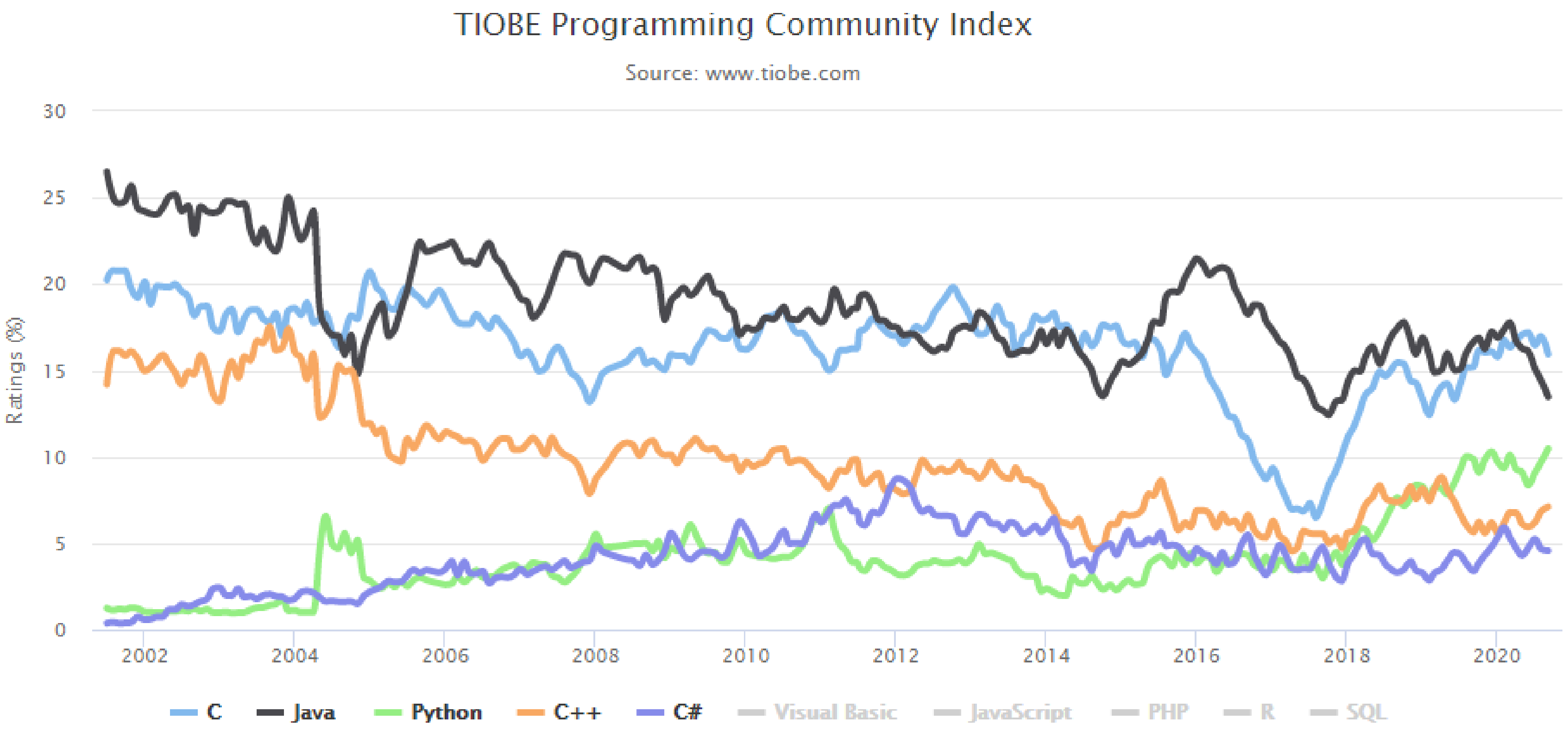
Статистика использования языков

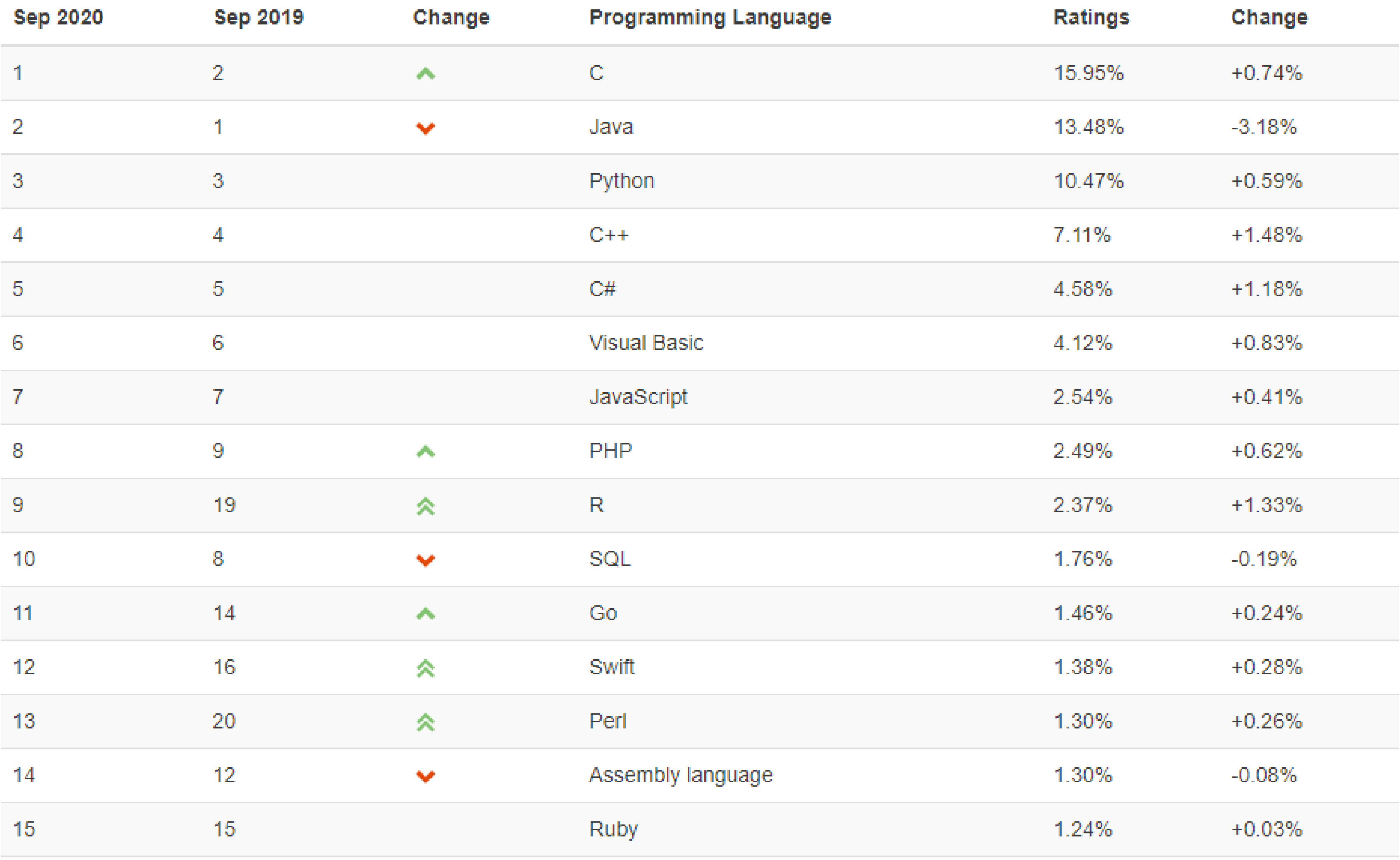


TIOBE Programming Community Index

Source: www.tiobe.com

https://www.tiobe.com/tiobe-index/

Статистика использования языков (2)

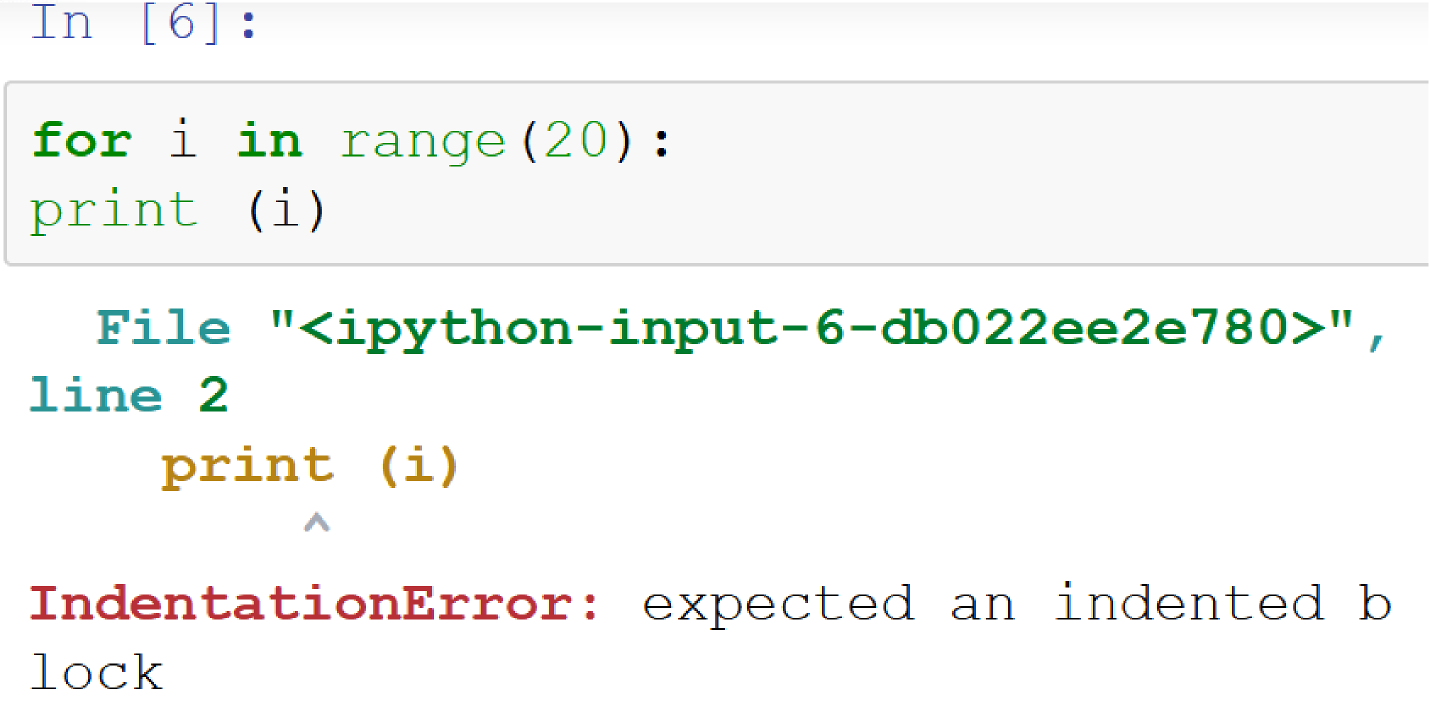


Sep 2020	Sep 2019	Change	Programming Language	Ratings	Change
1	2	⌃	C	15.95%	+0.74%
2	1	⌄	Java	13.48%	-3.18%
3	3		Python	10.47%	+0.59%
4	4		C++	7.11%	+1.48%
5	5		C#	4.58%	+1.18%
6	6		Visual Basic	4.12%	+0.83%
7	7		JavaScript	2.54%	+0.41%
8	9	⌃	PHP	2.49%	+0.62%
9	19	⇈	R	2.37%	+1.33%
10	8	⌄	SQL	1.76%	-0.19%
11	14	⌃	Go	1.46%	+0.24%
12	16	⇈	Swift	1.38%	+0.28%
13	20	⇈	Perl	1.30%	+0.26%
14	12	⌄	Assembly language	1.30%	-0.08%
15	15		Ruby	1.24%	+0.03%

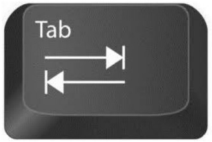
Языки программирования лидеров IT-рынка

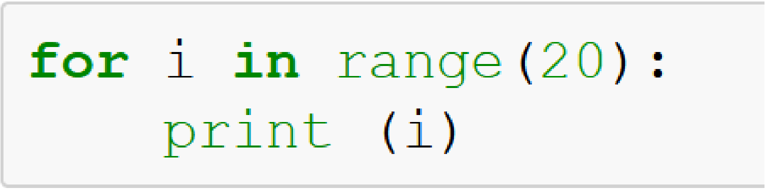
SAMSUNG	C, C++, Java, Python, JavaScript
Microsoft	C, C++, C#, HTML5/JavaScript
Google	C, C++, Java, Python, Go, HTML5/JavaScript
	Objective-C, Swift
facebook	PHP, HTML5/JavaScript, Hack
Интернет-стартапы	Python, Ruby

Особенности языка Python



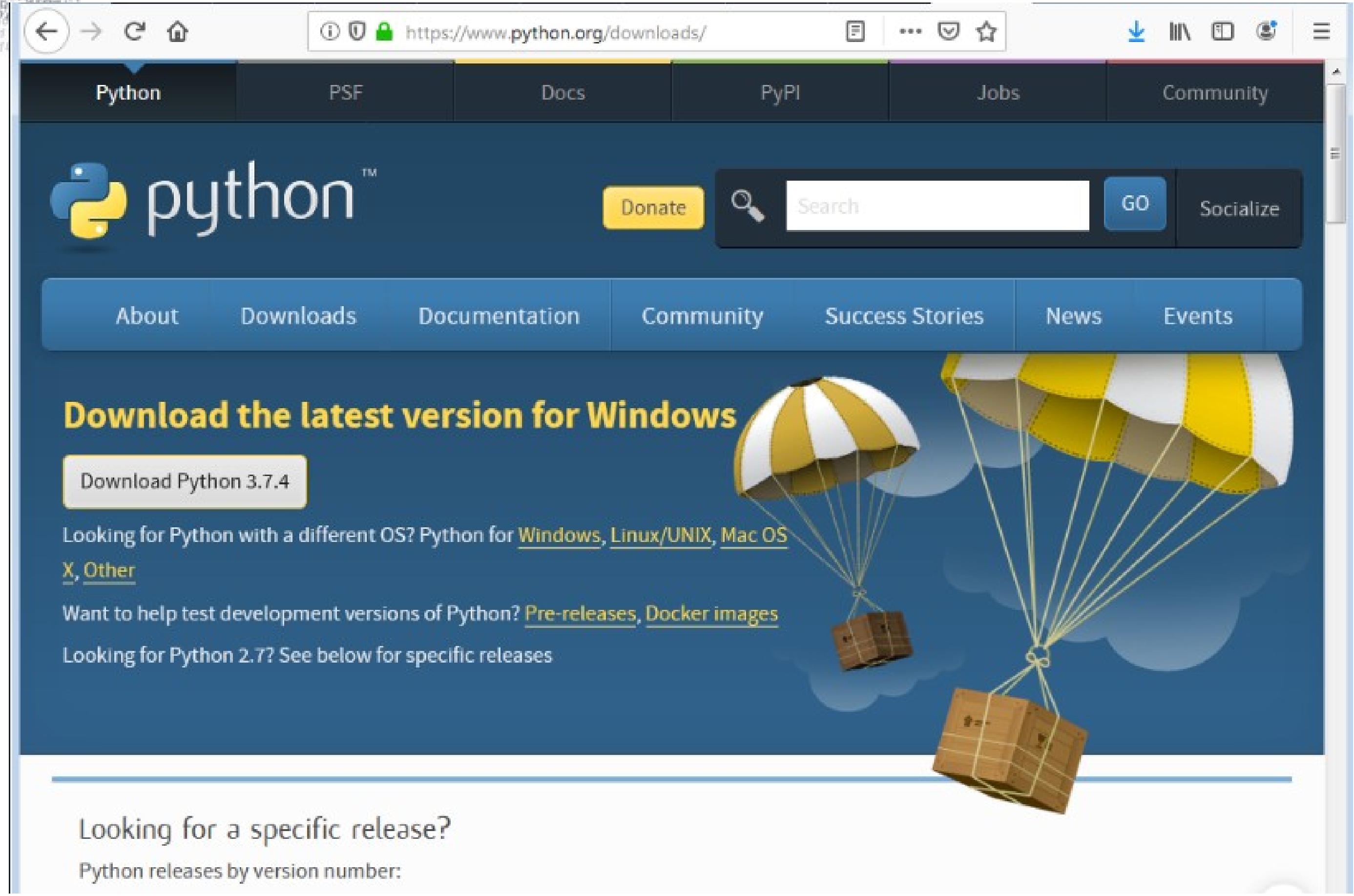
```
In [6]:

for i in range(20):
print (i)

  File "<ipython-input-6-db022ee2e780>",
line 2
    print (i)
        ^

IndentationError: expected an indented b
lock
```





```
for i in range(20):
    print (i)
```

Установка



Download the latest version for Windows

Download Python 3.7.4

Looking for Python with a different OS? Python for Windows, Linux/UNIX, Mac OS X, Other

Want to help test development versions of Python? Pre-releases, Docker images

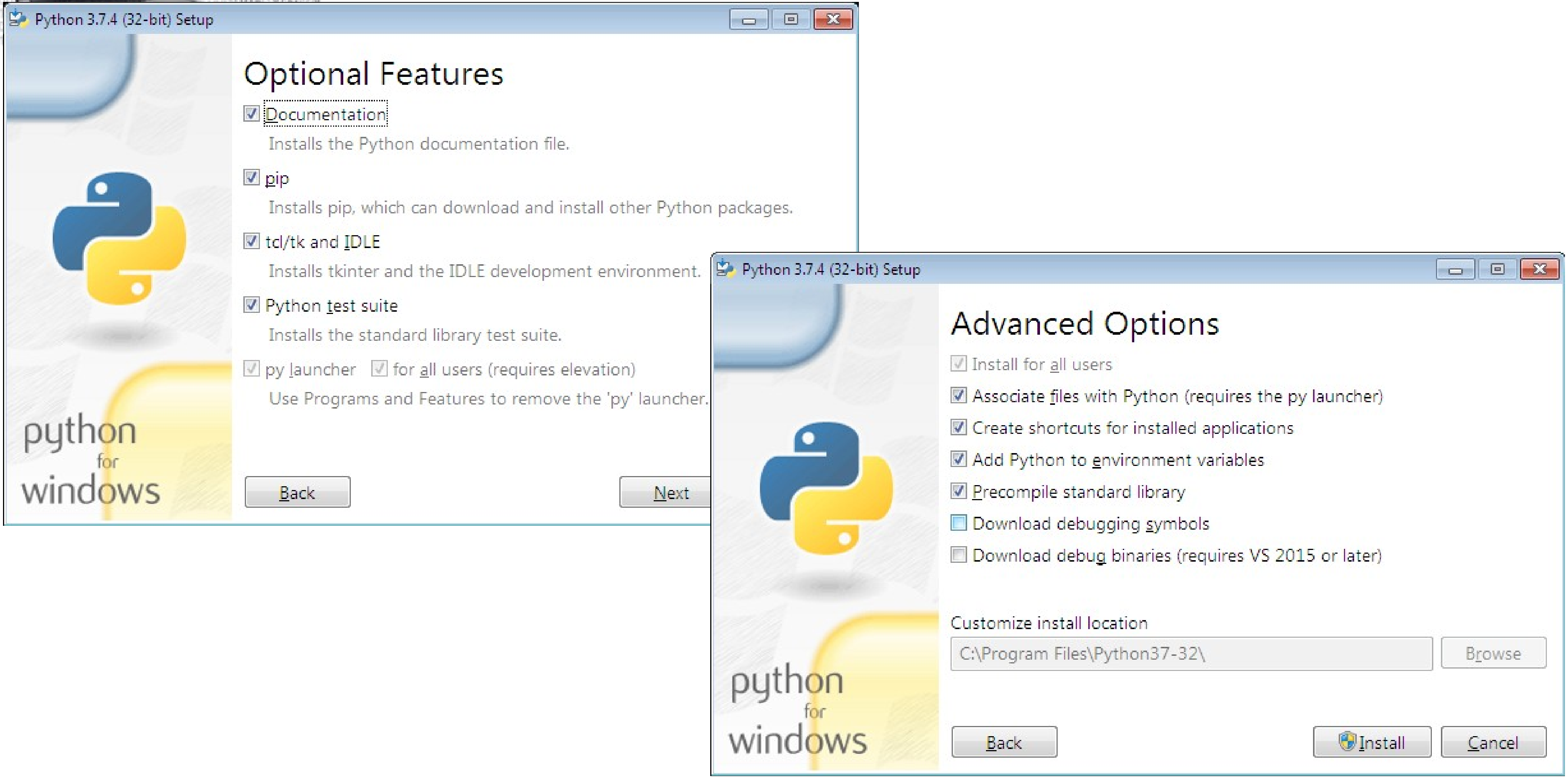
Looking for Python 2.7? See below for specific releases

Looking for a specific release?

Python releases by version number:

https://www.python.org/downloads/

Установка(2)



Python 3.7.4 (32-bit) Setup

Optional Features

☑ Documentation

Installs the Python documentation file.

☑ pip

Installs pip, which can download and install other Python packages.

☑ tcl/tk and IDLE

Installs tkinter and the IDLE development environment.

☑ Python test suite

Installs the standard library test suite.

☑ py launcher ☑ for all users (requires elevation)

Use Programs and Features to remove the 'py' launcher.

Python 3.7.4 (32-bit) Setup

Advanced Options

☑ Install for all users

☑ Associate files with Python (requires the py launcher)

☑ Create shortcuts for installed applications

☑ Add Python to environment variables

☑ Precompile standard library

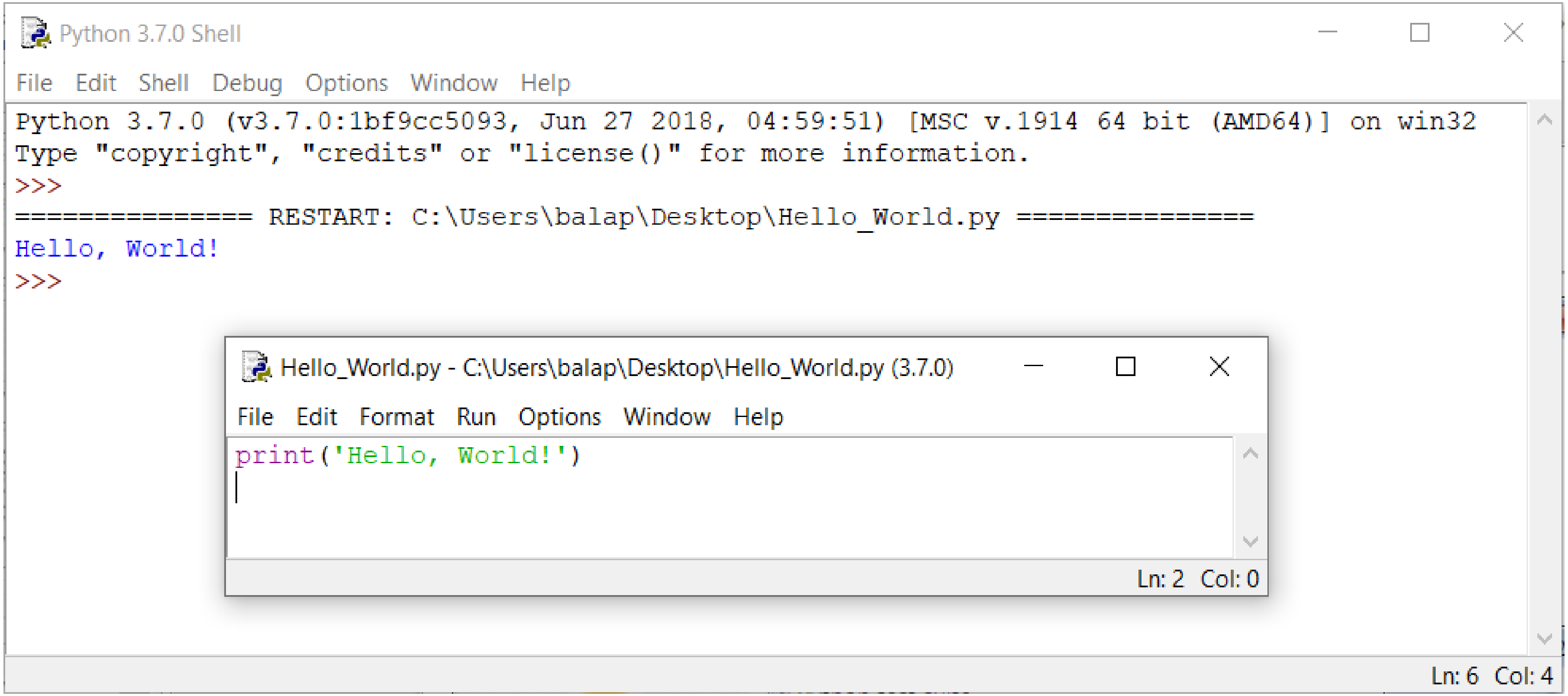
☐ Download debugging symbols

☐ Download debug binaries (requires VS 2015 or later)

Customize install location

C:\Program Files\Python37-32\

Hello, world!



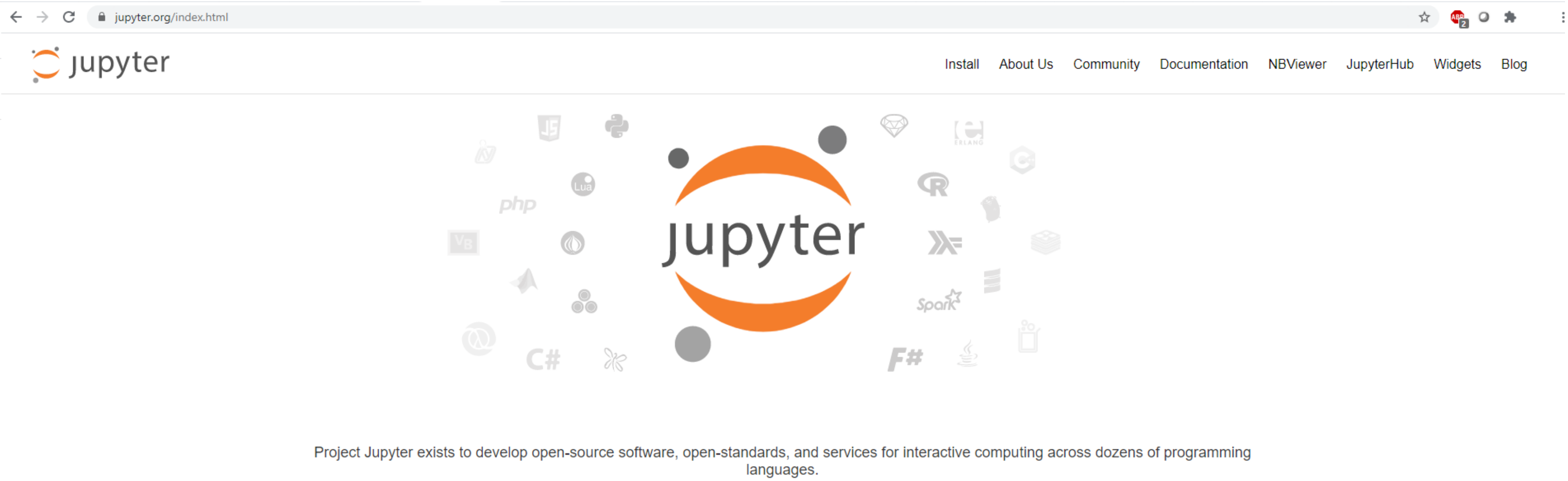
Python 3.7.0 Shell
File Edit Shell Debug Options Window Help
Ln: 6 Col: 4

```
Python 3.7.0 (v3.7.0:1bf9cc5093, Jun 27 2018, 04:59:51) [MSC v.1914 64 bit (AMD64)] on win32
Type "copyright", "credits" or "license()" for more information.
>>> 
=============== RESTART: C:\Users\balap\Desktop\Hello_World.py ===============
Hello, World!
>>> 
```

Hello_World.py - C:\Users\balap\Desktop\Hello_World.py (3.7.0)
File Edit Format Run Options Window Help
Ln: 2 Col: 0

```python
print('Hello, World!')
```

Environmnet Jupyter



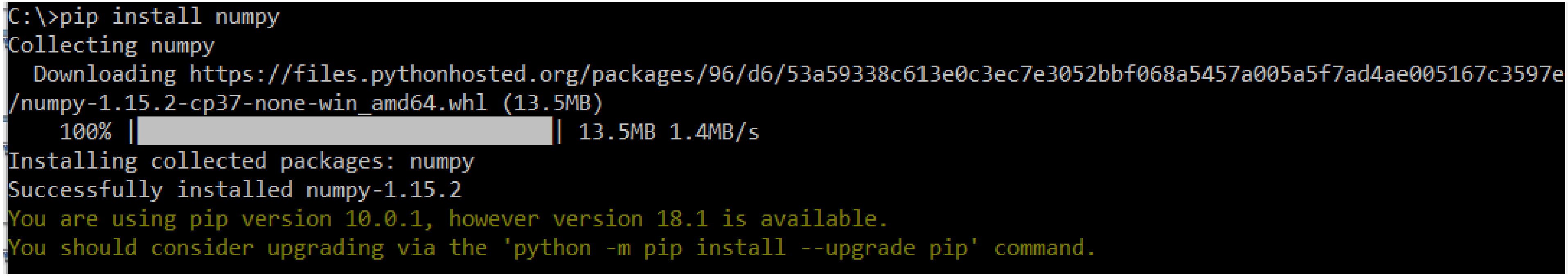
Project Jupyter exists to develop open-source software, open-standards, and services for interactive computing across dozens of programming languages.

Примеры команд

pip install --upgrade ipython jupyter
pip install jupyterlab

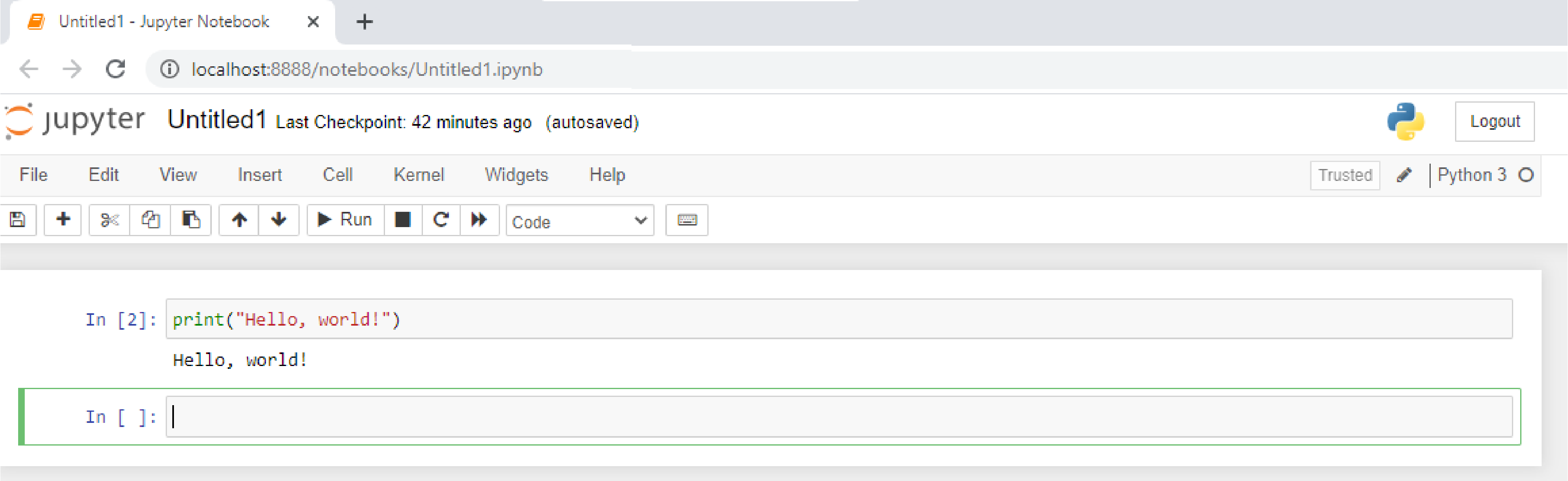
cd C:\Users\<USER_NAME>\AppData\Local\Programs\Python\Python37\Scripts

jupyter-notebook.exe



```
C:\>pip install numpy
Collecting numpy
  Downloading https://files.pythonhosted.org/packages/96/d6/53a59338c613e0c3ec7e3052bbf068a5457a005a5f7ad4ae005167c3597e
/numpy-1.15.2-cp37-none-win_amd64.whl (13.5MB)
    100% |████████████████████████████████| 13.5MB 1.4MB/s
Installing collected packages: numpy
Successfully installed numpy-1.15.2
You are using pip version 10.0.1, however version 18.1 is available.
You should consider upgrading via the 'python -m pip install --upgrade pip' command.
```

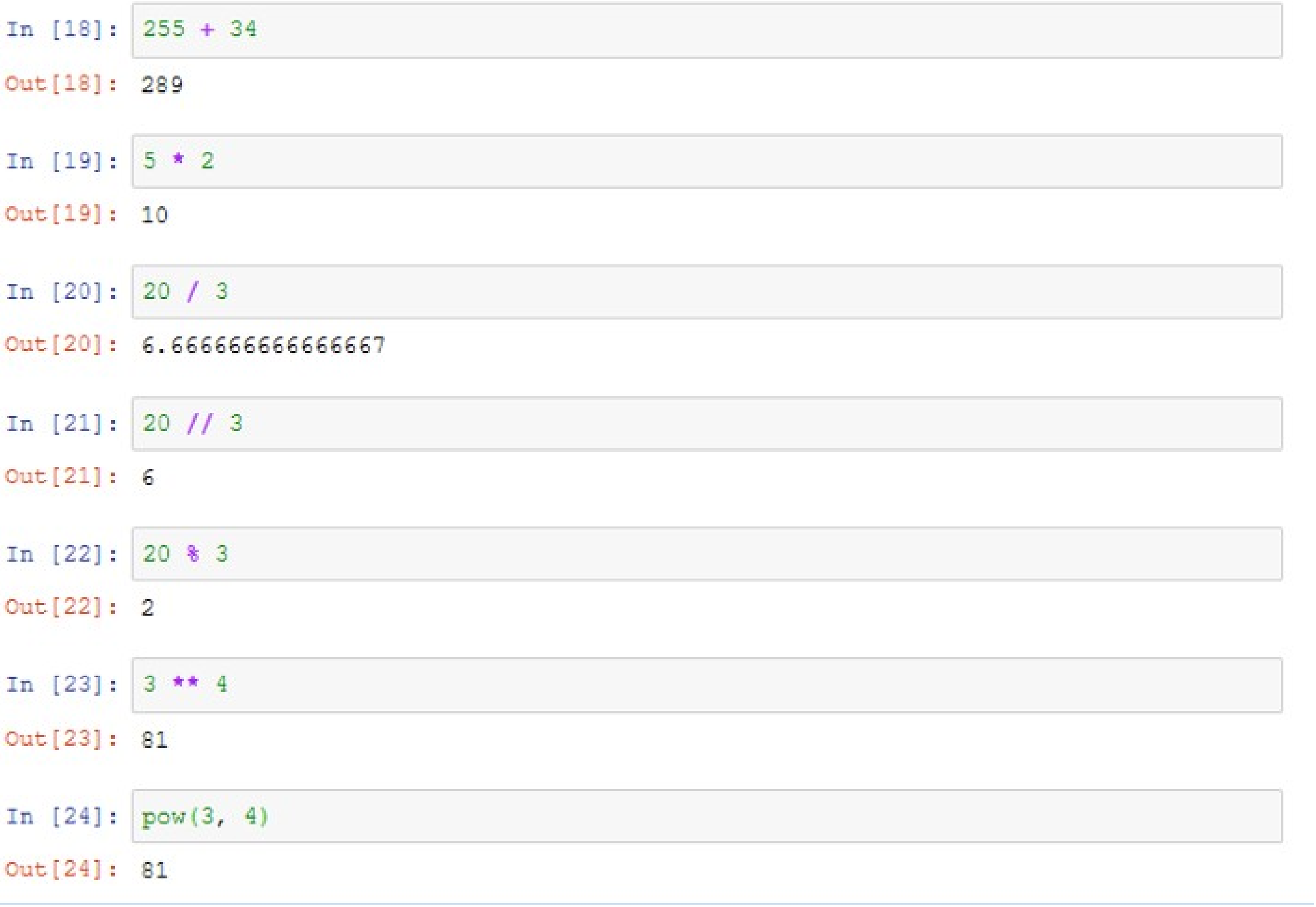
Hello, world! (2)



Untitled1 - Jupyter Notebook
localhost:8888/notebooks/Untitled1.ipynb
jupyter Untitled1 Last Checkpoint: 42 minutes ago (autosaved)
Logout
File
Edit
View
Insert
Cell
Kernel
Widgets
Help
Trusted
Python 3
Run
Code

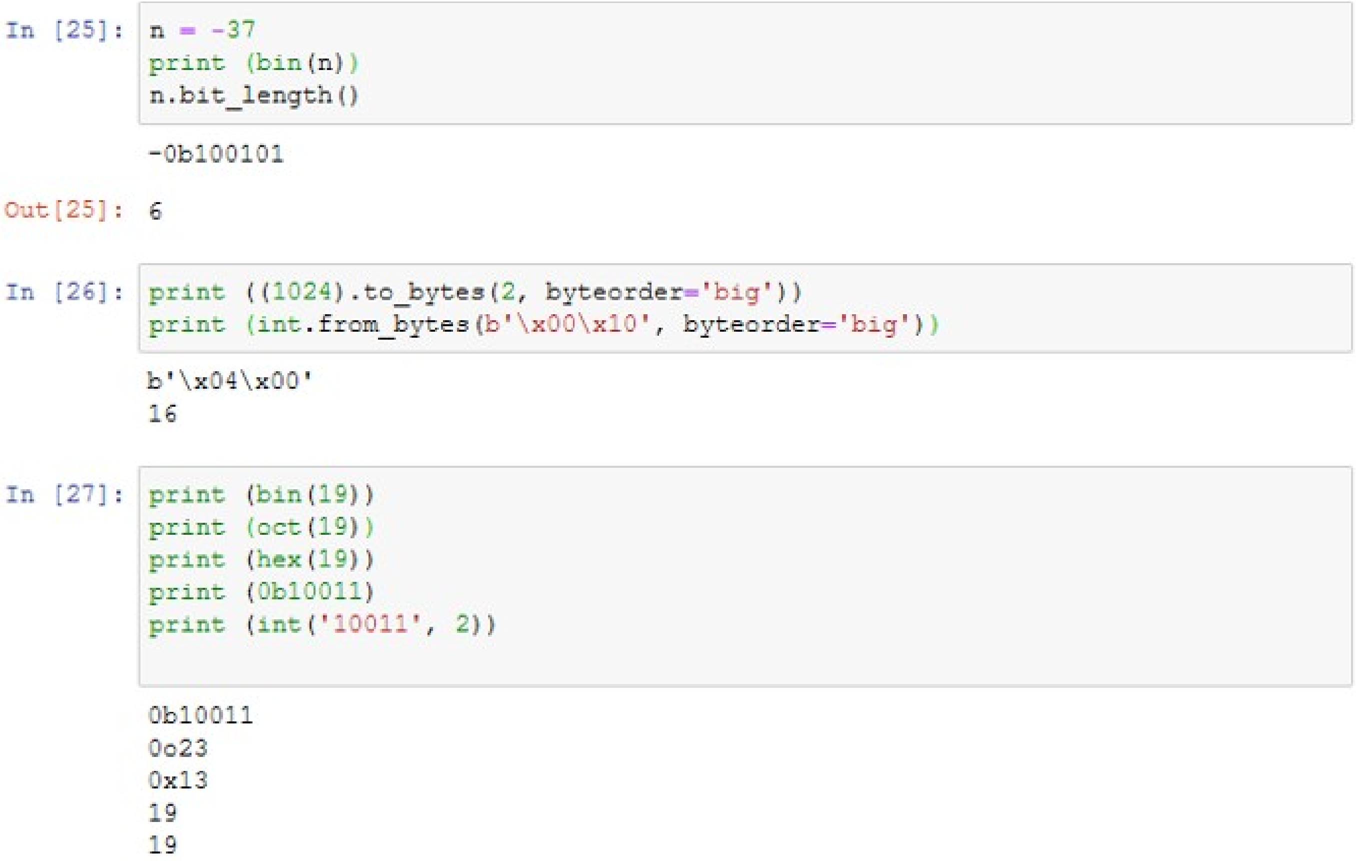
```
In [2]: print("Hello, world!")

        Hello, world!

In [ ]: 
```

Функции в Python



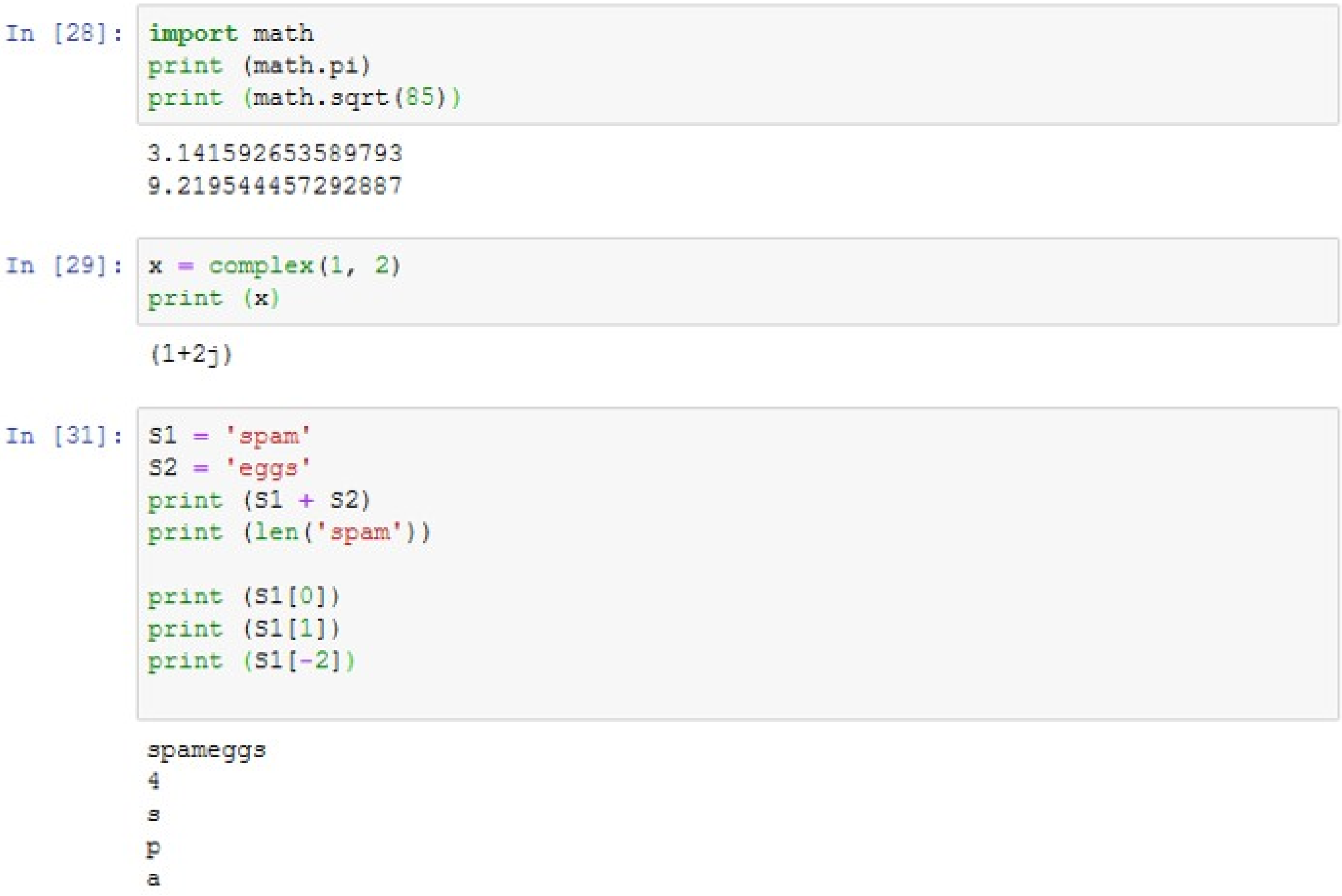
```
In [18]: 255 + 34

Out[18]: 289

In [19]: 5 * 2

Out[19]: 10

In [20]: 20 / 3

Out[20]: 6.666666666666667

In [21]: 20 // 3

Out[21]: 6

In [22]: 20 % 3

Out[22]: 2

In [23]: 3 ** 4

Out[23]: 81

In [24]: pow(3, 4)

Out[24]: 81
```

Функции в Python(2)



```
In [25]: n = -37
         print (bin(n))
         n.bit_length()

         -0b100101

Out[25]: 6

In [26]: print ((1024).to_bytes(2, byteorder='big'))
         print (int.from_bytes(b'\x00\x10', byteorder='big'))

         b'\x04\x00'
         16

In [27]: print (bin(19))
         print (oct(19))
         print (hex(19))
         print (0b10011)
         print (int('10011', 2))

         0b10011
         0o23
         0x13
         19
         19
```

Функции в Python(3)



```
In [28]: import math
         print (math.pi)
         print (math.sqrt(85))
```

```
3.141592653589793
9.219544457292887
```

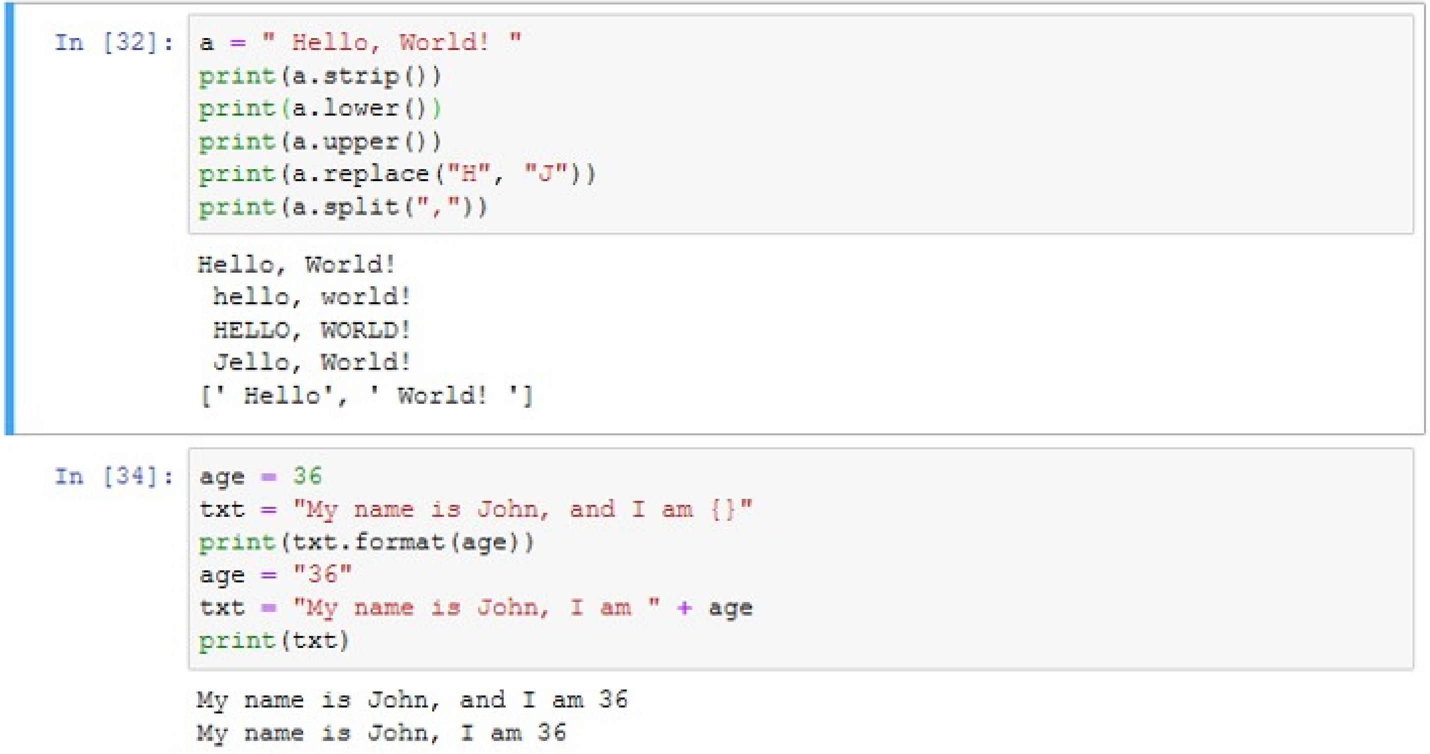
```
In [29]: x = complex(1, 2)
         print (x)
```

```
(1+2j)
```

```
In [31]: S1 = 'spam'
         S2 = 'eggs'
         print (S1 + S2)
         print (len('spam'))

         print (S1[0])
         print (S1[1])
         print (S1[-2])
```

```
spameggs
4
s
p
a
```

Функции в Python(4)



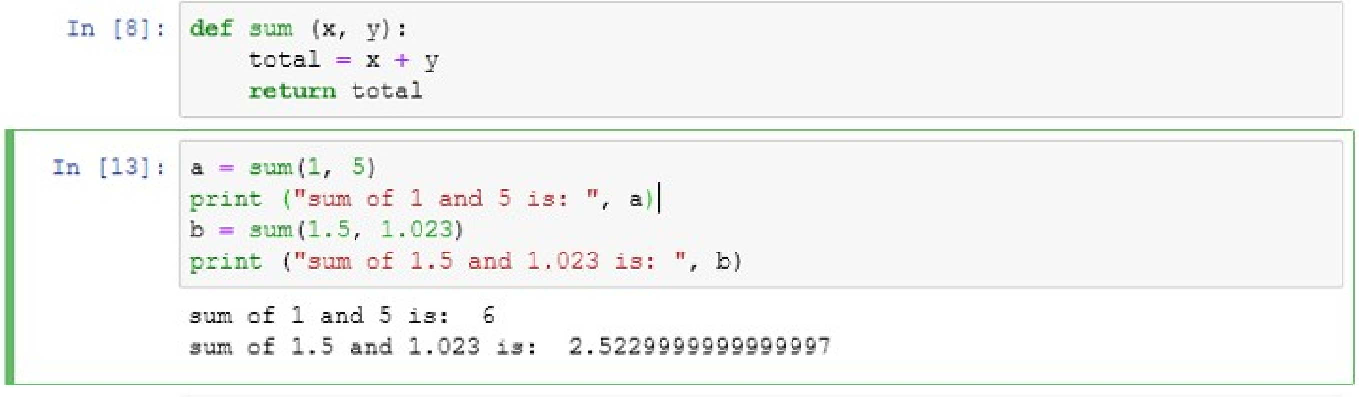
```
In [32]: a = " Hello, World! "
         print(a.strip())
         print(a.lower())
         print(a.upper())
         print(a.replace("H", "J"))
         print(a.split(","))
```

```
Hello, World!
 hello, world!
 HELLO, WORLD!
 Jello, World!
[' Hello', ' World! ']
```

```
In [34]: age = 36
         txt = "My name is John, and I am {}"
         print(txt.format(age))
         age = "36"
         txt = "My name is John, I am " + age
         print(txt)
```

```
My name is John, and I am 36
My name is John, I am 36
```

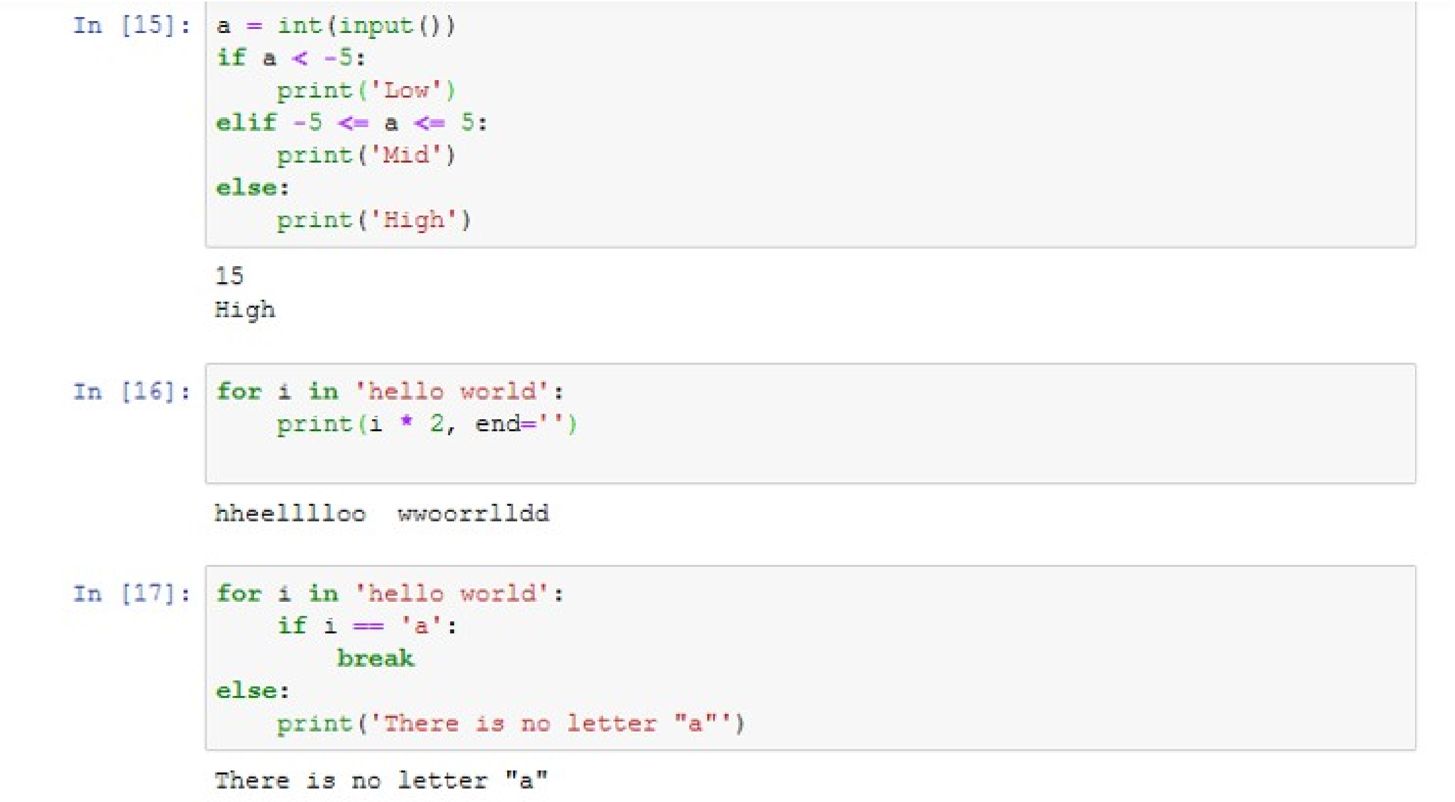
Функции в Python(5)



```
In [8]:  def sum (x, y):
             total = x + y
             return total
```

```
In [13]: a = sum(1, 5)
         print ("sum of 1 and 5 is: ", a)
         b = sum(1.5, 1.023)
         print ("sum of 1.5 and 1.023 is: ", b)

         sum of 1 and 5 is:  6
         sum of 1.5 and 1.023 is:  2.5229999999999997
```

Функции в Python(6)

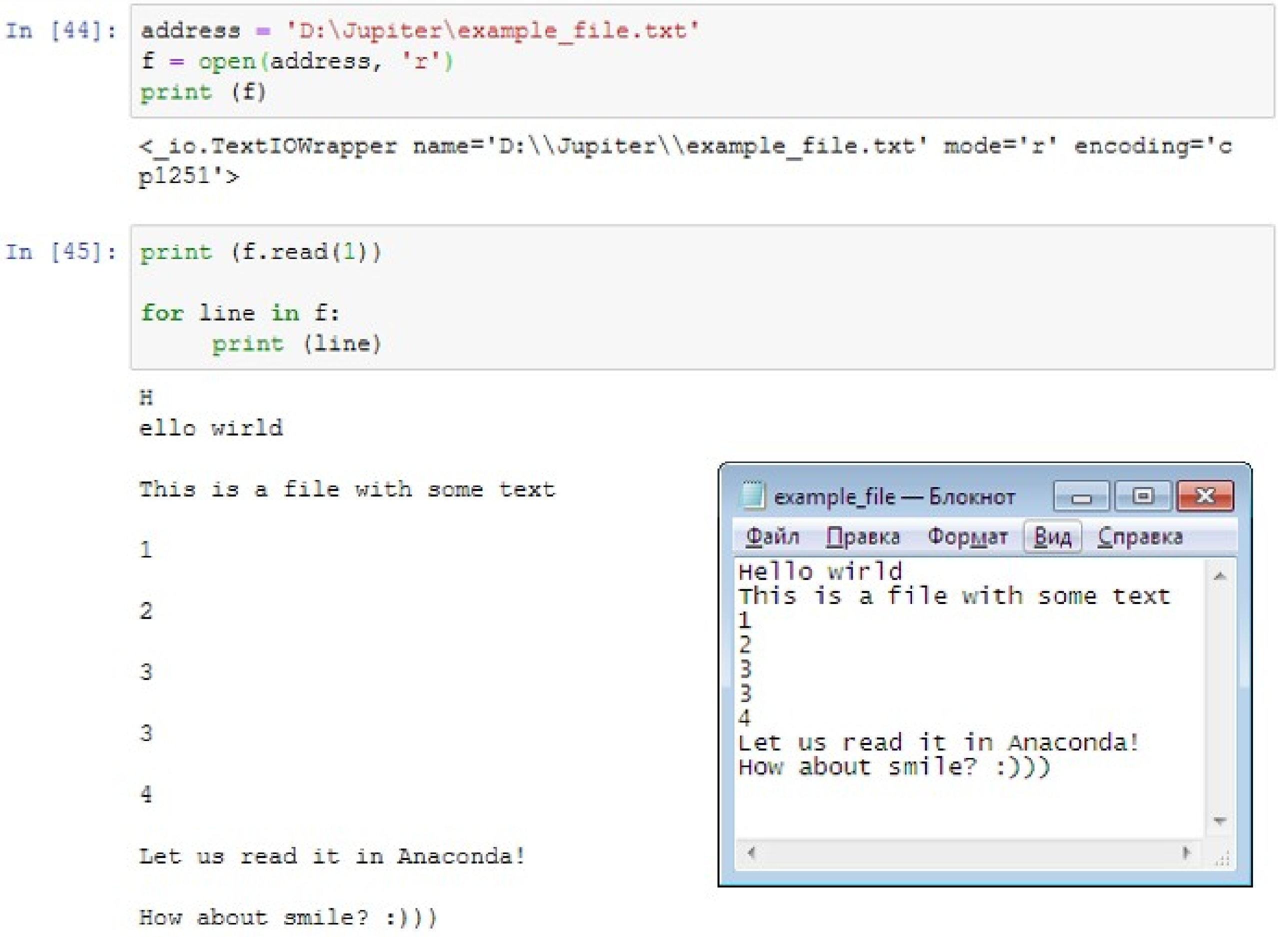


```
In [15]: a = int(input())
         if a < -5:
             print('Low')
         elif -5 <= a <= 5:
             print('Mid')
         else:
             print('High')

         15
         High
```

```
In [16]: for i in 'hello world':
             print(i * 2, end='')

         hheelllloo  wwoorrlldd
```

```
In [17]: for i in 'hello world':
             if i == 'a':
                 break
         else:
             print('There is no letter "a"')

         There is no letter "a"
```

Работа с файлами в Python



```
In [44]: address = 'D:\Jupiter\example_file.txt'
         f = open(address, 'r')
         print (f)
```

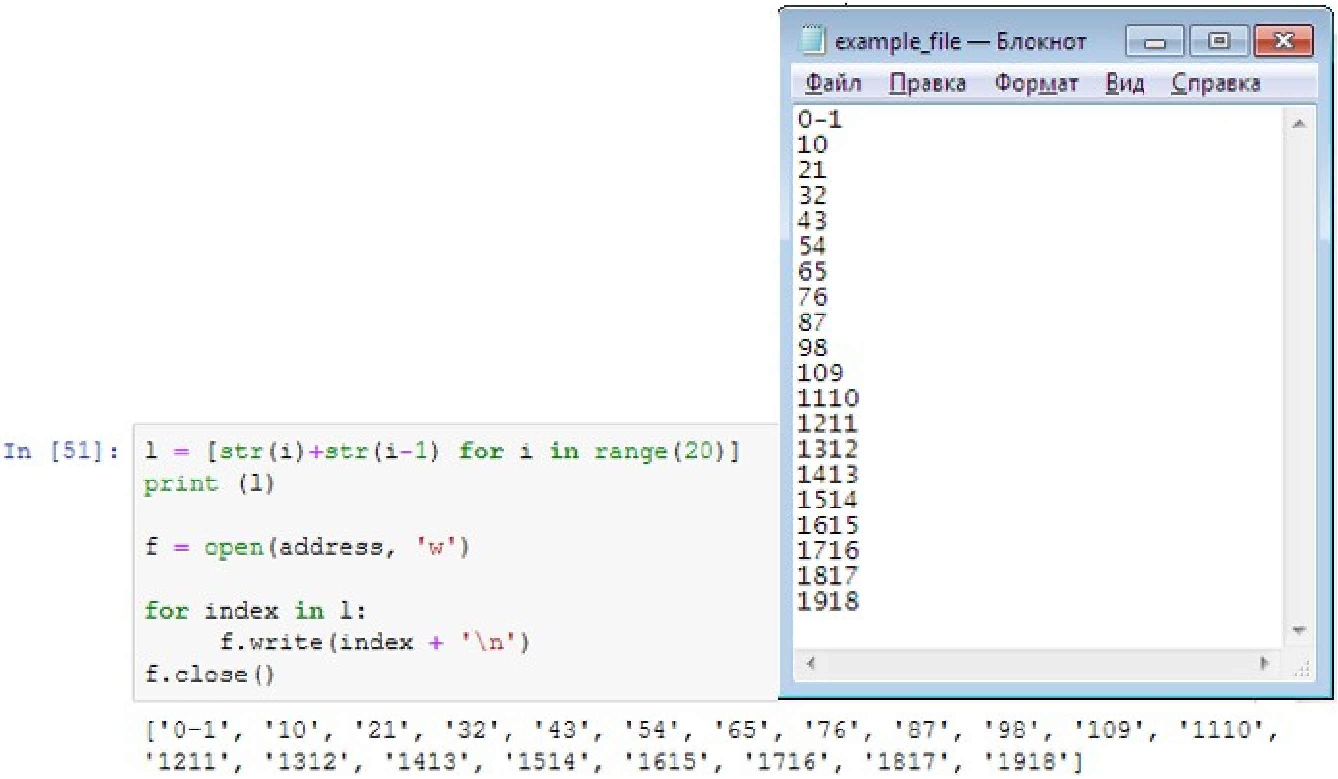
```
<_io.TextIOWrapper name='D:\\Jupiter\\example_file.txt' mode='r' encoding='c
p1251'>
```

```
In [45]: print (f.read(1))

         for line in f:
             print (line)
```

```
H
ello wirld

This is a file with some text

1

2

3

3

4

Let us read it in Anaconda!

How about smile? :)))
```

```
Hello wirld
This is a file with some text
1
2
3
3
4
Let us read it in Anaconda!
How about smile? :)))
```

Работа с файлами в Python(2)

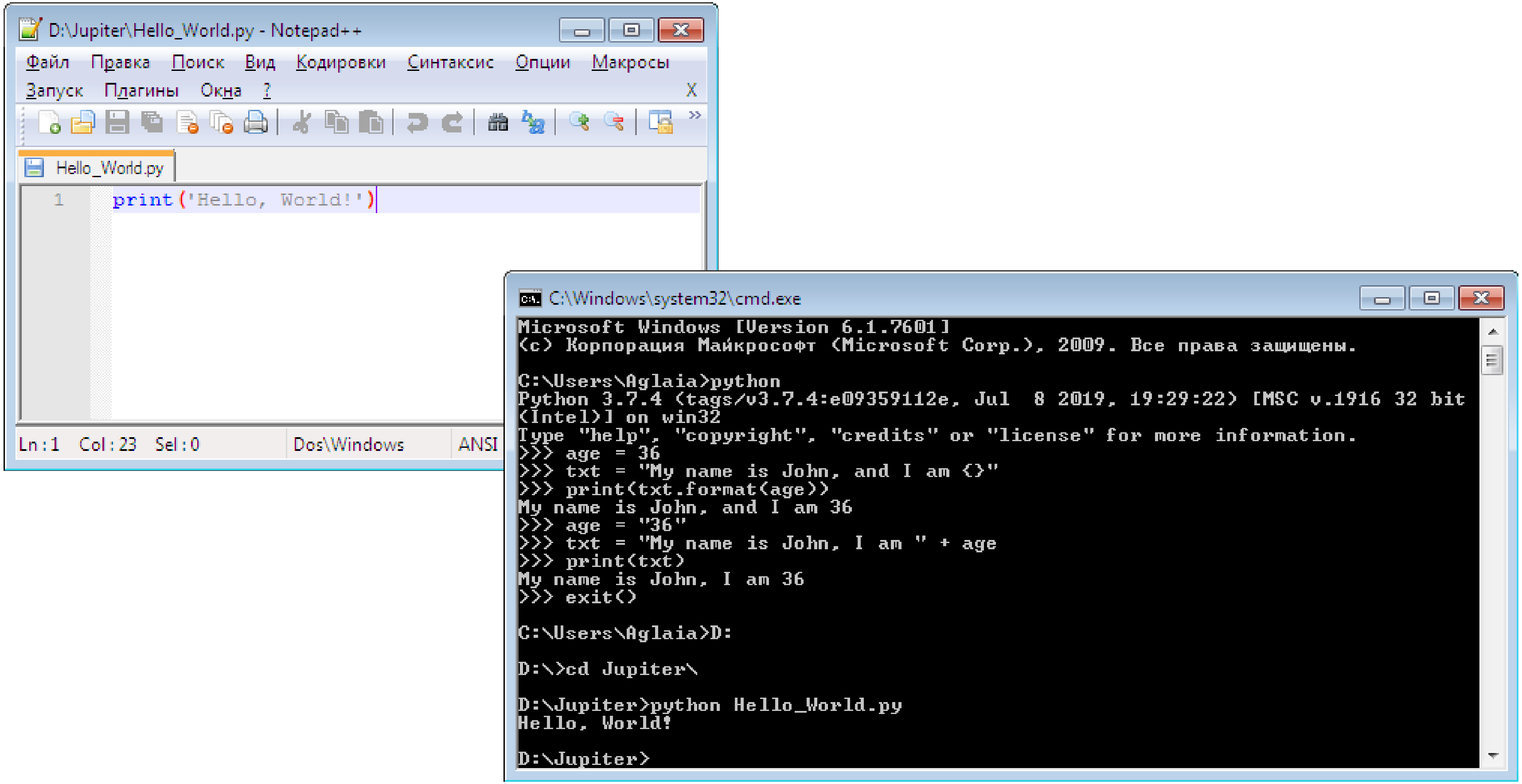


```
0-1
10
21
32
43
54
65
76
87
98
109
1110
1211
1312
1413
1514
1615
1716
1817
1918
```

```
In [51]: l = [str(i)+str(i-1) for i in range(20)]
         print (l)

         f = open(address, 'w')

         for index in l:
             f.write(index + '\n')
         f.close()
```

```
['0-1', '10', '21', '32', '43', '54', '65', '76', '87', '98', '109', '1110',
'1211', '1312', '1413', '1514', '1615', '1716', '1817', '1918']
```

Запуск из командной строки



D:\Jupiter\Hello_World.py - Notepad++
Файл Правка Поиск Вид Кодировки Синтаксис Опции Макросы
Запуск Плагины Окна ?
Hello_World.py
Ln : 1 Col : 23 Sel : 0
Dos\Windows
ANSI
C:\Windows\system32\cmd.exe

```python
print('Hello, World!')
```

```
Microsoft Windows [Version 6.1.7601]
(c) Корпорация Майкрософт (Microsoft Corp.), 2009. Все права защищены.

C:\Users\Aglaia>python
Python 3.7.4 (tags/v3.7.4:e09359112e, Jul  8 2019, 19:29:22) [MSC v.1916 32 bit
(Intel)] on win32
Type "help", "copyright", "credits" or "license" for more information.
>>> age = 36
>>> txt = "My name is John, and I am {}"
>>> print(txt.format(age))
My name is John, and I am 36
>>> age = "36"
>>> txt = "My name is John, I am " + age
>>> print(txt)
My name is John, I am 36
>>> exit()

C:\Users\Aglaia>D:

D:\>cd Jupiter\

D:\Jupiter>python Hello_World.py
Hello, World!

D:\Jupiter>
```

Полезные функции для работы со строками

capitalize()	Converts the first character to upper case	ljust()	Returns a left justified version of the string
casefold()	Converts string into lower case	lower()	Converts a string into lower case
center()	Returns a centered string	lstrip()	Returns a left trim version of the string
count()	Returns the number of times a specified value occurs in a string	maketrans()	Returns a translation table to be used in translations
encode()	Returns an encoded version of the string	partition()	Returns a tuple where the string is parted into three parts
endswith()	Returns true if the string ends with the specified value	replace()	Returns a string where a specified value is replaced with a specified value
expandtabs()	Sets the tab size of the string	rfind()	Searches the string for a specified value and returns the last position of where it was found
find()	Searches the string for a specified value and returns the position of where it was found	rindex()	Searches the string for a specified value and returns the last position of where it was found
format()	Formats specified values in a string	rjust()	Returns a right justified version of the string
format_map()	Formats specified values in a string	rpartition()	Returns a tuple where the string is parted into three parts
index()	Searches the string for a specified value and returns the position of where it was found	rsplit()	Splits the string at the specified separator, and returns a list
isalnum()	Returns True if all characters in the string are alphanumeric	rstrip()	Returns a right trim version of the string
isalpha()	Returns True if all characters in the string are in the alphabet	split()	Splits the string at the specified separator, and returns a list
isdecimal()	Returns True if all characters in the string are decimals	splitlines()	Splits the string at line breaks and returns a list

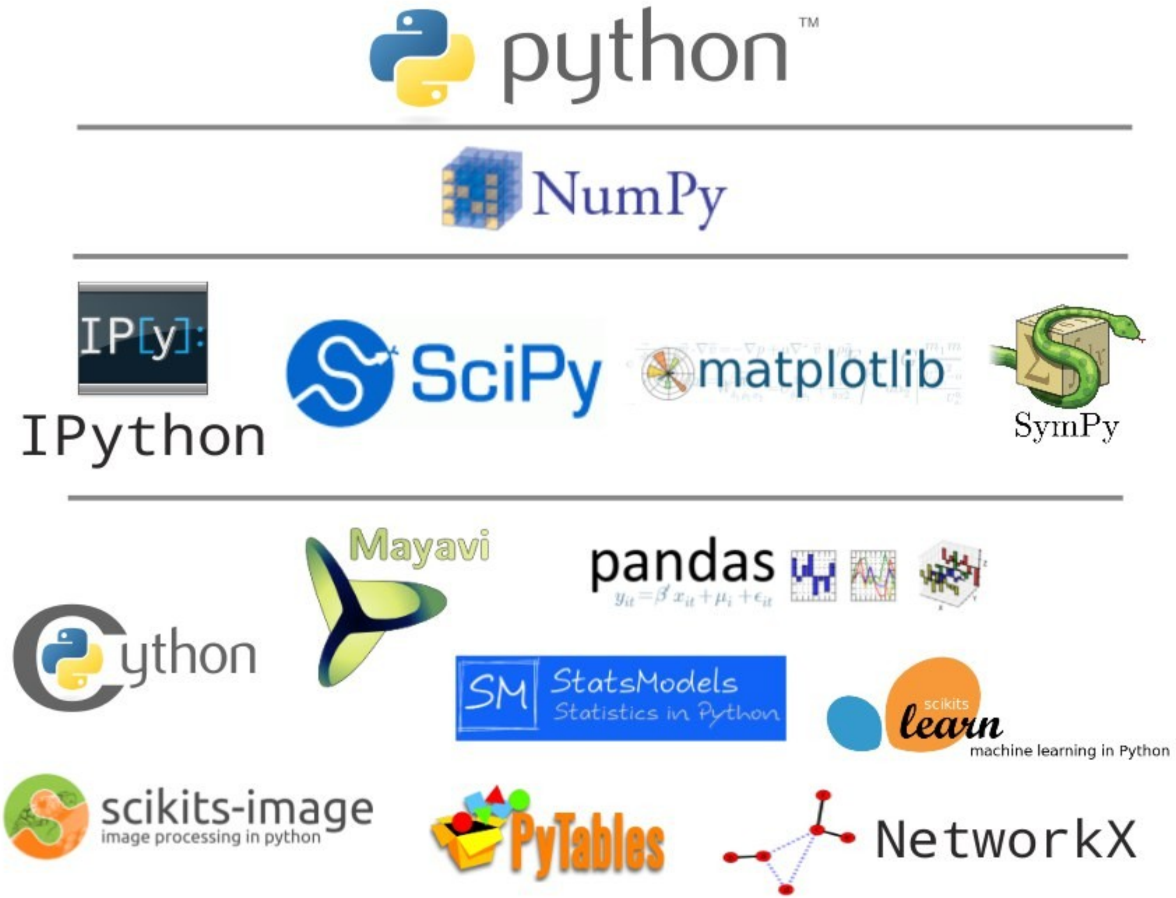
Полезные функции для работы со строками(2)

isdigit()	Returns True if all characters in the string are digits	startswith()	Returns true if the string starts with the specified value
isidentifier()	Returns True if the string is an identifier	strip()	Returns a trimmed version of the string
islower()	Returns True if all characters in the string are lower case	swapcase()	Swaps cases, lower case becomes upper case and vice versa
isnumeric()	Returns True if all characters in the string are numeric	title()	Converts the first character of each word to upper case
isprintable()	Returns True if all characters in the string are printable	translate()	Returns a translated string
isspace()	Returns True if all characters in the string are whitespaces	upper()	Converts a string into upper case
istitle()	Returns True if the string follows the rules of a title	zfill()	Fills the string with a specified number of 0 values at the beginning
isupper()	Returns True if all characters in the string are upper case	ljust()	Returns a left justified version of the string
join()	Joins the elements of an iterable to the end of the string	lower()	Converts a string into lower case
capitalize()	Converts the first character to upper case	lstrip()	Returns a left trim version of the string
casefold()	Converts string into lower case	maketrans()	Returns a translation table to be used in translations
center()	Returns a centered string	partition()	Returns a tuple where the string is parted into three parts
count()	Returns the number of times a specified value occurs in a string	replace()	Returns a string where a specified value is replaced with a specified value
encode()	Returns an encoded version of the string	rfind()	Searches the string for a specified value and returns the last position of where it was found
endswith()	Returns true if the string ends with the specified value	rindex()	Searches the string for a specified value and returns the last position of where it was found

Полезные функции для работы со строками(3)

expandtabs()	Sets the tab size of the string	rjust()	Returns a right justified version of the string
find()	Searches the string for a specified value and returns the position of where it was found	rpartition()	Returns a tuple where the string is parted into three parts
format()	Formats specified values in a string	rsplit()	Splits the string at the specified separator, and returns a list
format_map()	Formats specified values in a string	rstrip()	Returns a right trim version of the string
index()	Searches the string for a specified value and returns the position of where it was found	split()	Splits the string at the specified separator, and returns a list

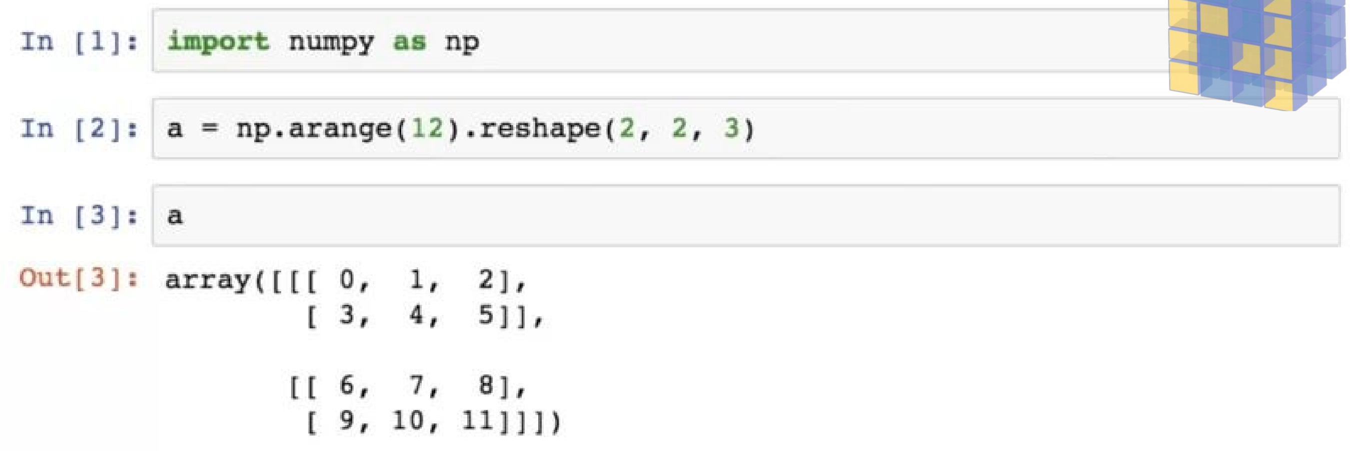
Дополнительные библиотеки и пакеты


python™
NumPy
IP[y]: IPython
SciPy
matplotlib
SymPy
Mayavi
pandas
$y_{it} = \beta' x_{it} + \mu_i + \epsilon_{it}$
Cython
SM StatsModels Statistics in Python
scikits learn machine learning in Python
scikits-image image processing in python
PyTables
NetworkX

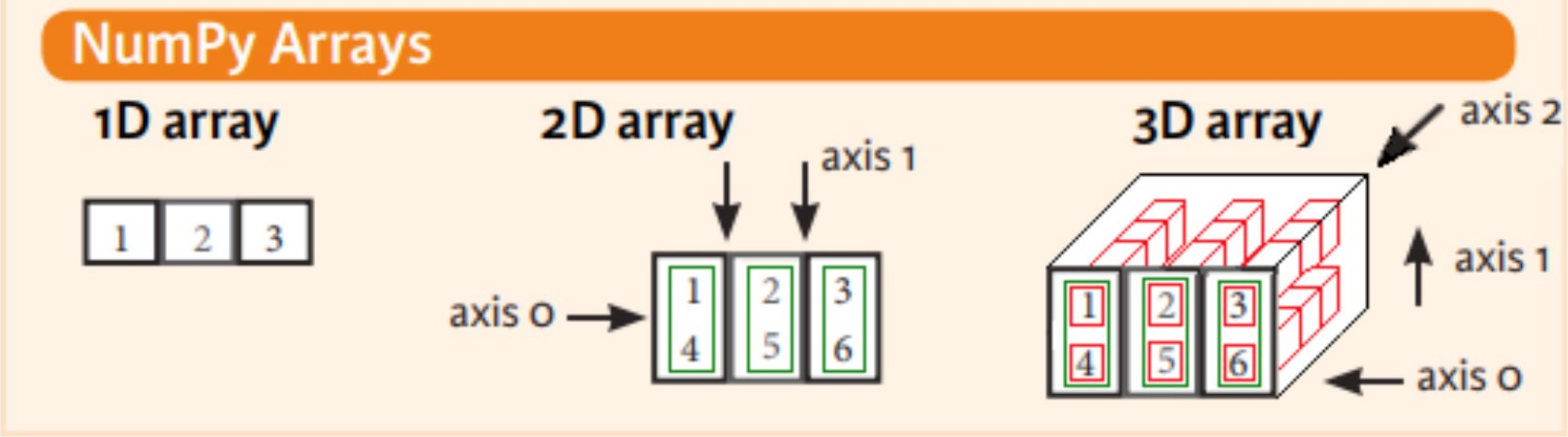
По материалам Жумагулова Я.В.

Дополнительные библиотеки и пакеты(2)

NumPy

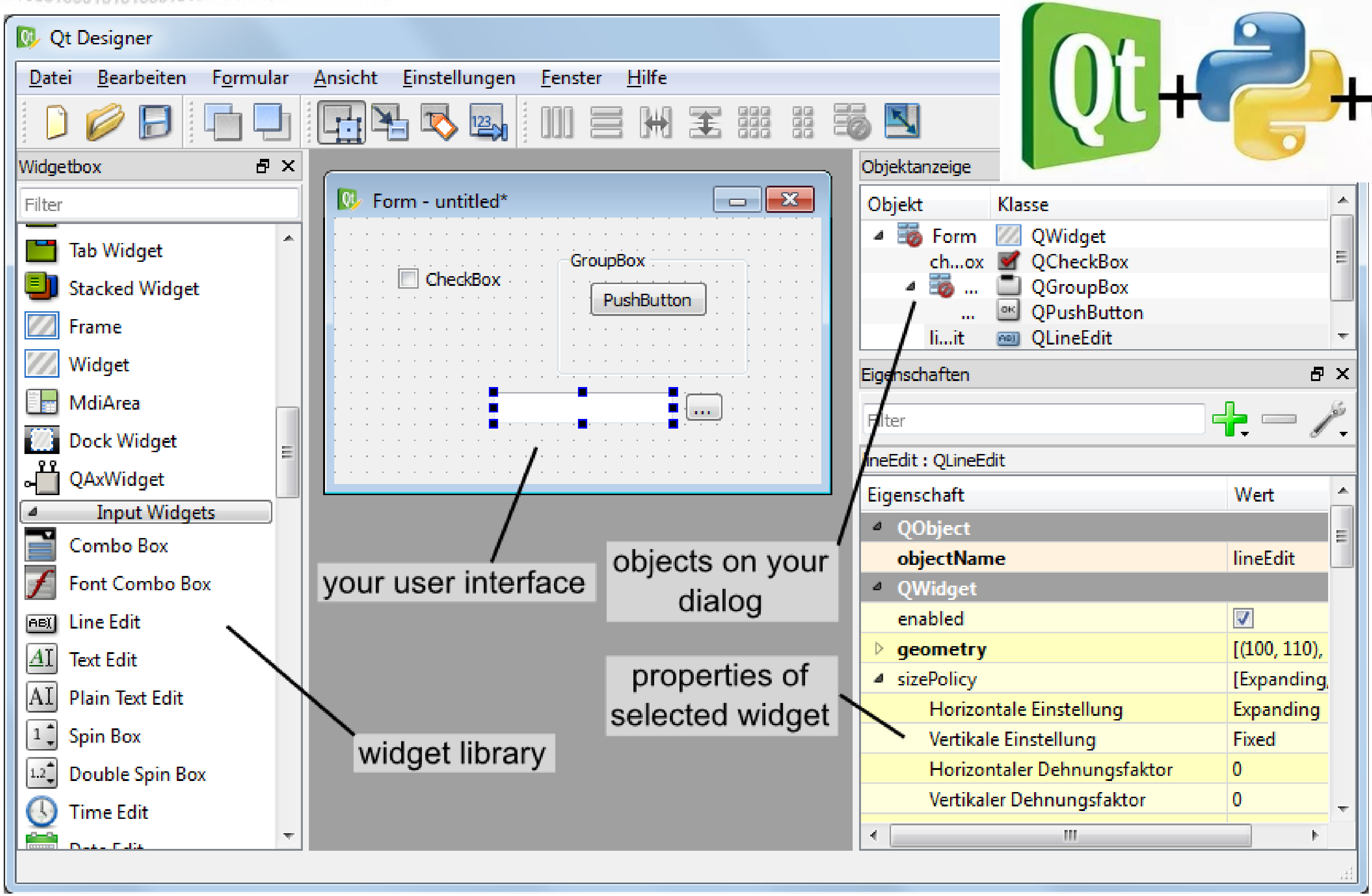


```
In [1]: import numpy as np

In [2]: a = np.arange(12).reshape(2, 2, 3)

In [3]: a

Out[3]: array([[[ 0,  1,  2],
                [ 3,  4,  5]],

               [[ 6,  7,  8],
                [ 9, 10, 11]]])
```



Дополнительные библиотеки и пакеты(3)

Qt + + = PySide
Python for Qt



Objekt	Klasse
Form	QWidget
ch...ox	QCheckBox
...	QGroupBox
...	QPushButton
li...it	QLineEdit

lineEdit : QLineEdit

Eigenschaft	Wert
QObject	
objectName	lineEdit
QWidget	
enabled	☑
geometry	[(100, 110),
sizePolicy	[Expanding,
Horizontale Einstellung	Expanding
Vertikale Einstellung	Fixed
Horizontaler Dehnungsfaktor	0
Vertikaler Dehnungsfaktor	0

your user interface

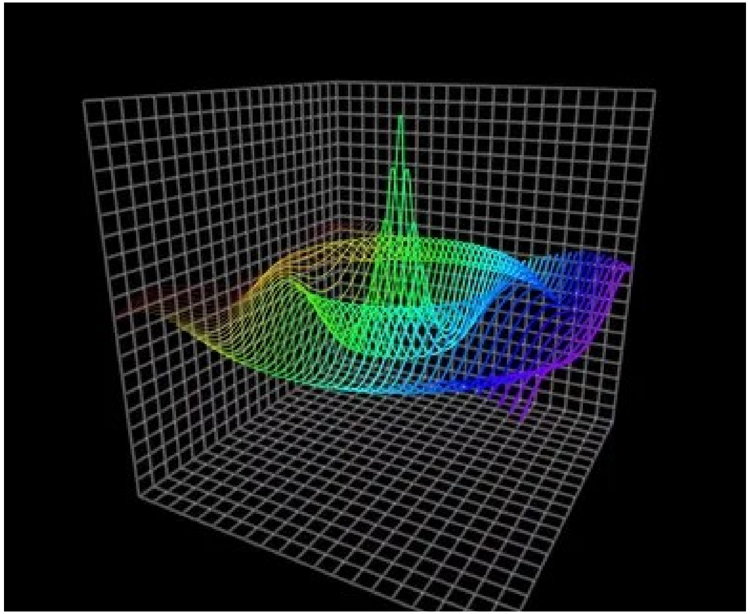
objects on your dialog

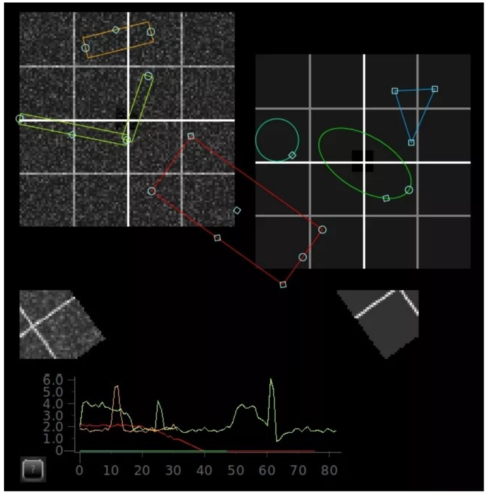
properties of selected widget

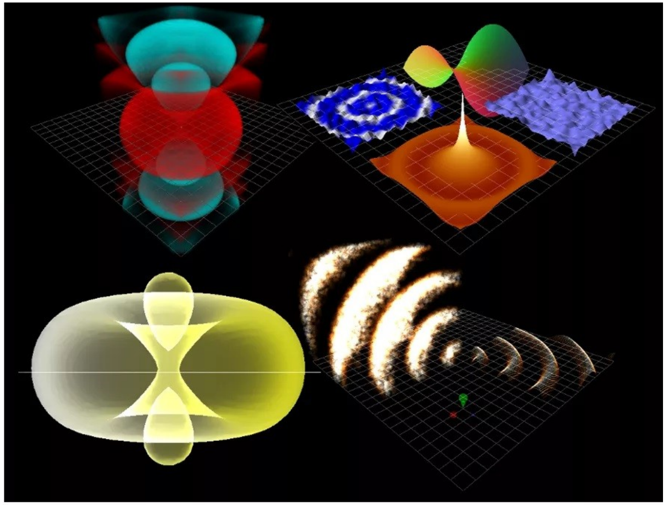
widget library

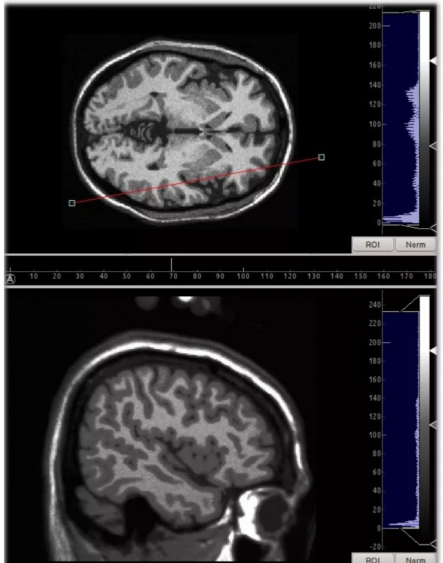
Дополнительные библиотеки и пакеты(4)

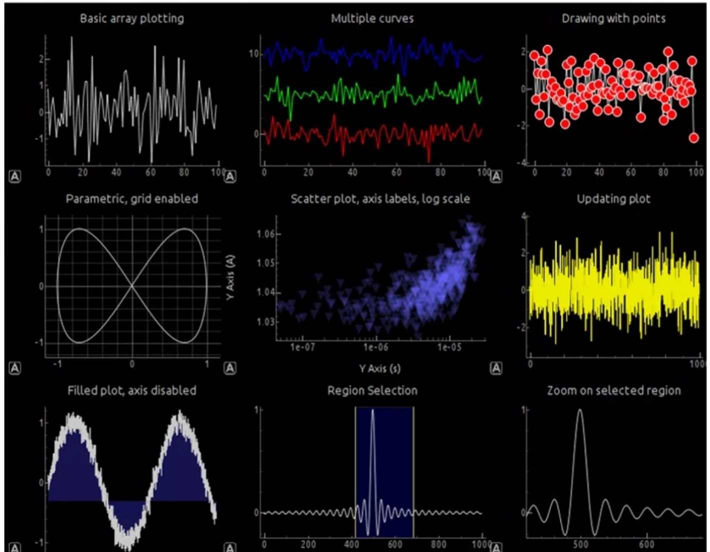
Pyqtgraph











Полезные ссылки (2)

https://ru.wikiversity.org/wiki/Программирование_и_научные_вычисления_на_языке_Python

https://realpython.com/ - Простые примеры

https://habr.com/post/352678/ - Установка и использование NumPy

https://www.lfd.uci.edu/~gohlke/pythonlibs/ - Набор готовых библиотек

https://tproger.ru/translations/jupyter-notebook-python-3/ - Командная оболочка Jupyter для интерактивных вычислений

https://www.jetbrains.com/pycharm/ - Интегрированная среда разработки

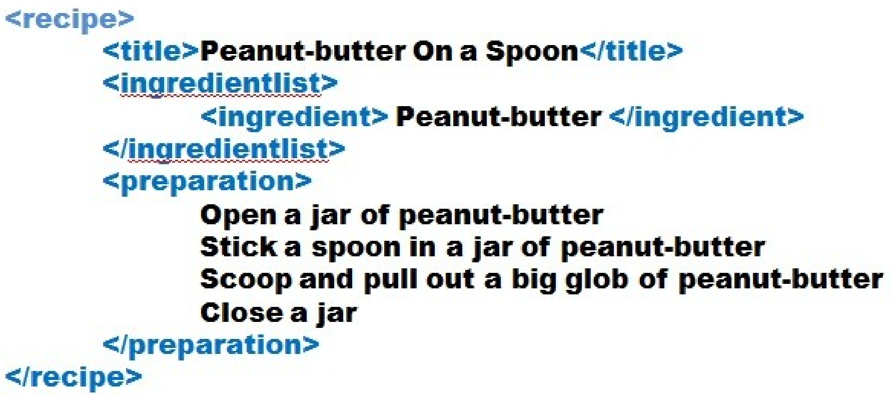
https://books.ifmo.ru/file/pdf/2256.pdf - Методическое пособие Лямина А.В.

Языки разметки

WYSISYG — What you see is what you get
WYSISYM — What you see is what you mean

Markup Language* — система/язык для маркировки и выделения документа, которая указывает его логическую структуру, и даёт инструкции для представления и компоновки содержимого документа, особенно при электронной передаче и отображении.

*https://www.merriam-webster.com/dictionary/markup%20language



```
<recipe>
        <title>Peanut-butter On a Spoon</title>
        <ingredientlist>
                <ingredient> Peanut-butter </ingredient>
        </ingredientlist>
        <preparation>
                Open a jar of peanut-butter
                Stick a spoon in a jar of peanut-butter
                Scoop and pull out a big glob of peanut-butter
                Close a jar
        </preparation>
</recipe>
```

William Warren Tunnicliffe
(1922-1996)

GenCode → GML → SGML

1967: GenCode — William Warren Tunniclife

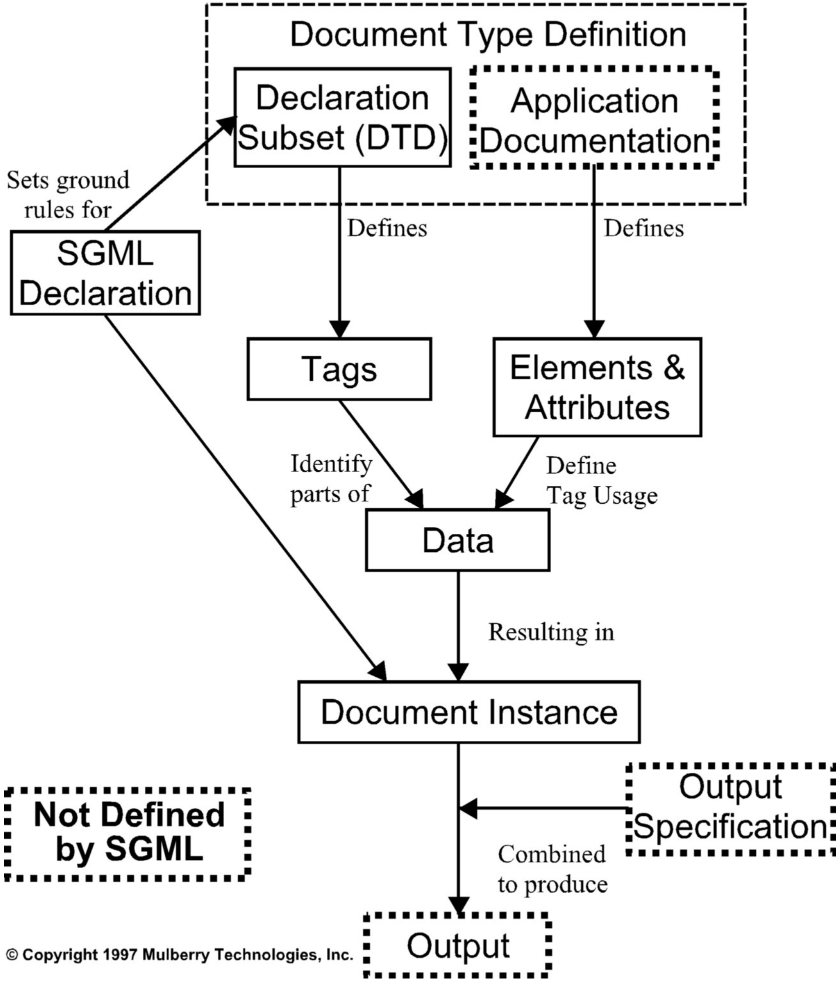
1969: Generalized Markup Language — Charles F. Goldfarb

1986: Standard Generalized Markup Language

Пример синтаксиса SGML:

```
<quote type="example">
  typically something like <italics>this</italics>
</quote>
```

SGML Document Components



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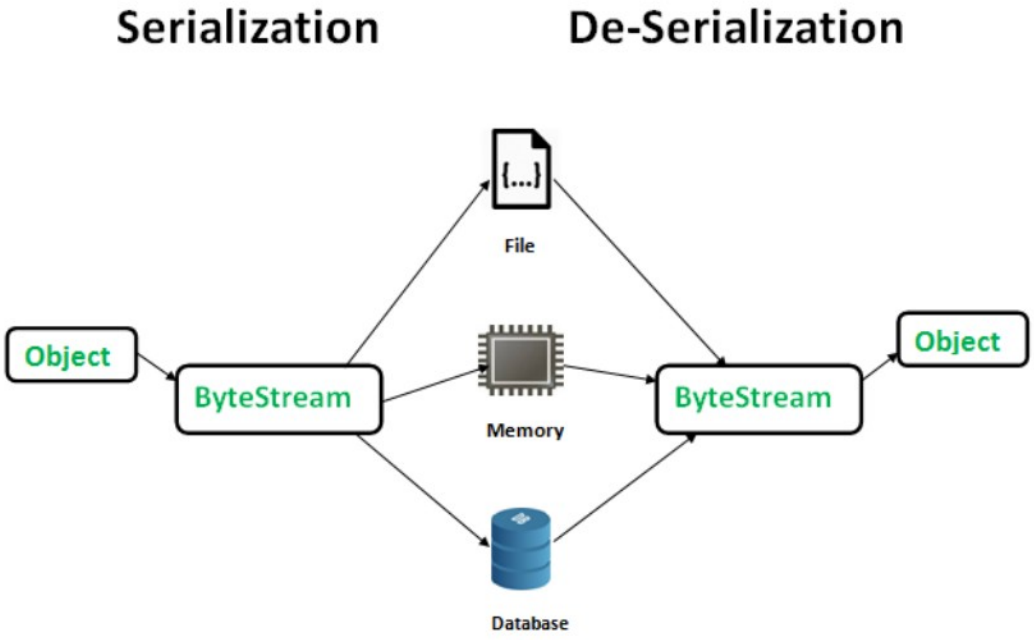
Сериализация и десериализация

Сереализация — процесс перевода структур данных или состояния объекта в формат, который может быть сохранён или передан и реконструирован позже. Обратный процесс — **десериализация**.

Сереализация применяется для:

- передачи данных по сетям;
- сохранения данных (базы данных);
- удалённых вызов процедур;
- распространения объектов;
- обнаружения изменений в данных, изменяющихся со временем.

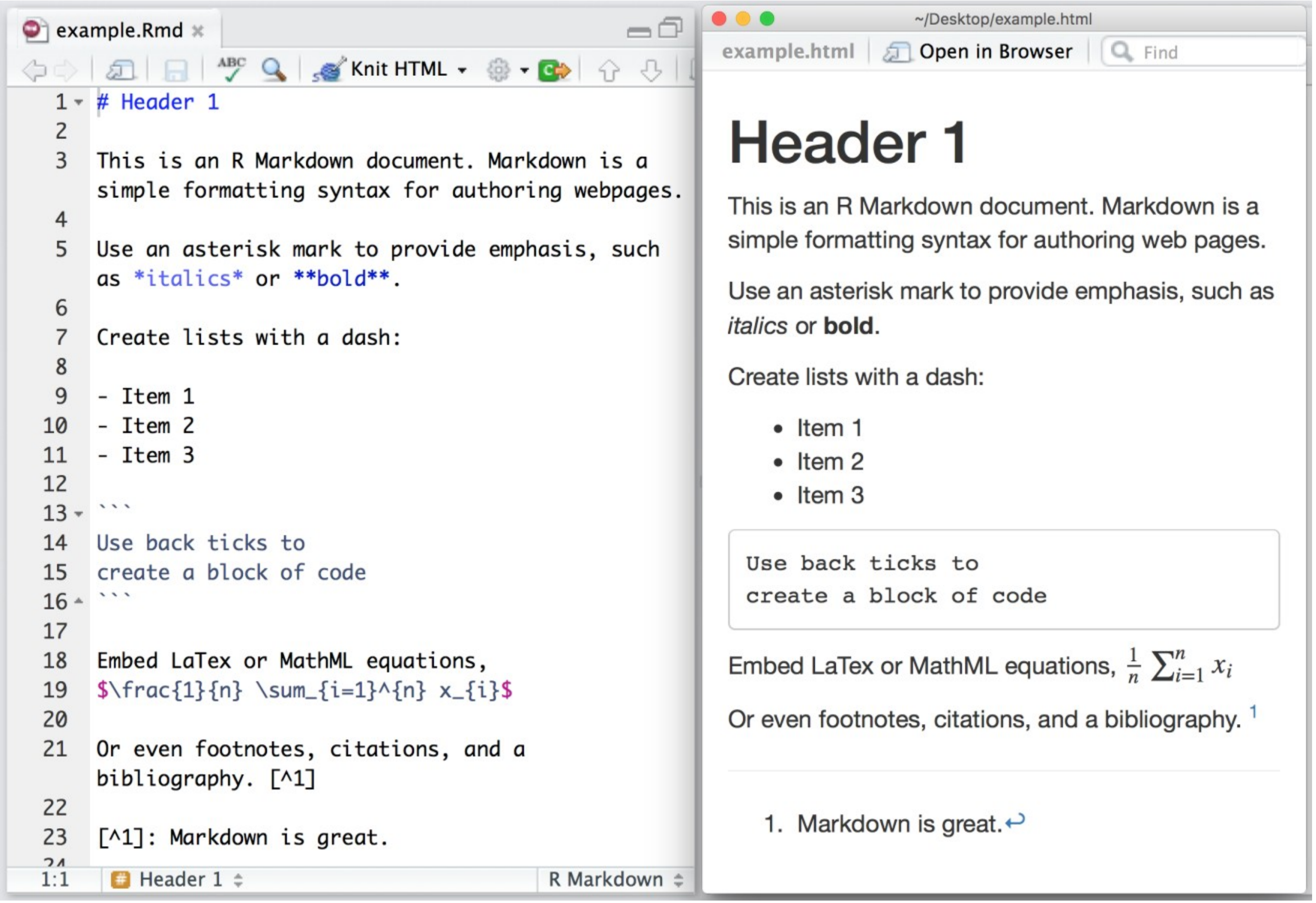


Современные языки разметки

XHTML

eXtensible HyperText Markup Language

Markdown — облегчённый язык разметки.



```
# Header 1

This is an R Markdown document. Markdown is a
simple formatting syntax for authoring webpages.

Use an asterisk mark to provide emphasis, such
as *italics* or **bold**.

Create lists with a dash:

- Item 1
- Item 2
- Item 3

```
Use back ticks to
create a block of code
```

Embed LaTex or MathML equations,
$\frac{1}{n} \sum_{i=1}^{n} x_{i}$

Or even footnotes, citations, and a
bibliography. [^1]

[^1]: Markdown is great.
```

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1. Markdown is great.↩

Полезные ссылки

https://typora.io/ - !!! Рекомендуемый многими Markdown-редактор !!!

https://dillinger.io/ - !!! Markdown online !!!

https://jsonviewer.io/ - !!! JSON online парсер!!!

http://yaml-online-parser.appspot.com/ - !!! YAML online parser !!!

https://www.pvsm.ru/java/70568/ - !!! Сравнение JSON и YAML !!!

https://habr.com/post/248147/ - !!! Сравнение XML, YAML и JSON !!!

https://habr.com/company/wrike/blog/279797/ - !!! Parquet !!!

https://wtools.io/ - !!! Удобный конвертор между форматами !!!

https://onlinejsontools.com/ - !!! Ещё один конвертор !!!