

# Основы языка программирования Python<sup>1</sup>

---

## Модули

```
def add(a, b):  
    return a + b  
  
def mul(a, b):  
    return a * b  
  
def add_abs(a, b):  
    return abs(a + b)  
  
def spam(a, b, action):  
    return action(a, b) * 2 + 1  
  
foo = spam(2, 3, add)  
bar = spam(2, 3, mul)  
baz = spam(2, -5, add_abs)  
  
print(f"{foo=}")  
print(f"{bar=}")  
print(f"{baz=}")
```

```
foo=11  
bar=13  
baz=7
```

```
# tools.py
```

```
def add(a, b):  
    return a + b
```

```
def mul(a, b):  
    return a * b
```

```
def add_abs(a, b):  
    return abs(a + b)
```

```
# example_modules_01.py
```

```
import tools
```

```
def spam(a, b, action):  
    return action(a, b) * 2 + 1
```

```
foo = spam(2, 3, tools.add)  
bar = spam(2, 3, tools.mul)  
baz = spam(2, -5, tools.add_abs)
```

```
print(f"{foo=}")  
print(f"{bar=}")  
print(f"{baz=}")
```

```
foo=11  
bar=13  
baz=7
```

```
# tools.py
```

```
def add(a, b):  
    return a + b
```

```
def mul(a, b):  
    return a * b
```

```
def add_abs(a, b):  
    return abs(a + b)
```

```
# example_modules_02.py
```

```
import tools as tl
```

```
def spam(a, b, action):  
    return action(a, b) * 2 + 1
```

```
foo = spam(2, 3, tl.add)  
bar = spam(2, 3, tl.mul)  
baz = spam(2, -5, tl.add_abs)
```

```
print(f"{foo=}")  
print(f"{bar=}")  
print(f"{baz=}")
```

```
foo=11  
bar=13  
baz=7
```

```
# tools.py
```

```
def add(a, b):  
    return a + b
```

```
def mul(a, b):  
    return a * b
```

```
def add_abs(a, b):  
    return abs(a + b)
```

```
# example_modules_03.py
```

```
from tools import add, add_abs, mul
```

```
def spam(a, b, action):  
    return action(a, b) * 2 + 1
```

```
foo = spam(2, 3, add)  
bar = spam(2, 3, mul)  
baz = spam(2, -5, add_abs)
```

```
print(f"{foo=}")  
print(f"{bar=}")  
print(f"{baz=}")
```

```
foo=11  
bar=13  
baz=7
```

```
# tools.py
```

```
def add(a, b):  
    return a + b
```

```
def mul(a, b):  
    return a * b
```

```
def add_abs(a, b):  
    return abs(a + b)
```

```
# example_modules_04.py
```

```
# Не рекомендуемый способ импорта!  
from tools import *
```

```
def spam(a, b, action):  
    return action(a, b) * 2 + 1
```

```
foo = spam(2, 3, add)  
bar = spam(2, 3, mul)  
baz = spam(2, -5, add_abs)
```

```
print(f"{foo=}")  
print(f"{bar=}")  
print(f"{baz=}")
```

```
foo=11  
bar=13  
baz=7
```

```
# tools_debug.py
```

```
print("Run tool_debug - 1")
```

```
def add(a, b):  
    return a + b
```

```
print("Run tool_debug - 2")
```

```
def mul(a, b):  
    return a * b
```

```
print("Run tool_debug - 3")
```

```
def add_abs(a, b):  
    return abs(a + b)
```

```
print("Run tool_debug - 4")
```

```
# example_modules_05.py
```

```
print("Main script - 1")
```

```
import tools_debug
```

```
print("Main script - 2")
```

```
def spam(a, b, action):  
    return action(a, b) * 2 + 1
```

```
foo = spam(2, 3, tools_debug.add)  
bar = spam(2, 3, tools_debug.mul)  
baz = spam(2, -5, tools_debug.add_abs)
```

```
print(f"{foo=}")  
print(f"{bar=}")  
print(f"{baz=}")
```

```
Main script - 1  
Run tool_debug - 1  
Run tool_debug - 2  
Run tool_debug - 3  
Run tool_debug - 4  
Main script - 2  
foo=11  
bar=13  
baz=7
```

```
# example_modules_01.py
```

```
import tools
```

```
def spam(a, b, action):  
    return action(a, b) * 2 + 1
```

```
foo = spam(2, 3, tools.add)  
bar = spam(2, 3, tools.mul)  
baz = spam(2, -5, tools.add_abs)
```

```
print(f"{foo=}")  
print(f"{bar=}")  
print(f"{baz=}")
```

```
# example_modules_06.py
```

```
import tools  
from example_modules_01 import spam
```

```
foo = spam(3, 4, tools.add)  
bar = spam(5, 6, tools.mul)  
baz = spam(7, -8, tools.add_abs)
```

```
print(f"{foo=}")  
print(f"{bar=}")  
print(f"{baz=}")
```

```
foo=11  
bar=13  
baz=7  
foo=15  
bar=61  
baz=3
```



```
# tools_vars.py
```

```
def add(a, b):  
    return a + b
```

```
def mul(a, b):  
    return a * b
```

```
def add_abs(a, b):  
    return abs(a + b)
```

```
print(f"tools_vars.py: {__name__=}")
```

```
# example_modules_07.py
```

```
import tools_vars
```

```
print(f"example_modules_07.py: {__name__=}")
```

```
def spam(a, b, action):  
    return action(a, b) * 2 + 1
```

```
foo = spam(2, 3, tools_vars.add)
```

```
bar = spam(2, 3, tools_vars.mul)
```

```
baz = spam(2, -5, tools_vars.add_abs)
```

```
print(f"{foo=}")
```

```
print(f"{bar=}")
```

```
print(f"{baz=}")
```

```
tools_vars.py: __name__='tools_vars'
```

```
example_modules_07.py: __name__='__main__'
```

```
foo=11
```

```
bar=13
```

```
baz=7
```

```
# example_modules_08.py
```

```
import tools
```

```
def spam(a, b, action):  
    return action(a, b) * 2 + 1
```

```
if __name__ == "__main__":  
    foo = spam(2, 3, tools.add)  
    bar = spam(2, 3, tools.mul)  
    baz = spam(2, -5, tools.add_abs)  
  
    print(f"{foo=}")  
    print(f"{bar=}")  
    print(f"{baz=}")
```

```
# example_modules_09.py
```

```
import tools  
from example_modules_08 import spam
```

```
foo = spam(3, 4, tools.add)  
bar = spam(5, 6, tools.mul)  
baz = spam(7, -8, tools.add_abs)
```

```
print(f"{foo=}")  
print(f"{bar=}")  
print(f"{baz=}")
```

```
foo=15  
bar=61  
baz=3
```



# Пакеты модулей

`src/11. Modules/example_modules_10.py`

`src/11. Modules/example_modules_11.py`

# Установка библиотек с помощью pip

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# Установка библиотек с помощью pip <sup>14</sup>

Установка пакетов для всех пользователей ОС  
(требуется права администратора):

```
pip install пакет_1 пакет_2 ... пакет_N
```

ИЛИ

```
python -m pip install пакет_1 пакет_2 ... пакет_N
```

# Установка библиотек с помощью pip <sup>15</sup>

Установка пакетов для текущего пользователя ОС  
(права администратора не требуются):

```
pip install --user пакет_1 пакет_2 ... пакет_N
```

ИЛИ

```
python -m pip install --user пакет_1 пакет_2 ... пакет_N
```

# Обновление библиотек с помощью `pip`

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Обновление библиотек для всех пользователей ОС  
(требуется права администратора):

```
pip install --upgrade пакет_1 пакет_2 ... пакет_N
```

Обновление библиотек для текущего пользователя ОС  
(права администратора не требуются):

```
pip install --upgrade --user пакет_1 пакет_2 ... пакет_N
```



# Удаление библиотек с помощью `pip`

```
pip uninstall пакет_1 пакет_2 ... пакет_N
```

# Получение списка установленных библиотек с помощью pip 18

Получить список всех установленных пакетов:

```
pip list
```

Получить список установленных пакетов, для которых появились новые версии:

```
pip list --outdated
```

# Установка библиотек для инженерных и научных вычислений

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```
pip install --user numpy matplotlib scipy pandas
```