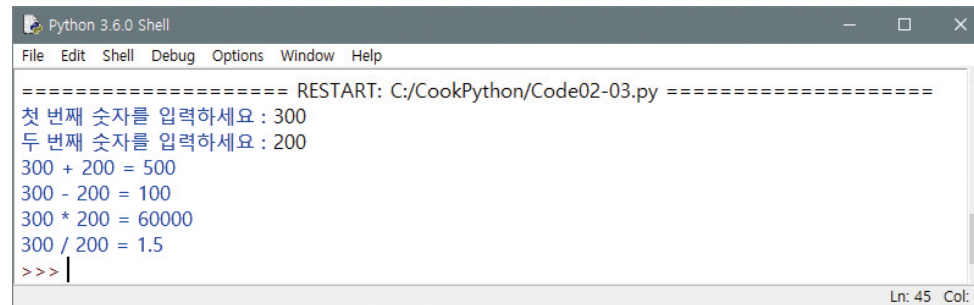


# AI Programming

Lecture 2

# Preview

- Ch. 2 미리 만드는 쓸 만한 프로그램
  - Calculator



```
Python 3.6.0 Shell
File Edit Shell Debug Options Window Help
===== RESTART: C:/CookPython/Code02-03.py =====
첫 번째 숫자를 입력하세요 : 300
두 번째 숫자를 입력하세요 : 200
300 + 200 = 500
300 - 200 = 100
300 * 200 = 60000
300 / 200 = 1.5
>>> |
Ln: 45 Col: 4
```

# IDLE

- **IDLE 실행 방법**

- Window + R → IDLE 검색
- C:\Users\H.LEE\AppData\Local\Anaconda3\Lib\idlelib → idle.bat 실행
- Anaconda prompt 실행 후 아래 명령어 입력

```
(base) C:\Users\H.LEE>cd Anaconda3\Lib\idlelib  
(base) C:\Users\H.LEE\AppData\Local\Anaconda3\Lib\idlelib>idle.bat
```

## **2.2 계산기 프로그램의 기본 기능 구현**

# Calculator

- 계산기 동작

- 1. 숫자 변수 두개 준비
- 2. 산술 연산 수행
  - $+$ ,  $-$ ,  $*$ ,  $/$
- 3. 결과 출력

# Calculator

- 대입 연산자 (할당 연산자)
  - 변수 이름 = 값

```
Python 3.6.0 Shell
File Edit Shell Debug Options Window Help
>>> a=100
>>> b=50
```



그릇 이름 : a



그릇 이름 : b

# Calculator

- Addition & substitution

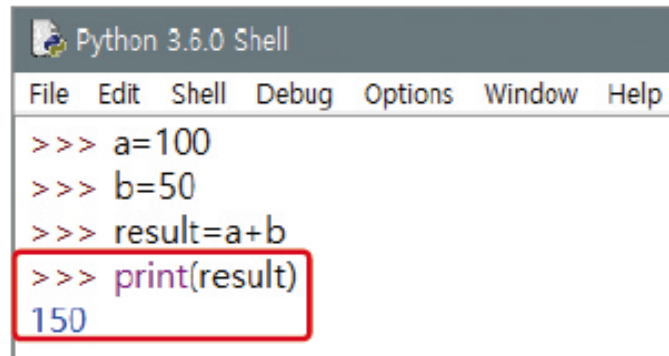
```
Python 3.6.0 Shell
File Edit Shell Debug Options Window He
>>> a=100
>>> b=50
>>> result=a+b
```



# Calculator

- **Print function**

- `print()`: 입력 받은 문자 혹은 변수의 값을 출력



```
Python 3.6.0 Shell
File Edit Shell Debug Options Window Help
>>> a=100
>>> b=50
>>> result=a+b
>>> print(result)
150
```

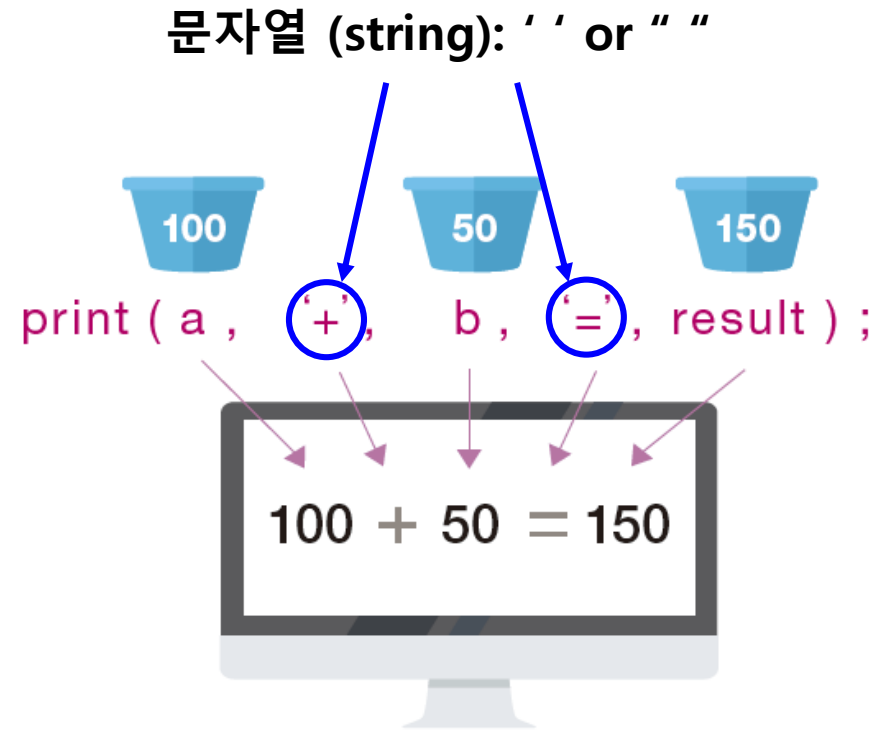
The screenshot shows a Python 3.6.0 Shell window with a menu bar (File, Edit, Shell, Debug, Options, Window, Help). The command prompt shows the following sequence of commands and output: `>>> a=100`, `>>> b=50`, `>>> result=a+b`, and `>>> print(result)`. The output `150` is displayed below the last command. A red rectangle highlights the `print(result)` command and its output.



# Calculator

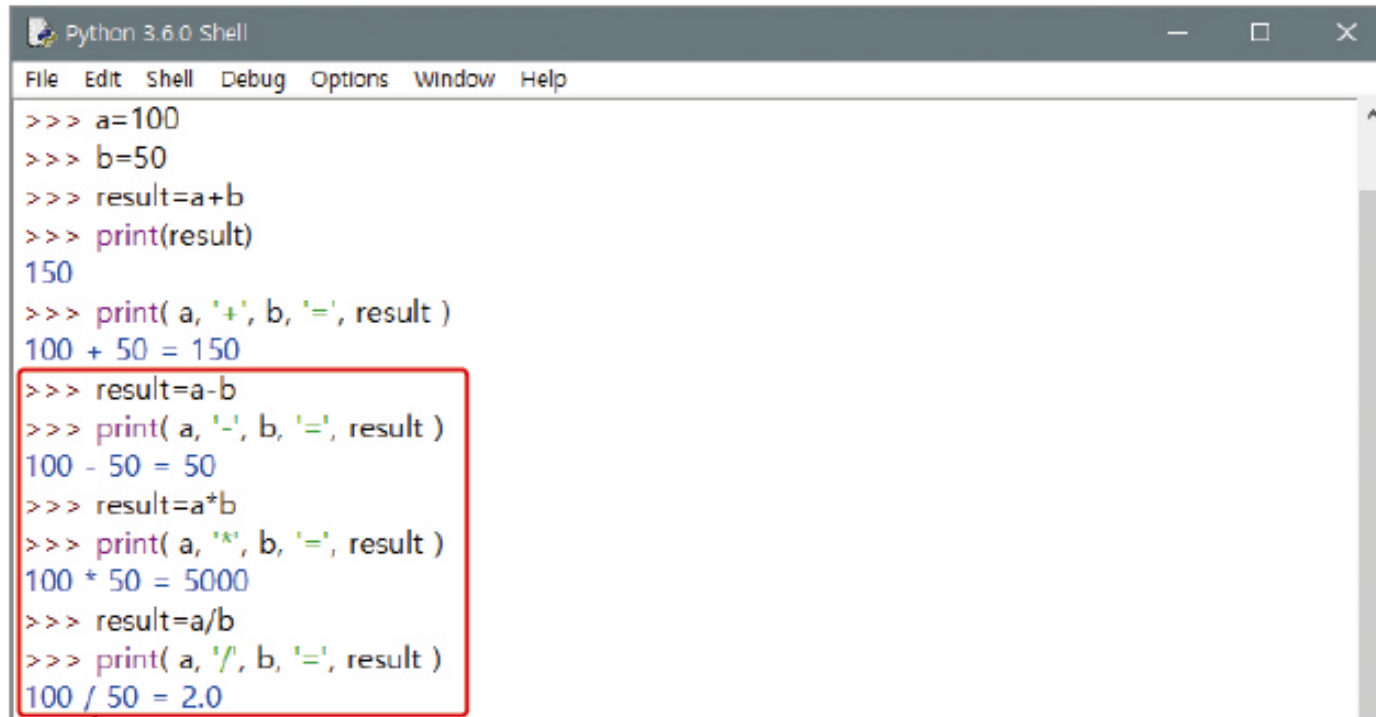
- Print function
  - Multiple variables

```
Python 3.6.0 Shell
File Edit Shell Debug Options Window Help
>>> a=100
>>> b=50
>>> result=a+b
>>> print(result)
150
>>> print( a, '+', b, '=', result )
100 + 50 = 150
```



# Calculator

- Practice



```
Python 3.6.0 Shell
File Edit Shell Debug Options Window Help
>>> a=100
>>> b=50
>>> result=a+b
>>> print(result)
150
>>> print( a, '+', b, '=', result )
100 + 50 = 150
>>> result=a-b
>>> print( a, '-', b, '=', result )
100 - 50 = 50
>>> result=a*b
>>> print( a, '*', b, '=', result )
100 * 50 = 5000
>>> result=a/b
>>> print( a, '/', b, '=', result )
100 / 50 = 2.0
```

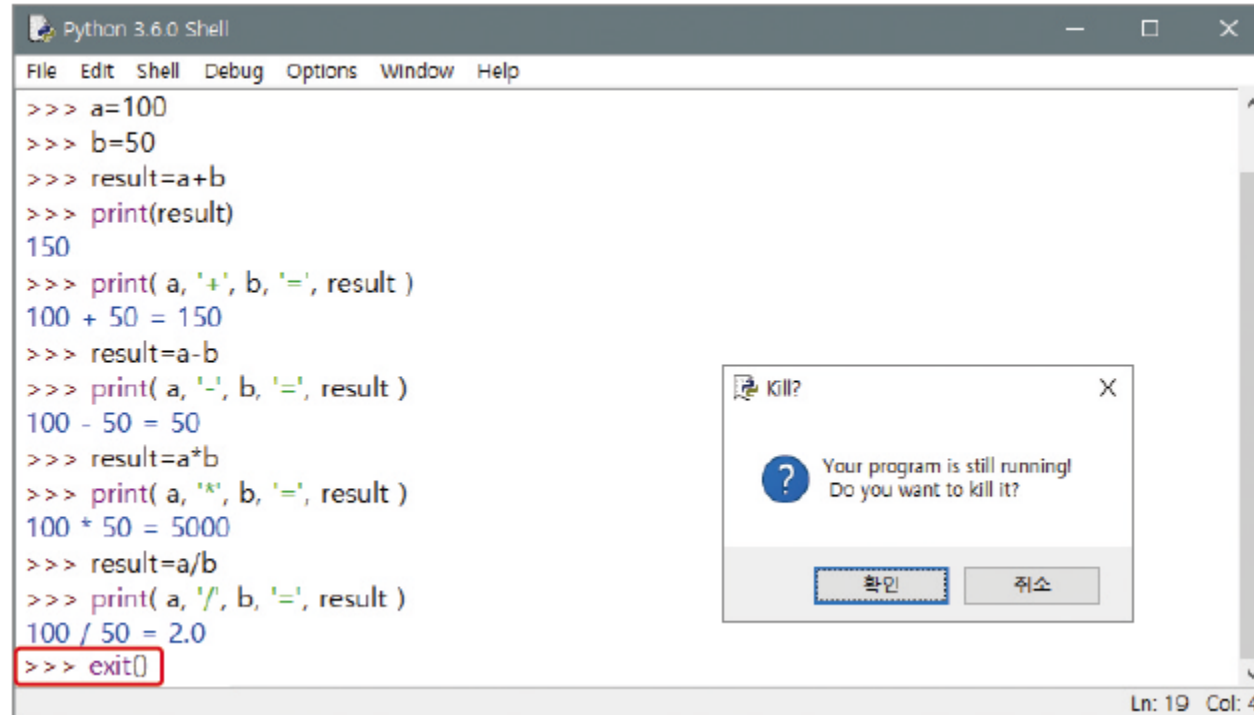
The screenshot shows a Python 3.6.0 Shell window with a menu bar (File, Edit, Shell, Debug, Options, Window, Help). The code entered is as follows:

- `>>> a=100`
- `>>> b=50`
- `>>> result=a+b`
- `>>> print(result)`  
Output: `150`
- `>>> print( a, '+', b, '=', result )`  
Output: `100 + 50 = 150`
- `>>> result=a-b`
- `>>> print( a, '-', b, '=', result )`  
Output: `100 - 50 = 50`
- `>>> result=a*b`
- `>>> print( a, '*', b, '=', result )`  
Output: `100 * 50 = 5000`
- `>>> result=a/b`
- `>>> print( a, '/', b, '=', result )`  
Output: `100 / 50 = 2.0`

The last four lines of code and their corresponding outputs are enclosed in a red rectangular box.

# Calculator

- Terminate IDLE



The image shows a screenshot of a Python 3.6.0 Shell window. The window has a menu bar with 'File', 'Edit', 'Shell', 'Debug', 'Options', 'Window', and 'Help'. The main area contains the following code and output:

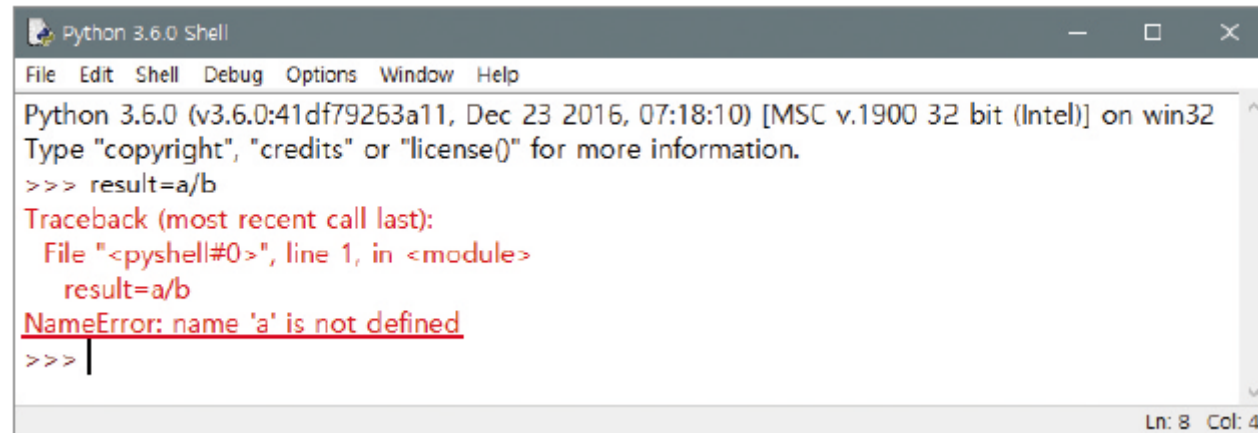
```
>>> a=100
>>> b=50
>>> result=a+b
>>> print(result)
150
>>> print( a, '+', b, '=', result )
100 + 50 = 150
>>> result=a-b
>>> print( a, '-', b, '=', result )
100 - 50 = 50
>>> result=a*b
>>> print( a, '*', b, '=', result )
100 * 50 = 5000
>>> result=a/b
>>> print( a, '/', b, '=', result )
100 / 50 = 2.0
>>> exit()
```

The `exit()` command is highlighted with a red box. A 'Kill?' dialog box is overlaid on the right side of the shell window. The dialog box has a question mark icon and the text: 'Your program is still running! Do you want to kill it?'. It has two buttons: '확인' (Yes) and '취소' (No). The status bar at the bottom right of the shell window shows 'Ln: 19 Col: 4'.

## 2.3 계산기 프로그램 저장

# Python Code

- Why save codes?



A screenshot of a Python 3.6.0 Shell window. The window has a title bar that says "Python 3.6.0 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 text area shows the following content: "Python 3.6.0 (v3.6.0:41df79263a11, Dec 23 2016, 07:18:10) [MSC v.1900 32 bit (Intel)] on win32", "Type 'copyright', 'credits' or 'license()' for more information.", and a prompt ">>>". The user has entered "result=a/b", which has caused a "NameError: name 'a' is not defined". The error message is displayed in red text, with the file path "<pyshell#0>", line 1, in <module>" and the code "result=a/b" also in red. The error message "NameError: name 'a' is not defined" is underlined. The prompt ">>>" is followed by a vertical cursor. At the bottom right of the window, the status bar shows "Ln: 8 Col: 4".

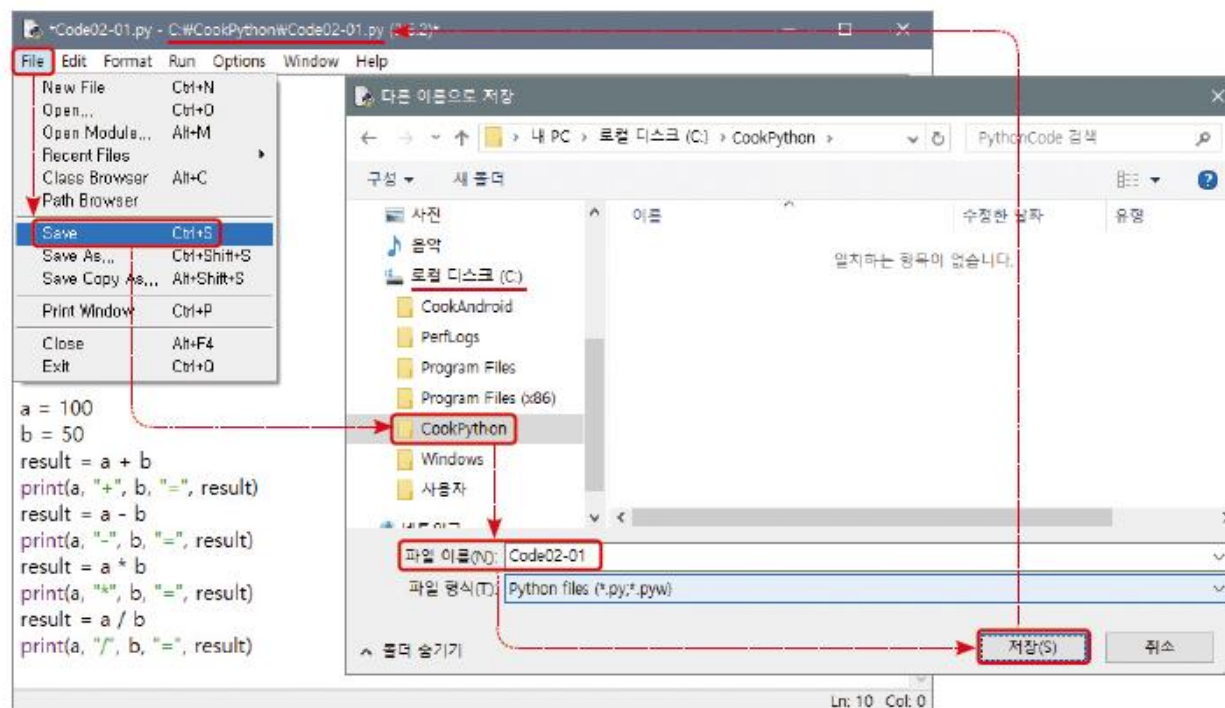
```
Python 3.6.0 (v3.6.0:41df79263a11, Dec 23 2016, 07:18:10) [MSC v.1900 32 bit (Intel)] on win32
Type "copyright", "credits" or "license()" for more information.
>>> result=a/b
Traceback (most recent call last):
  File "<pyshell#0>", line 1, in <module>
    result=a/b
NameError: name 'a' is not defined
>>> |
```

Ln: 8 Col: 4

# Python Code

- Create & Save

- [File] → [New File]
- [File] → [Save] (or Ctrl + S)
- `*.py` file is created



# Python Code

- Practice

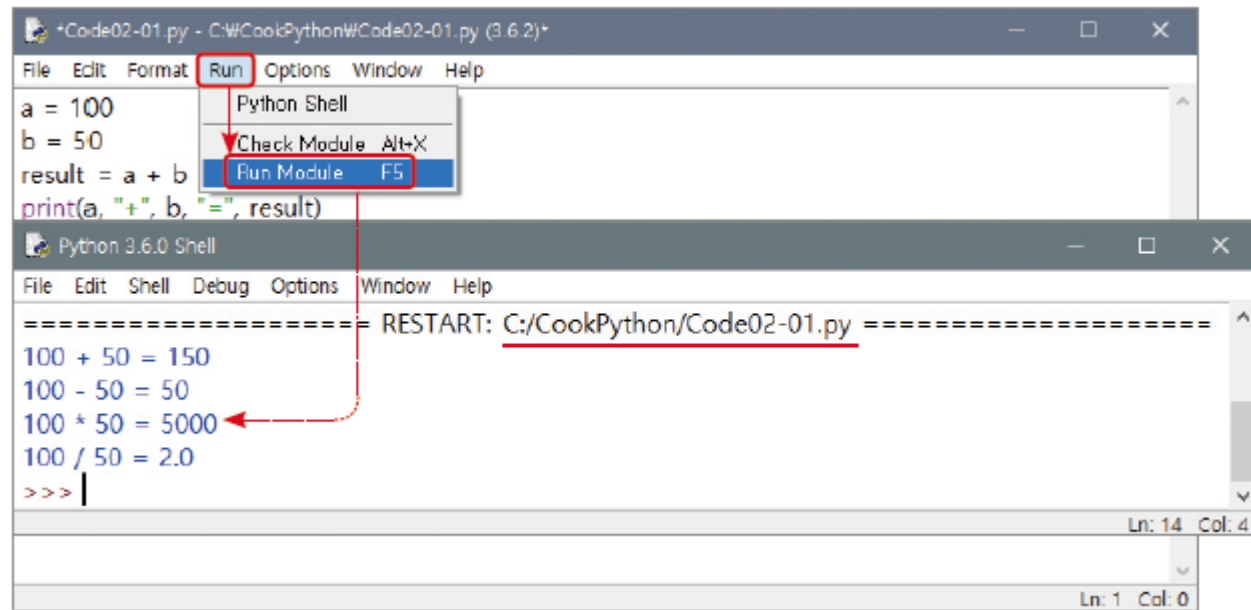
Code02-01.py

```
1 a = 100
2 b = 50
3 result = a + b
4 print(a, "+", b, "=", result)
5 result = a - b
6 print(a, "-", b, "=", result)
7 result = a * b
8 print(a, "*", b, "=", result)
9 result = a / b
10 print(a, "/", b, "=", result)
```

# Python Code

- **Execution**

- [Run] → [Run Module] or [F5]

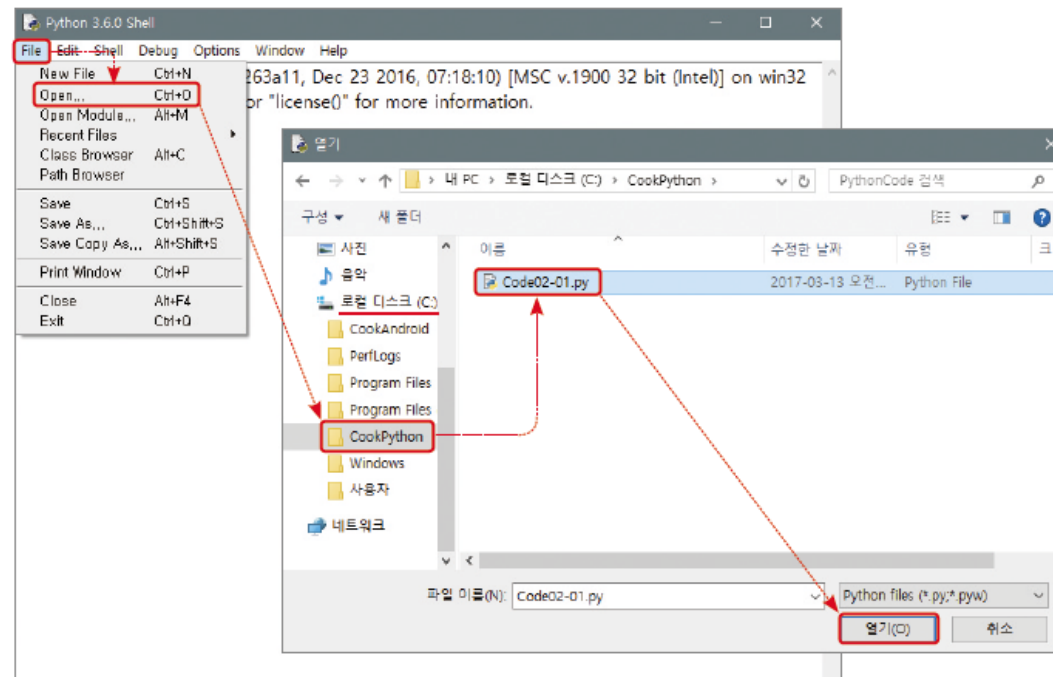




# Python Code

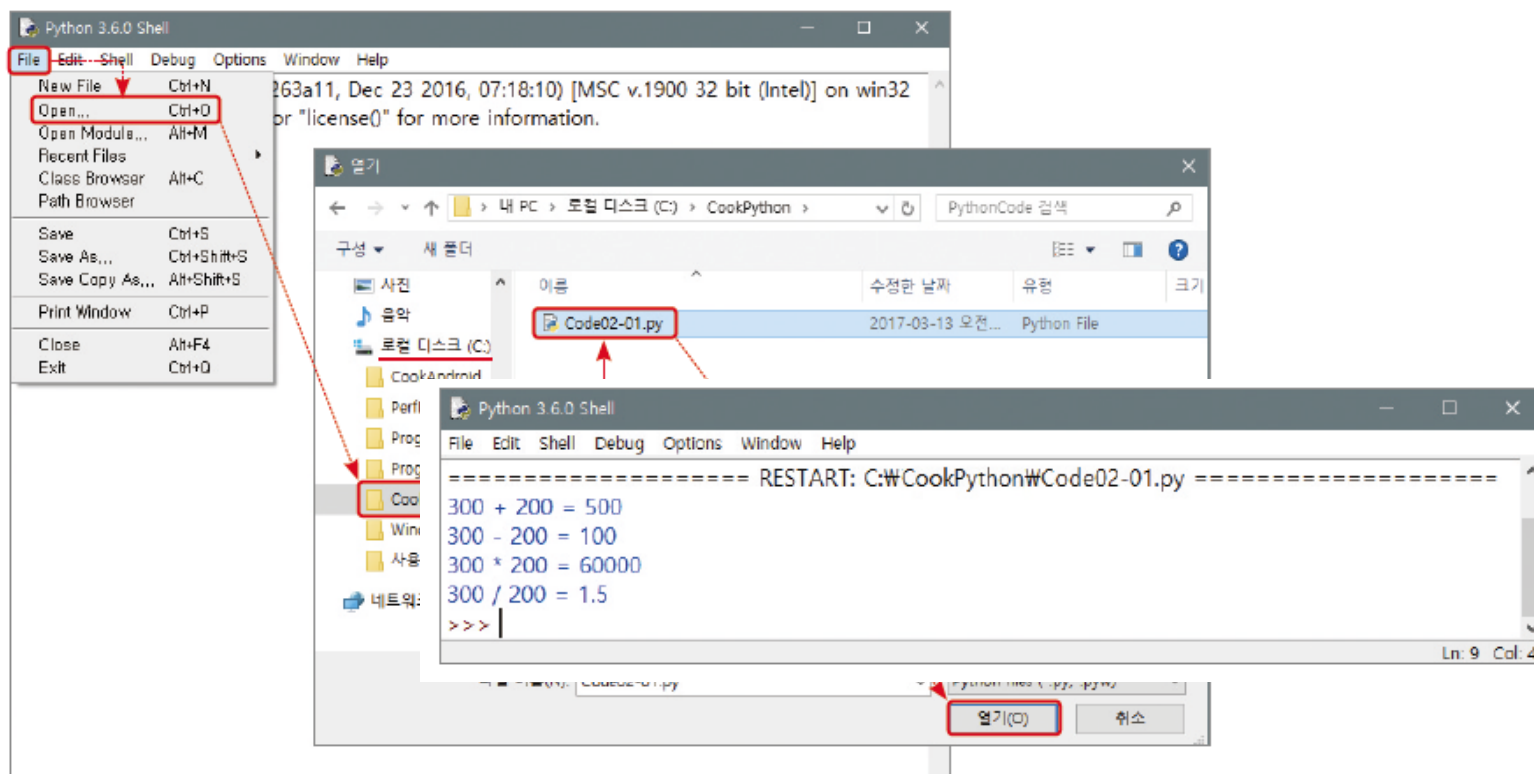
- Open

- [File] → [Open]



# Python Code

- Edit

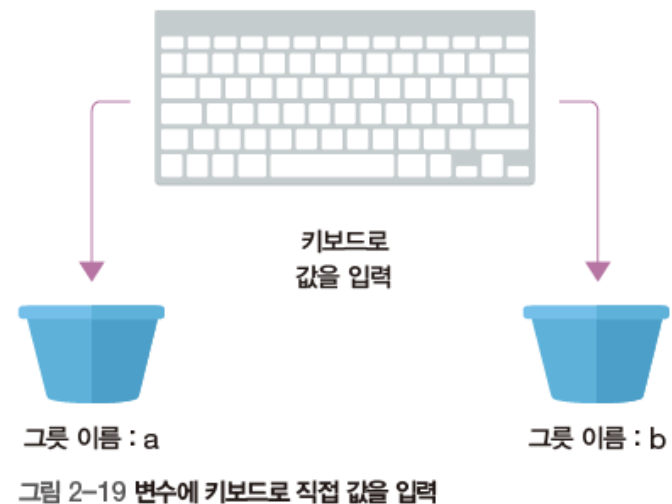


## 2.4 계산기 프로그램 확장

# Calculator

- Operations

- Step 1) 사용자로부터 숫자 변수 입력 받기
- Step 2) 사칙연산 계산 결과 출력



```
Python 3.7.2 Shell
File Edit Shell Debug Options Window Help
Python 3.7.2 (tags/v3.7.2:9a3ffc0492, Dec 23 2018, 23:09:28) [MSC v.1916 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
RESTART: C:\Users\User\Dropbox\수업\2019년1학기\융합프로그래밍\CookPython\190306\Code02_4.py
첫 번째 숫자를 입력하세요 : 100
두 번째 숫자를 입력하세요 : 50
100 + 50 = 150
100 - 50 = 50
100 * 50 = 5000
100 / 50 = 2.0
>>> |
```

Ln: 11 Col: 4

# Calculator

- Practice

Code02-02.py

```
1 a = input()
2 b = input()
3 result = a + b
4 print(a, "+", b, "=", result)
5 result = a - b
6 print(a, "-", b, "=", result)
7 result = a * b
8 print(a, "*", b, "=", result)
9 result = a / b
10 print(a, "/", b, "=", result)
```

```
Python 3.6.0 Shell
File Edit Shell Debug Options Window Help
===== RESTART: C:/CookPython/Code02-02.py =====
100
50 ← 사용자가 입력한 값
100 + 50 = 10050
Traceback (most recent call last):
  File "C:/CookPython/Code02-02.py", line 5, in <module>
    result=a-b
TypeError: unsupported operand type(s) for -: 'str' and 'str'
>>> |
Ln: 18 Col: 4
```

# Calculator

- **Types of variable (Ch. 3.3)**

- 정수형 (int)

- `a = 5, b = 3`

- 문자열 (string)

- `a = "python", b = "파이썬", c = "3"`

- 부동소수점 (float)

- `a = 3.14, b = 5.2, c = 10.0`

# Calculator

- Casting (형변환)

- Change types of variables

```
>>> a = "3"
>>> a + 5
Traceback (most recent call last):
  File "<pyshell#5>", line 1, in <module>
    a + 5
TypeError: can only concatenate str (not "int") to str
>>> b = int("3")
>>> b + 5
8
```

```
>>> c = 5.0
>>> print(c)
5.0
>>> d = int(c)
>>> print(d)
5
>>> e = float(d)
>>> print(e)
5.0
```

# Calculator

- Practice

```
int("100")      # 결과는 정수 100  
int(100.123)    # 결과는 정수 100
```

Code02-03.py

```
1 a = int(input())  
2 b = int(input())
```

```
Python 3.6.0 Shell  
File Edit Shell Debug Options Window Help  
==== RESTART: C:/CookPython/Code02-03.py =====  
100  
50  
100 + 50 = 150  
100 - 50 = 50  
100 * 50 = 5000  
100 / 50 = 2.0  
>>>  
Ln: 30 Col: 4
```

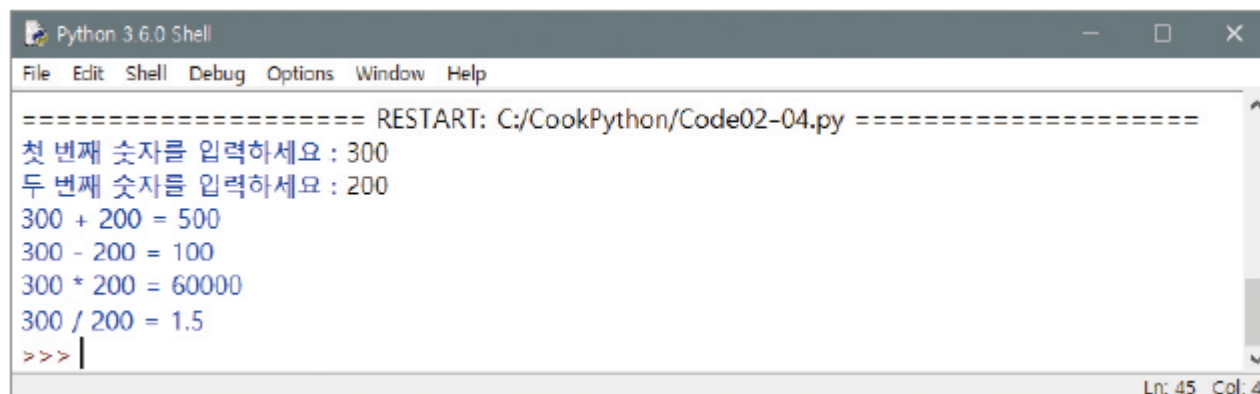


# Calculator

- Practice

Code02-04.py

```
1 a = int(input("첫 번째 숫자를 입력하세요 : "))
2 b = int(input("두 번째 숫자를 입력하세요 : "))
3 result = a + b
4 print(a, "+", b, "=", result)
5 result = a - b
6 print(a, "-", b, "=", result)
7 result = a * b
8 print(a, "*", b, "=", result)
9 result = a / b
10 print(a, "/", b, "=", result)
```



```
Python 3.6.0 Shell
File Edit Shell Debug Options Window Help
===== RESTART: C:/CookPython/Code02-04.py =====
첫 번째 숫자를 입력하세요 : 300
두 번째 숫자를 입력하세요 : 200
300 + 200 = 500
300 - 200 = 100
300 * 200 = 60000
300 / 200 = 1.5
>>>
```

Ln: 45 Col: 4

# Summary

- 변수

- $a = 10, b = 20$

- 사칙연산

- $c = a + b$

- $c = a - b$

- $c = a * b$

- $c = a / b$

# Practice

- 거듭제곱/제곱근 계산기

- $a^b \rightarrow a ** b$

- $\sqrt{a} \rightarrow a ** 0.5$

첫 번째 정수를 입력하시오: 4  
두 번째 정수를 입력하시오: 2  
4 의 2 승은 16 입니다.  
4 의 제곱근은 2.0 입니다.

첫 번째 정수를 입력하시오: 3  
두 번째 정수를 입력하시오: 3  
3 의 3 승은 27 입니다.  
3 의 제곱근은 1.7320508075688772 입니다.

# Practice

- Solution

```
a = int(input("첫 번째 정수를 입력하시오: "))
b = int(input("두 번째 정수를 입력하시오: "))

result = a ** b
print(a, "의 ", b, " 승은 ", result, " 입니다.")

result = a ** 0.5
print(a, "의 제곱근은 ", result, " 입니다.")
```

# Practice

- 변수의 이름

- 의무 규칙

- 첫 글자는 영문자 또는 밑줄 ( \_ ) 문자로만 시작 가능
      - 숫자로 시작은 불가능, but 중간에 숫자를 사용하는 것은 가능
      - e.g.) 1a (X), a1 (o), \_a1 (o), a\_1 (o)
    - 특수문자, 공백 사용 불가능
    - 소문자와 대문자는 다른 변수 취급
    - 예약어 사용 금지 (if, for, while, def, ...)

# Practice

- 변수의 이름

- 규칙 (추천)

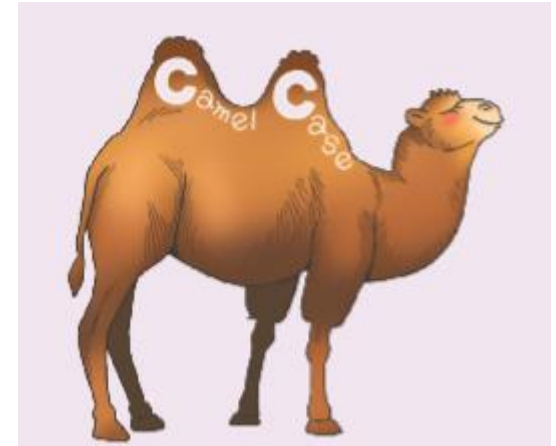
- 즉흥적으로 의미 없이 작명 금지
    - 첫 문자는 소문자 활용

- e.g.) `result` (good), `Result` (not preferred)

- 낙타체 사용

- e.g.) `newResult` (good), `newresult` (not preferred)

- e.g.) `myNewCar` (good), `mynewcar` (not preferred)



# Practice

- Solution

```
num1 = int(input("첫 번째 정수를 입력하시오: "))
num2 = int(input("두 번째 정수를 입력하시오: "))

power = num1 ** num2
print(num1, "의 ", num2, " 승은 ", power, " 입니다.")

sqrt = num1 ** 0.5
print(num1, "의 제곱근은 ", sqrt, " 입니다.")
```

# Assignment 1

- 신체질량 지수 (BMI) 계산기

- *Step 1)* 몸무게를 kg 단위로 입력받음 (float)
- *Step 2)* 신장을 cm 단위로 입력받음 (float)
- *Step 3)* 신장을 m 단위로 변환
- *Step 4)* BMI 계산후 출력

$$\text{BMI} = \frac{\text{weight [kg]}}{(\text{height [m]})^2}$$

몸무게를 kg 단위로 입력하시오: 67  
신장을 cm 단위로 입력하시오: 181  
당신의 BMI = 20.45114617990904

몸무게를 kg 단위로 입력하시오: 52.5  
신장을 cm 단위로 입력하시오: 165.7  
당신의 BMI = 19.12116224615747