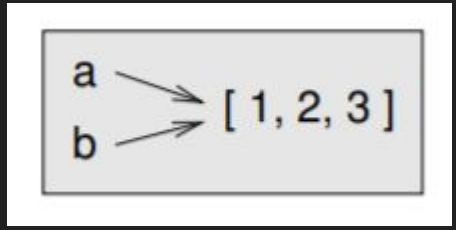
```
False
```

```
>>> a = [1, 2, 3]
>>> b = a
>>> a is b
```

```
True
```

```
>>> b[0] = 17
>>> print a
```

```
[17, 2, 3]
```



Section VIII: Словари

Section VIII: Словари

Словарь – отображение. Инициализация

```
>>> eng2ru = dict()
>>> print(eng2ru)
{}
```

```
>>> eng2ru['one'] = 'один'
```

```
>>> print(eng2ru)
{'one': 'один'}
```

```
eng2ru = {'one': 'один',
          'two': 'два',
          'three': 'три'}
```

```
>>> print(eng2ru)
{'one': 'один', 'two': 'два',
'three': 'три'}
```

```
>>> print(eng2ru['one'])
один
```

```
>>> print(eng2ru['four'])
KeyError: 'four'
```

Section VIII: Словари

Словарь как набор счетчиков

```python
def histogram(input_string):
    count_dict = {}
    for char in input_string:
        if char not in count_dict:
            count_dict[char] = 1
        else:
            count_dict[char] += 1
    return count_dict
```

```python
h = histogram('brontosaurus')
print(h)
```

```
{'b': 1, 'r': 2, 'o': 2, 'n': 1, 't': 1, 's': 2, 'a': 1, 'u': 2}
```

Section VIII: Словари

Словарь как набор счетчиков. Метод `get`

```
1   d = {'a': 1}
2   print(d.get('a', default))
```

```
1
```

```
1   def histogram(input_string):
2       count_dict = {}
3       for i in input_string:
4           count_dict[i] = count_dict.get(i, 0) + 1
5       return count_dict
6
7   h = histogram('brontosaurus')
8   print(h)
```

```
{'b': 1, 'r': 2, 'o': 2, 'n': 1, 't': 1, 's': 2, 'a': 1, 'u': 2}
```

Section VIII: Словари

Словарь как набор счетчиков. Метод `get`

```
1   d = {'a': 1}
2   print(d.get('a', default))
```

```
1
```

```
1   def histogram(input_string):
2       count_dict = {}
3       for i in input_string:
4           count_dict[i] = count_dict.get(i, 0) + 1
5       return count_dict
6
7   h = histogram('brontosaurus')
8   print(h)
```

```
{'b': 1, 'r': 2, 'o': 2, 'n': 1, 't': 1, 's': 2, 'a': 1, 'u': 2}
```

Section VIII: Словари

Итерации по словарю

```
1   def print_dict(dictionary):
2       for key in dictionary:
3           print('{}: {}'.format(key, dictionary[key]))
```

```
1   def print_dict(dictionary):
2       for key, value in dictionary.items():
3           print('{}: {}'.format(key, value))
```

Section VIII: Словари

Методы

https://www.w3schools.com/python/python_ref_dictionary.asp

clear()	Removes all the elements from the dictionary
copy()	Returns a copy of the dictionary
fromkeys()	Returns a dictionary with the specified keys and value
get()	Returns the value of the specified key
items()	Returns a list containing a tuple for each key value pair
keys()	Returns a list containing the dictionary's keys
pop()	Removes the element with the specified key
popitem()	Removes the last inserted key-value pair
setdefault()	Returns the value of the specified key. If the key does not exist: insert the key, with the specified value
update()	Updates the dictionary with the specified key-value pairs
values()	Returns a list of all the values in the dictionary

Section VIII: Словари

Немного о глобальных переменных…

```
1   verbose = True
2
3   def example_1():
4       if verbose:
5           print('Running example_1.')
6
7   example_1()
```

```
Running example_1.
```

```
1   been_called = False
2
3   def example_2():
4       been_called = True
5
6   example_2()
7   print(been_called)
```

```
False
```

Section VIII: Словари

Немного о глобальных переменных…

```python
been_called = False

def example_3():
    global been_called
    been_called = True

example_3()
print(been_called)
```

```
True
```

Section IX: Кортежи (tuples)

Section IX: Кортежи (tuples)

Кортежи: почти как листы, только неизменяемые (immutable)

```
>>> t = 'a', 'b', 'c', 'd', 'e'
```

```
>>> t = ('a', 'b', 'c', 'd', 'e')
```

```
>>> t = tuple('lupins')
>>> print(t)
('l', 'u', 'p', 'i', 'n', 's')
```

```
>>> t[0] = 'A'
TypeError: object doesn't support item assignment
```

```
>>> t = ('A',) + t[1:]
>>> print(t)
('A', 'b', 'c', 'd', 'e')
```

Section IX: Кортежи (tuples)

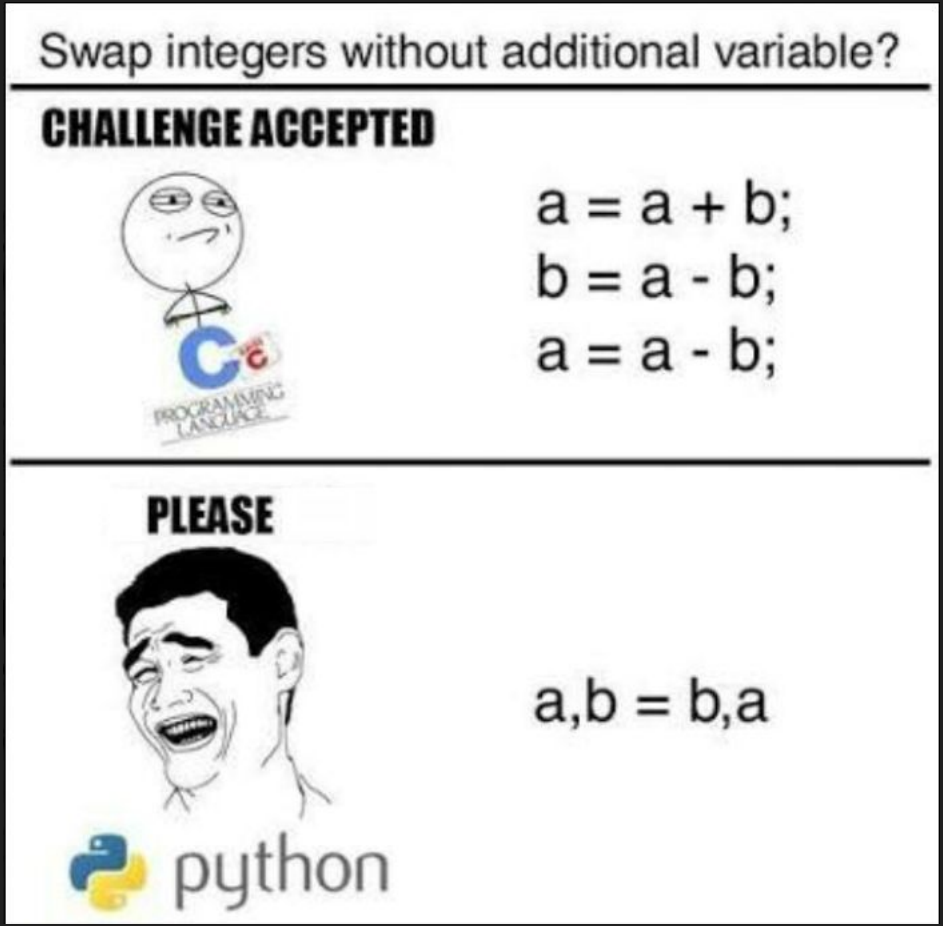
Tuple Assignment

```
>>> temp = a
>>> a = b
>>> b = temp
```

```
>>> a, b = b, a
```

```
>>> a, b = 1, 2, 3
ValueError: too many values to unpack
```

```
>>> addr = 'monty@python.org'
>>> uname, domain = addr.split('@')
```



Section IX: Кортежи (tuples)

Кортеж как возвращаемое значение

```
>>> t = divmod(7, 3)
>>> print(t)
(2, 1)
```

```
>>> quot, rem = divmod(7, 3)
>>> print(quot)
2
>>> print(rem)
1
```

```
>>> def min_max(t):
...     return min(t), max(t)
```

Section IX: Кортежи (tuples)

Переменное количество аргументов

```
>>> def printall(*args):
...     print(args)
```

```
>>> printall(1, 2.0, '3')
(1, 2.0, '3')
```

```
>>> t = (7, 3)
>>> divmod(t)
TypeError: divmod expected 2
arguments, got 1
```

```
>>> divmod(*t)
(2, 1)
```

```
>>> def printall(**kwargs):
...     print(kwargs)
```

```
>>> printall(**{'a': 1, 'b': 2, 'c': 3})
{'a': 1, 'b': 2, 'c': 3}
```

Section IX: Кортежи (tuples)

Кортежи и листы. Функция `zip`

```
>>> s = 'abc'
>>> t = [0, 1, 2]
>>> zip(s, t)
[('a', 0), ('b', 1), ('c', 2)]
```

```
>>> zip('Anne', 'Elk')
[('A', 'E'), ('n', 'l'), ('n', 'k')]
```

```
>>> t = [('a', 0), ('b', 1), ('c', 2)]
>>> for letter, number in t:
...     print(number, letter)
```

Section IX: Кортежи (tuples)

Кортежи и листы. Функции `zip`, `enumerate`

```
1  def has_match(t1, t2):
2      for x, y in zip(t1, t2):
3          if x == y:
4              return True
5      return False
```

```
1  for index, element in enumerate('abc'):
2      print(index, element)
```

```
0 a
1 b
2 c
```

Section IX: Кортежи (tuples)

Кортежи и словари

```
>>> d = {'a':0, 'b':1, 'c':2}
>>> t = d.items()
>>> print(t)
[('a', 0), ('c', 2), ('b', 1)]
```

```
>>> t = [('a', 0), ('c', 2), ('b', 1)]
>>> d = dict(t)
>>> print(d)
{'a': 0, 'c': 2, 'b': 1}
```

```
>>> d = dict(zip('abc', range(3)))
>>> print(d)
{'a': 0, 'c': 2, 'b': 1}
```

Как с помощью zip и dict создать словарь с целочисленными ключами?