

Lecture #1. 파이썬 기초

2D 게임 프로그래밍

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파이썬

- 1991년, Guido van Rossum 이 개발
- VM 기반 인터프리터 언어
- 최신 버전 3.11.5 (2023년 9 기준)



특징

- **다양한 프로그래밍 패러다임 제공**

- 구조적 프로그래밍
- 절차지향 프로그래밍
- 객체지향 프로그래밍
- 함수형 프로그래밍

- **동적 자료형**

- **풍부한 기본 라이브러리 함수**

장점

- 쉽다.
- 간결하다.
- 빠르게 개발할 수 있다.

파이썬의 인기

- 지난 30년간 지속적으로 순위가 상승하면서, 드디어 2022년 1위로 등극 !

| Programming Language | 2022 | 2017 | 2012 | 2007 | 2002 | 1997 | 1992 | 1987 |
|----------------------|------|------|------|------|------|------|------|------|
| Python | 1 | 5 | 8 | 7 | 12 | 28 | - | - |
| C | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 1 |
| Java | 3 | 1 | 2 | 1 | 1 | 16 | - | - |
| C++ | 4 | 3 | 3 | 3 | 3 | 2 | 2 | 6 |
| C# | 5 | 4 | 4 | 8 | 14 | - | - | - |
| Visual Basic | 6 | 14 | - | - | - | - | - | - |
| JavaScript | 7 | 8 | 10 | 9 | 8 | 24 | - | - |
| Assembly language | 8 | 10 | - | - | - | - | - | - |
| SQL | 9 | - | - | - | 7 | - | - | - |
| PHP | 10 | 7 | 6 | 5 | 6 | - | - | - |
| Prolog | 24 | 32 | 33 | 27 | 17 | 21 | 12 | 3 |
| Lisp | 33 | 31 | 13 | 16 | 13 | 10 | 4 | 2 |
| Pascal | 270 | 114 | 16 | 22 | 99 | 9 | 3 | 5 |
| (Visual) Basic | - | - | 7 | 4 | 4 | 3 | 6 | 4 |

프로그래밍 언어 순위 변화 (Source : <https://www.tiobe.com/tiobe-index/>)

단점

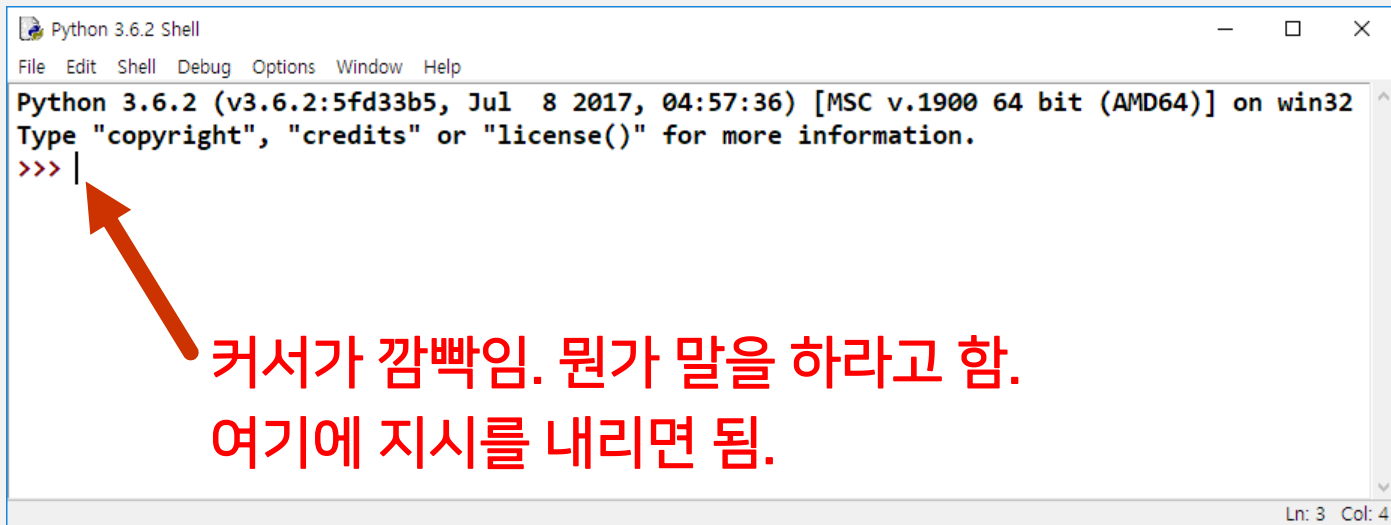
- 느리다.
- 너무 유연하다.
- 진입 장벽이 낮다.

Python Key Words

| | | | | |
|--------|--------|--------|--------|----------|
| False | class | return | is | finally |
| None | if | for | lambda | continue |
| True | def | from | while | nonlocal |
| and | del | global | not | with |
| as | elif | try | or | yield |
| assert | else | import | pass | |
| break | except | in | raise | |

IDLE 실행 화면

- Python 언어로 지시하면, 이를 해석해서 일을 함.



```
Python 3.6.2 (v3.6.2:5fd33b5, Jul 8 2017, 04:57:36) [MSC v.1900 64 bit (AMD64)] on win32
Type "copyright", "credits" or "license()" for more information.
>>> |
```

커서가 깜빡임. 뭔가 말을 하라고 함.
여기에 지시를 내리면 됨.

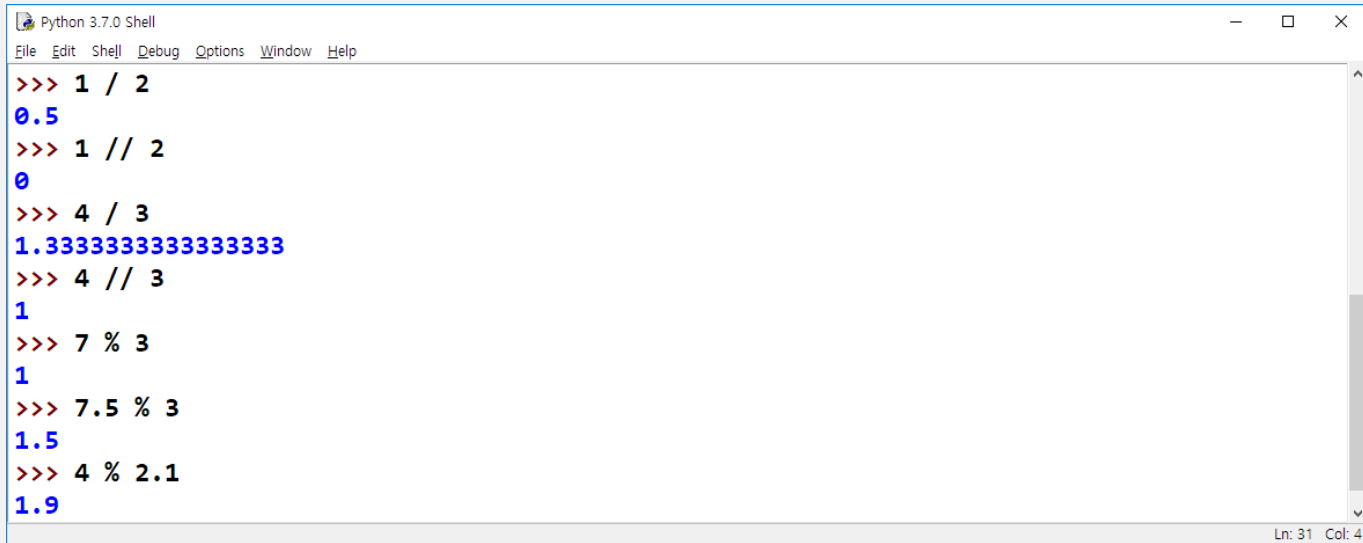
계산을 시켜보자.

```
Python 3.6.3 Shell
File Edit Shell Debug Options Window Help
Python 3.6.3 (v3.6.3:2c5fed8, 0
Type "copyright", "credits" or
>>>
>>> 1+2
3
>>> 100-1
99
>>> 7 * 52
364
>>> 1024 / 8
128.0
>>>
>>> |
```

```
IDLE Shell 3.11.5
File Edit Shell Debug Options Window Help
Python 3.11.5 (tags/v3.11.5:cce6ba9, Aug 24 2023, 14:38:34) [MSC v.1936 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>> 1+2
3
>>> 100-1
99
>>> 7*52
364
>>> 1024/8
128.0
>>> 1/2
0.5
>>> 1//2
0
>>> 4/3
1.3333333333333333
>>> 4//3
1
>>> 7%3
1
>>>
```

Ln: 21 Col: 0

나누기와 나머지 연산



```
Python 3.7.0 Shell
File Edit Shell Debug Options Window Help

>>> 1 / 2
0.5
>>> 1 // 2
0
>>> 4 / 3
1.3333333333333333
>>> 4 // 3
1
>>> 7 % 3
1
>>> 7.5 % 3
1.5
>>> 4 % 2.1
1.9
Ln: 31 Col: 4
```

A screenshot of a Python 3.7.0 Shell window. The window has a title bar with the text 'Python 3.7.0 Shell' and standard window controls (minimize, maximize, close). Below the title bar is a menu bar with the following items: File, Edit, Shell, Debug, Options, Window, and Help. The main area of the window contains a series of Python commands and their outputs. The commands are: `>>> 1 / 2`, `>>> 1 // 2`, `>>> 4 / 3`, `>>> 4 // 3`, `>>> 7 % 3`, `>>> 7.5 % 3`, and `>>> 4 % 2.1`. The outputs are: `0.5`, `0`, `1.3333333333333333`, `1`, `1`, `1.5`, and `1.9`. The status bar at the bottom right of the window shows 'Ln: 31 Col: 4'.

원의 넓이를 구해보자. 반지름이 3미터 이면?

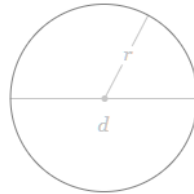
Circle

Solve for area ▾

$$A = \pi r^2$$

r Radius

Enter value



```
Python 3.6.3 Shell
File Edit Shell Debug Options Window Help
>>>
>>>
>>>
>>>
>>>
>>> 3.141592653589793 * (3 * 3)
28.274333882308138
>>>
>>> 3.141592653589793 * 3 ** 2
28.274333882308138
>>>
>>> |
```

28.274328 평방미터

Ln: 77 Col: 4

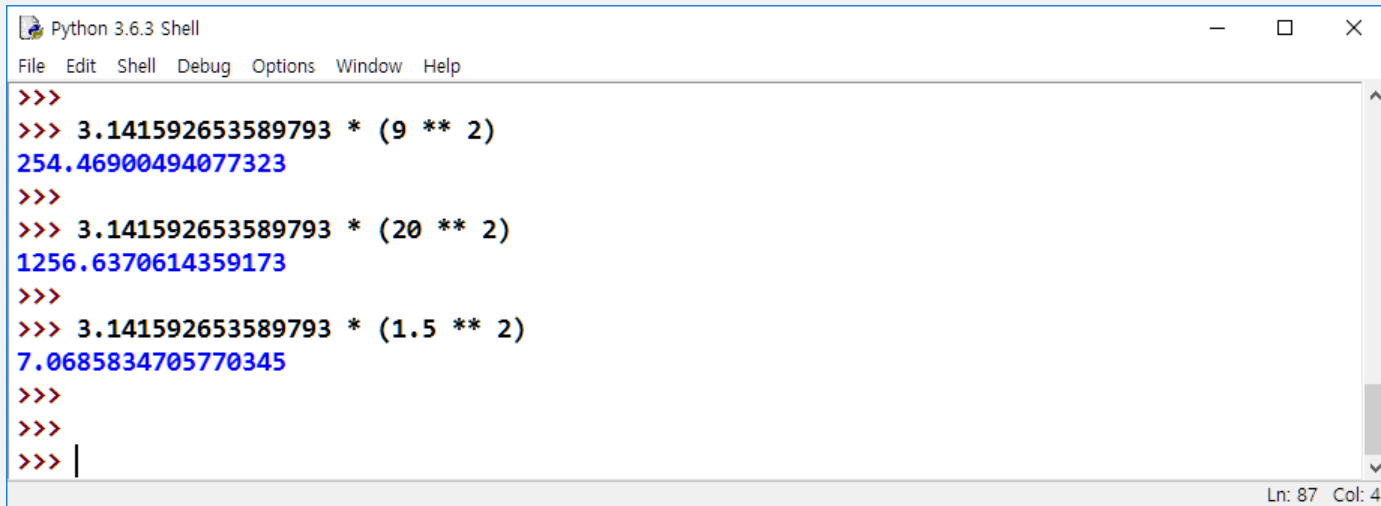
IDLE 에디팅 팁

- 라인 단위로의 입력이 기본
- 이미 입력한 라인은 편집이 불가능
- 입력한 라인들은 내부 버퍼에 저장되어 있음.
- **Alt + p** 와 **Alt + n** 을 이용해서, 앞서 입력했던 라인들을 꺼내올 수 있음.

연산 기호

| 연산자 | 연산 |
|--------|-----|
| + | 덧셈 |
| - | 뺄셈 |
| * | 곱셈 |
| / 과 // | 나눗셈 |
| ** | 제곱 |
| % | 나머지 |

반지름이 9미터이면? 20 미터면? 1.5미터면?



```
Python 3.6.3 Shell
File Edit Shell Debug Options Window Help
>>>
>>> 3.141592653589793 * (9 ** 2)
254.46900494077323
>>>
>>> 3.141592653589793 * (20 ** 2)
1256.6370614359173
>>>
>>> 3.141592653589793 * (1.5 ** 2)
7.0685834705770345
>>>
>>>
>>> |
```

Ln: 87 Col: 4

슬슬 귀찮아지기 시작한다.

3.141592... 를 어디엔가 기록해놓고, 이걸 재사용하면 좋을 것 같은데...

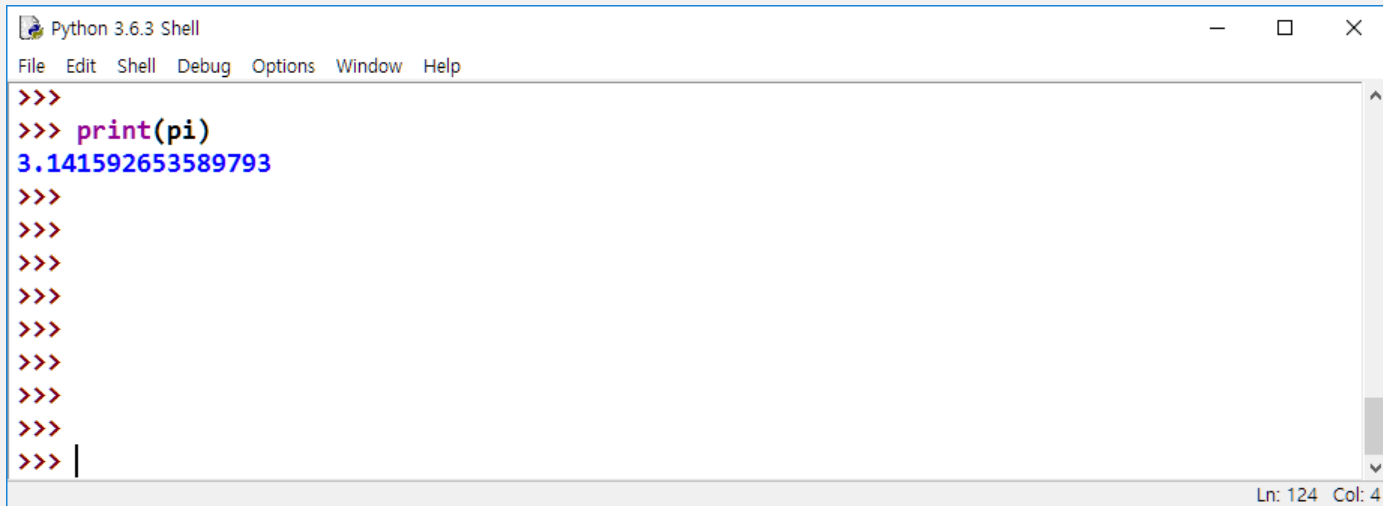
변수(variable)

- 변수: 값을 저장해놓는 컴퓨터 메모리 안의 공간
- 변수는 해당되는 이름이 있다. 프로그래머가 이름을 지어야 함.
- 이름은 영문자와 숫자를 조합해서 씀. 단, 파이썬의 기본 단어는 쓰면 안됨.
- 사실, 변수의 값은 맘대로 언제든지 바꿀 수 있다.

```
Python 3.6.3 Shell
File Edit Shell Debug Options Window Help
>>>
>>>
>>> pi = 3.141592653589793
>>>
>>> pi * 4 ** 2
50.26548245743669
>>> pi * 2.5 ** 2
19.634954084936208
>>> pi * 8 ** 2
201.06192982974676
>>>
>>> |
```

```
>>> pi = 3.141592
>>> r = 4
>>> area = pi*r**2
>>> area
50.265472
>>> print(area)
50.265472
>>>
```

print 함수를 이용하면, 변수의 값을 볼 수 있다.



A screenshot of a Python 3.6.3 Shell window. The window has a title bar with the text "Python 3.6.3 Shell" and standard window controls (minimize, maximize, close). Below the title bar is a menu bar with the following items: File, Edit, Shell, Debug, Options, Window, and Help. The main area of the window is a text editor with a white background. It contains the following text:
>>>
>>> print(pi)
3.141592653589793
>>>
>>>
>>>
>>>
>>>
>>>
>>>
>>>
>>>
>>> |
The output "3.141592653589793" is displayed in a blue font, while the prompt ">>>" is in a red font. A vertical scrollbar is visible on the right side of the text area. At the bottom right of the window, the status bar shows "Ln: 124 Col: 4".

반지름 변수 r과 면적 변수 area 를 사용한 면적 계산



```
Python 3.6.3 Shell
File Edit Shell Debug Options Window Help
>>>
>>>
>>>
>>> r = 7
>>>
>>> area = pi * r ** 2
>>>
>>> print(area)
153.93804002589985
>>>
>>>
>>>
Ln: 133 Col: 4
```

변수값을 바꿔서 사용 : r 에 11을 대입



The image shows a Python 3.6.3 Shell window with a menu bar (File, Edit, Shell, Debug, Options, Window, Help) and a command prompt. The code being executed is as follows:

```
>>>  
>>> r = 11  
>>>  
>>> area = pi * r ** 2  
>>>  
>>> print(area)  
380.132711084365  
>>>  
>>>  
>>>  
>>>  
>>>
```

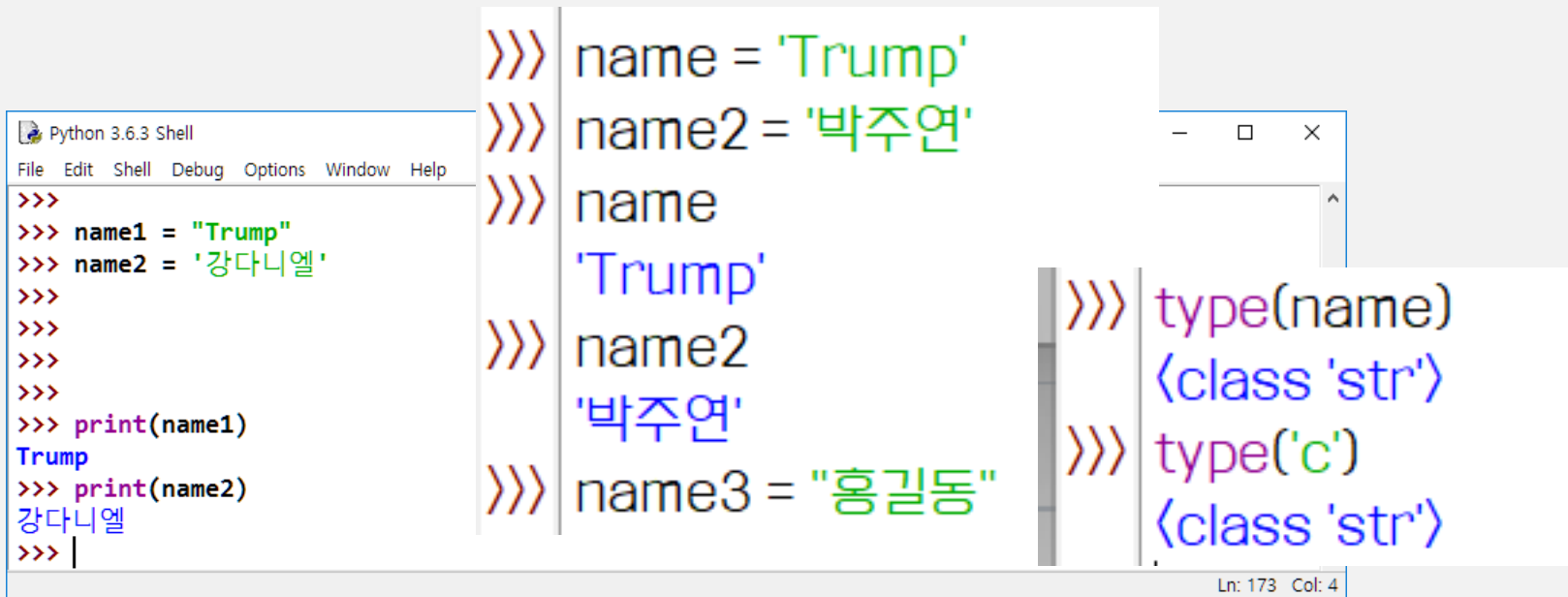
To the right of the shell window, a separate box displays the output of the `type()` function:

```
>>> type(pi)  
<class 'float'  
>>> type(r)  
<class 'int'
```

The status bar at the bottom right of the shell window indicates "Ln: 139 Col: 4".

Alt + p

변수에는 문자열(string)을 담을 수 있다.



```
Python 3.6.3 Shell
File Edit Shell Debug Options Window Help
>>>
>>> name1 = "Trump"
>>> name2 = '강다니엘'
>>>
>>>
>>>
>>> print(name1)
Trump
>>> print(name2)
강다니엘
>>>

>>> name = 'Trump'
>>> name2 = '박주연'
>>> name
'Trump'
>>> name2
'박주연'
>>> name3 = "홍길동"
>>> type(name)
<class 'str'>
>>> type('c')
<class 'str'>
```

Ln: 173 Col: 4

문자열은 문자들의 집합임. 여러 개의 문자들을 나열한 것. 큰따옴표 또는 작은 따옴표로 감쌌. 한글, 영어 상관없음.

기본 자료형(Type)

- 변수에는 다양한 종류의 정보를 담을 수 있음.

order = 4 정수형 int

pi = 3.141592 실수형 float

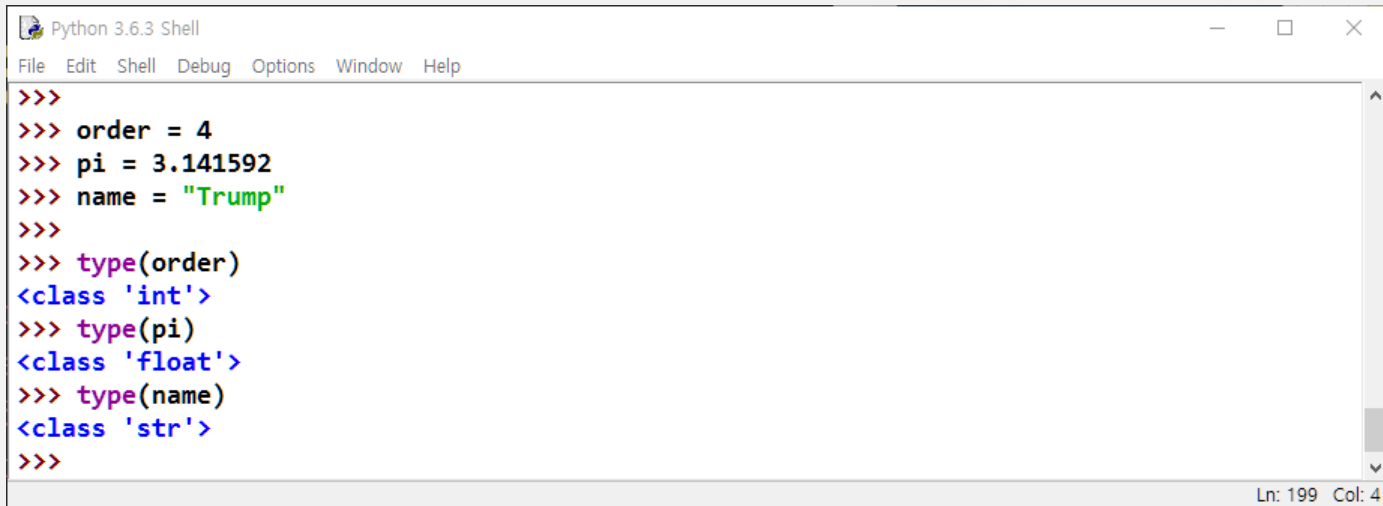
name1 = "Trump"
name2 = 'Daehyun' 문자열형 str

result = True 참거짓형 bool

```
>>> True
True
>>> False
False
>>> true
Traceback (most recent call last):
  File "<pyshell#38>", line 1, in <module>
    true
NameError: name 'true' is not defined, Did you mean: 'True'?
>>> false
Traceback (most recent call last):
  File "<pyshell#39>", line 1, in <module>
    false
NameError: name 'false' is not defined, Did you mean: 'False'?
>>>
```

```
>>> a = 3>2
>>> type(a)
<class 'bool'>
```

자료형 파악 type



```
Python 3.6.3 Shell
File Edit Shell Debug Options Window Help
>>>
>>> order = 4
>>> pi = 3.141592
>>> name = "Trump"
>>>
>>> type(order)
<class 'int'>
>>> type(pi)
<class 'float'>
>>> type(name)
<class 'str'>
>>>
```

Ln: 199 Col: 4

사용자로부터 입력 받기

- input 함수를 이용함.
- 사용자가 입력한 정보가 "문자열"로 되어 넘어옴.

[illegible]

자료형 변환

- mins의 값은 4가 아니고, '4'임. 즉, 정수가 아니고 문자열임.
- 이것을 정수로 바꾸기 위해서는 int() 라는 함수를 사용함.

```
Python 3.6.3 Shell
File Edit Shell Debug Options Window Help
>>>
>>> mins
'4'
>>> type(mins)
<class 'str'>
>>> m = int(mins)
>>> m
4
>>> type(m)
<class 'int'>
>>>
>>>
```

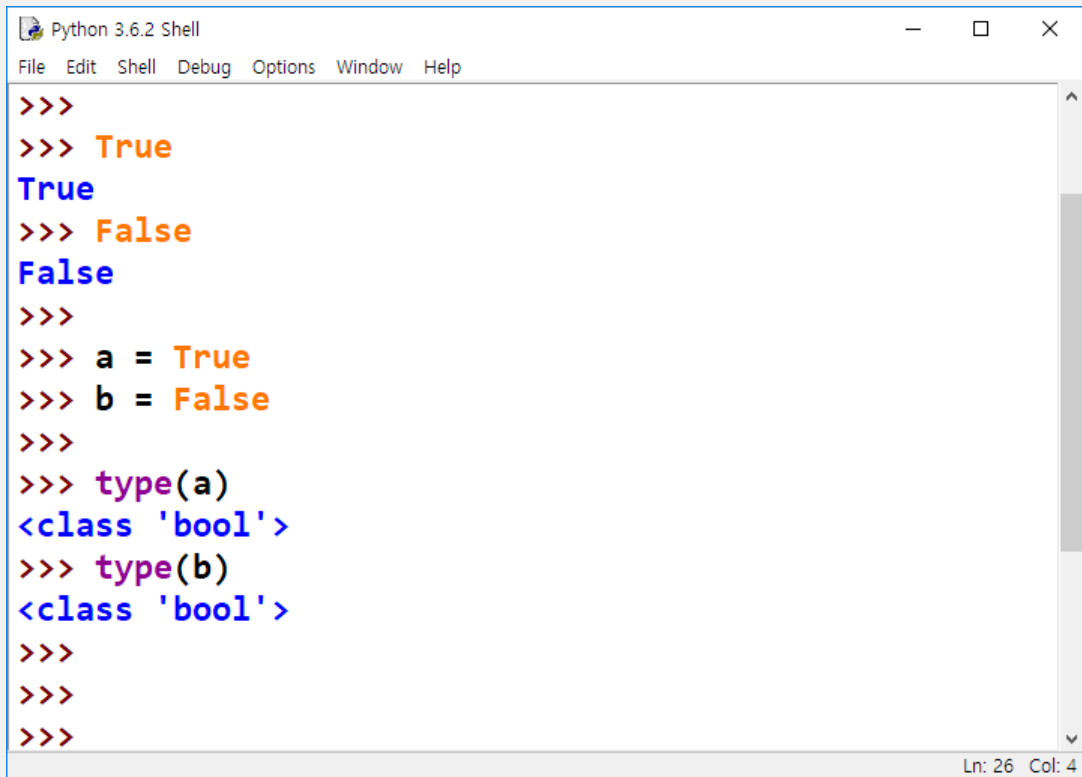
```
>>> mins = input('enter hour.')
enter hour.4
>>> mins = int(mins)
>>> mins
4
>>> mins = input('enter hour.')
enter hour.4
>>> mins
'4'
>>> type(mins)
<class 'str'>
>>> mins = int(mins)
>>> mins
4
>>> type(mins)
<class 'int'>
...
```

자료형 변환

```
>>> str(0)
'0'
>>> str(-3.14)
'-3.14'
>>> int('42')
42
>>> int(1.25)
1
>>> float('3.14')
3.14
>>> float(10)
10.0
```


자료형: bool

- 참(True), 또는 거짓(False)을 나타내는데 사용되는 자료형



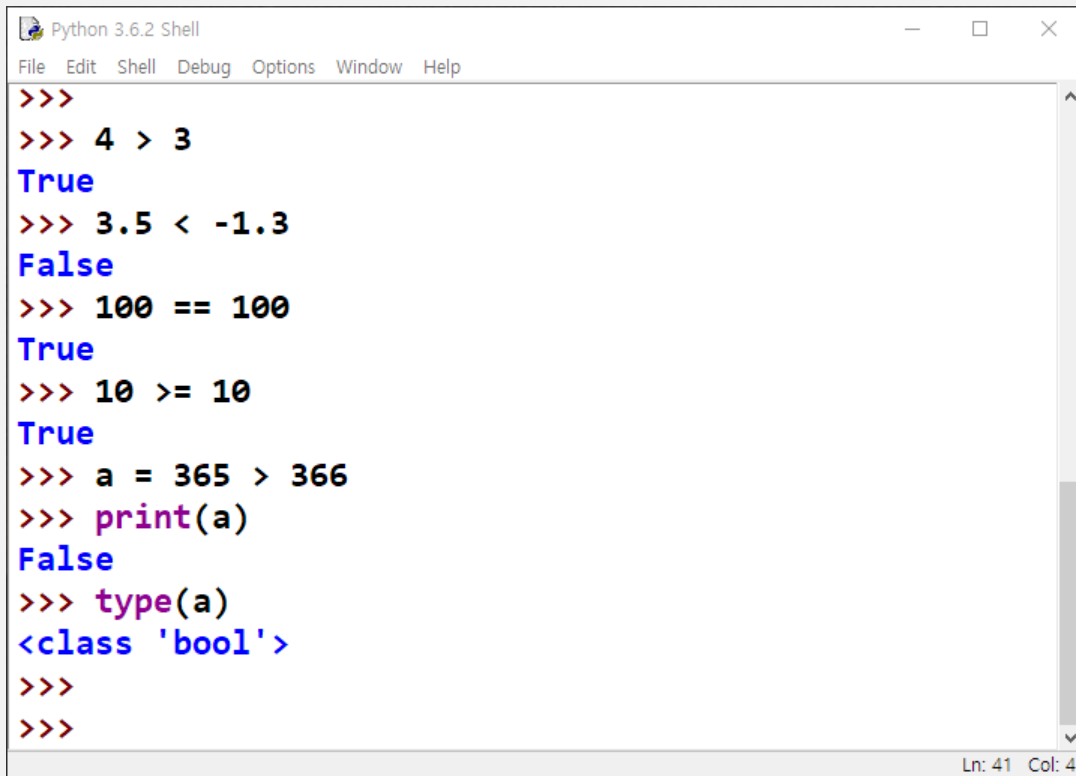
```
Python 3.6.2 Shell
File Edit Shell Debug Options Window Help

>>>
>>> True
True
>>> False
False
>>>
>>> a = True
>>> b = False
>>>
>>> type(a)
<class 'bool'>
>>> type(b)
<class 'bool'>
>>>
>>>
>>>
```

Ln: 26 Col: 4

비교 연산(Comparison Operation)

- 두개의 값의 대소, 동일 등을 확인하는 계산.
- 결과는 참(True) 또는 거짓(False)임.

A screenshot of a Python 3.6.2 Shell window. The window has a title bar with the text 'Python 3.6.2 Shell' and standard window controls (minimize, maximize, close). Below the title bar is a menu bar with 'File', 'Edit', 'Shell', 'Debug', 'Options', 'Window', and 'Help'. The main area of the window contains a series of Python commands and their outputs. The commands are: '>>>', '>>> 4 > 3', '>>> 3.5 < -1.3', '>>> 100 == 100', '>>> 10 >= 10', '>>> a = 365 > 366', '>>> print(a)', and '>>> type(a)'. The outputs are: 'True', 'False', 'True', 'True', 'False', and '<class \'bool\'>'. The window also has a status bar at the bottom right showing 'Ln: 41 Col: 4'.

```
Python 3.6.2 Shell
File Edit Shell Debug Options Window Help
>>>
>>> 4 > 3
True
>>> 3.5 < -1.3
False
>>> 100 == 100
True
>>> 10 >= 10
True
>>> a = 365 > 366
>>> print(a)
False
>>> type(a)
<class 'bool'>
>>>
>>>
Ln: 41 Col: 4
```

비교 연산 기호

| 기호 | 뜻 |
|----|--------|
| < | 작다 |
| <= | 작거나 같다 |
| == | 같다 |
| >= | 크거나 같다 |
| > | 크다 |
| != | 다르다 |

문자열의 비교

```
Python 3.6.3 Shell
File Edit Shell Debug Options Window Help
>>>
>>>
>>> "KOREA" == "korea"
False
>>>
>>>
>>> 'abcdefg' == "abcdefg"
True
>>>
>>> |
```

```
>>> "KOREA" == "korea"
False
>>> 'abcdefg' == "abcdefg"
True
>>> 'korea' > 'korea'
False
>>> 'korea' > 'Korea'
True
```

문자열 str 의 다양한 연산

```
Python 3.7.0 Shell - C:/Users/dustinlee/Desktop/test.py (3.7.0)
File Edit Shell Debug Options Window Help

>>>
>>> first = "Daehyun"
>>> last = "Lee"
>>> name = first + " " + last
>>> name
'Daehyun Lee'
>>> print(name)
Daehyun Lee
>>>
>>> name * 2
'Daehyun LeeDaehyun Lee'
>>> name * 3
'Daehyun LeeDaehyun LeeDaehyun Lee'
>>>
>>> name[0]
'D'
>>> name[2]
'e'
>>> name[-1]
'e'
>>> name[-2]
'e'
```

```
Type help() , copyright , credits or keywords for more information.
>>> first = 'Juyeon'
>>> last = 'Park'
>>> full_name = first + last
>>> full_name
'JuyeonPark'
>>> full_name = first + '.' + last
>>> full_name
'Juyeon.Park'
>>> full_name * 2
'Juyeon.ParkJuyeon.Park'
>>> full_name * 3
Traceback (most recent call last):
  File "<pyshell#7>", line 1, in <module>
    full_name * 3
NameError: name 'ful_name' is not defined. Did you mean: 'full_name'?
>>> full_name * 3
'Juyeon.ParkJuyeon.ParkJuyeon.Park'
>>>

>>> full_name[0]
'J'
>>> full_name[1]
'u'
>>> full_name[2]
'y'
>>> full_name[-1]
'k'
>>>
```

Ln: 157 Col: 4

Slice(슬라이스)

■ 문자열의 일부분을 잘라내는 기법

■ name[start : stop : step]

```
>>> title = "Python 2D Game Programming"
>>> title[0:6]
'Python'
>>> title[7:9]
'2D'
>>> title[10:14]
'Game'
>>> title[:6]
'Python'
>>> title[-11:]
'Programming'
>>> title[::2]
'Pto DGm rgamn'
>>> title[::-1]
'gnimmargorP emaG D2 nohtyP'
```

```
>>> full_name[0:2]
'Ju'
>>> full_name[0:3]
'Juy'
>>> full_name[:3]
'Juy'
>>> full_name[3:7]
'eon.'
>>> full_name[3:7:1]
'eon.'
>>> full_name[3:7:2]
'en'
>>> full_name[:7:2]
'Jyo.'
>>> full_name[::]
'Juyeon,Park'
>>> full_name[::2]
'Jyo.ak'
>>> full_name[::-1]
'kraP,noeyuJ'
>>>
```

List

```
>>> twice = ['momo', 'sana', 'zwi', 'nayun', 'dahyun']
>>> black_pink = ['jisu', 'jeni', 'rose', 'risa']
>>> twice
['momo', 'sana', 'zwi', 'nayun', 'dahyun']
>>> twice.append('jihyo')
>>> twice
['momo', 'sana', 'zwi', 'nayun', 'dahyun', 'jihyo']
>>> twice.sort()
>>> twice
['dahyun', 'jihyo', 'momo', 'nayun', 'sana', 'zwi']
>>> len(twice)
6
>>> unite = twice + black_pink
>>> unite
['dahyun', 'jihyo', 'momo', 'nayun', 'sana', 'zwi', 'jisu', 'jeni', 'rose', 'risa']
>>> unite.remove('momo')
>>> unite
['dahyun', 'jihyo', 'nayun', 'sana', 'zwi', 'jisu', 'jeni', 'rose', 'risa']
```

List 에서 Slice 가 적용됨.

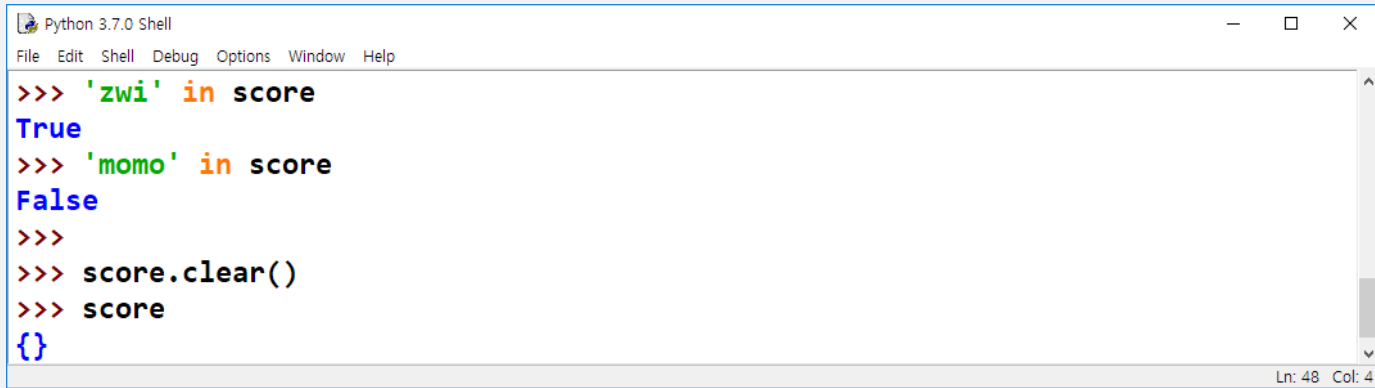
```
>>> unite[0]
'dahyun'
>>> unite[-1]
'risa'
>>> unite[:3]
['dahyun', 'jihyo', 'nayun']
>>> unite[-3:]
['jeni', 'rose', 'risa']
```

```
>>> twice = ['momo', 'sana', 'zwi', 'nayun', 'dahyun']
>>> len(twice)
5
>>> twice.append('jihyo')
>>> len(twice)
6
>>> twice.sort()
>>> twice
['dahyun', 'jihyo', 'momo', 'nayun', 'sana', 'zwi']
>>> #sort는 순서대로 배열해줌
>>> center = twice[0]
>>> center
'dahyun'
>>> black_pink = ['jisu', 'jeni', 'rose', 'risa']
>>> len(black_pink)
4
>>> black_pink.sort()
>>> bp_center = black_pink[0]
>>> bp_center
'jeni'
>>> unite = twice + black_pink
>>> unite
['dahyun', 'jihyo', 'momo', 'nayun', 'sana', 'zwi', 'jeni', 'jisu', 'risa', 'rose']
>>> len(unite)
10
>>> unite.sort()
>>> unite
['dahyun', 'jeni', 'jihyo', 'jisu', 'momo', 'nayun', 'risa', 'rose', 'sana', 'zwi']
>>> unite.remove('momo')
>>> unite
['dahyun', 'jeni', 'jihyo', 'jisu', 'nayun', 'risa', 'rose', 'sana', 'zwi']
>>> len(unite)
9
>>> del unite[-1]
>>> del unite[-1]
>>> del unite[-1]
>>> unite
['dahyun', 'jeni', 'jihyo', 'jisu', 'nayun', 'risa']
>>> unite_unit = unite[:3]
>>> unite_unit
```


Dictionary

```
Python 3.7.0 Shell
File Edit Shell Debug Options Window Help
>>> score = { 'momo' : 80, 'zwi' : 85, 'sana' : 98 }
>>> type(score)
<class 'dict'>
>>> score['momo']
80
>>> score['nayun']
Traceback (most recent call last):
  File "<pyshell#3>", line 1, in <module>
    score['nayun']
KeyError: 'nayun'
>>> score['nayun'] = 100
>>> score
{'momo': 80, 'zwi': 85, 'sana': 98, 'nayun': 100}
>>> del score['momo']
>>> score
{'zwi': 85, 'sana': 98, 'nayun': 100}
>>> score.keys()
dict_keys(['zwi', 'sana', 'nayun'])
>>> score.values()
dict_values([85, 98, 100])
>>>
```

Ln: 12 Col: 0



A screenshot of a Python 3.7.0 Shell window. The window has a title bar with the text "Python 3.7.0 Shell" and standard window controls (minimize, maximize, close). Below the title bar is a menu bar with the following items: File, Edit, Shell, Debug, Options, Window, and Help. The main area of the window contains a Python REPL session with the following code and output:

```
>>> 'zwi' in score
True
>>> 'momo' in score
False
>>>
>>> score.clear()
>>> score
{}
```

The status bar at the bottom right of the window shows "Ln: 48 Col: 4".

Tuple

- 여러 개의 값을 동시에 관리. 리스트와 유사.
- 하지만, 기본적으로 값을 바꿀 수는 없음. ==> 프로그램 중 변경이 되지 않는 값들의 모음이 필요할 때 사용하면 됨.

```
Python 3.7.0 Shell
File Edit Shell Debug Options Window Help
>>>
>>> t1 = (1,2,3)
>>> t2 = (1, )
>>> t3 = ()
>>> t4 = 1,2,3,4
>>> t4
(1, 2, 3, 4)
>>> type(t4)
<class 'tuple'>
>>> t5 = (1, 'a', "park", (1, 2))
>>> t1[1:]
(2, 3)
>>> t1 + t5
(1, 2, 3, 1, 'a', 'park', (1, 2))
>>> t4 * t4
Traceback (most recent call last):
  File "<pyshell#15>", line 1, in <module>
    t4 * t4
TypeError: can't multiply sequence by non-int of type 'tuple'
>>> t4 * 2
(1, 2, 3, 4, 1, 2, 3, 4)
>>> |
```

Ln: 37 Col: 4

set

- 집합 자료형, 리스트와 달리, 중복을 허용하지 않고, 순서가 없음.

```
Python 3.7.0 Shell
File Edit Shell Debug Options Window Help
>>> s1 = {1,2,3}
>>> type(s1)
<class 'set'>
>>> s1 = {1,2,2,4}
>>> s1
{1, 2, 4}
>>> l1 = [1,2,2,2,2,3,3,3,3,5,5,5,5,5]
>>> s1 = set(l1)
>>> s1
{1, 2, 3, 5}
>>> s2 = {3,5,6,7}
>>> s1 + s2
Traceback (most recent call last):
  File "<pyshell#36>", line 1, in <module>
    s1 + s2
TypeError: unsupported operand type(s) for +: 'set' and 'set'
>>> s1 | s2
{1, 2, 3, 5, 6, 7}
>>> s1 & s2
{3, 5}
>>> s2 - s1
{6, 7}
>>> s1 - s2
{1, 2}
>>> s1.add(8)
>>> s1
{1, 2, 3, 5, 8}
>>> s2.remove(6)
>>> s2
{3, 5, 7}
```

Ln: 86 Col: 4

Complex Data Type

▪ List – list

- 순서가 있는, 중복을 허용하는 데이터들의 집합.
- 원하는 데이터를 찾기 위해, 순서 index 를 이용.

[val1, val2, ...]

▪ Dictionary – dict

- 검색을 위한 키를 갖는 데이터들의 집합
- key – value 쌍 들의 집합

{ key1: val1, key2: val2, ... }

▪ Tuple – tuple

- 순서가 있는, 중복을 허용하는 데이터들의 집합
- 다만, 데이터값을 변경하는 것은 불가

(val1, val2, ...)

▪ Set – set

- 중복을 허용하지 않는, 순서에 상관없는 데이터들의 집합

{ val1, val2, ... }