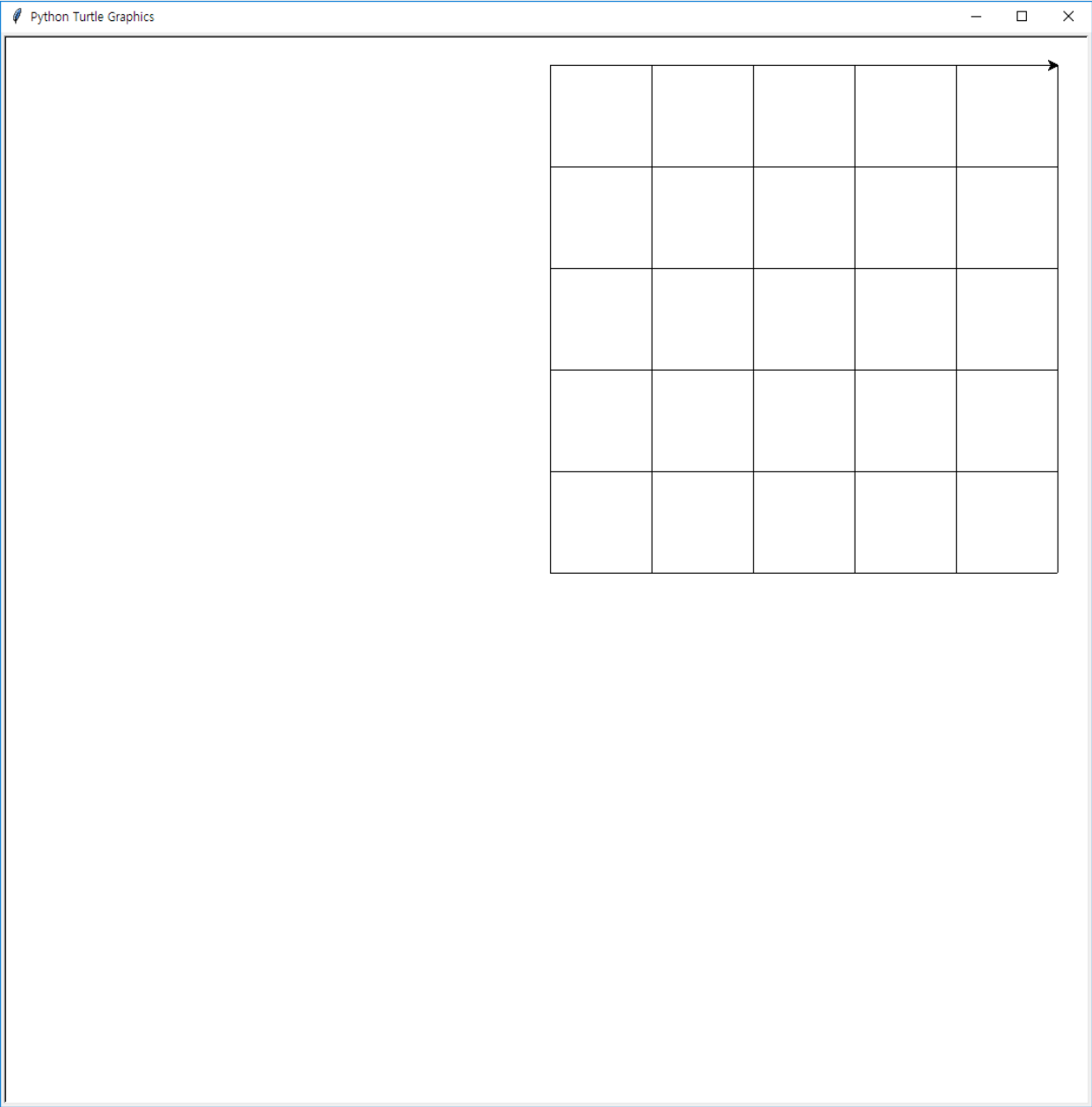


Lecture #3. 파이썬 기초 (3)

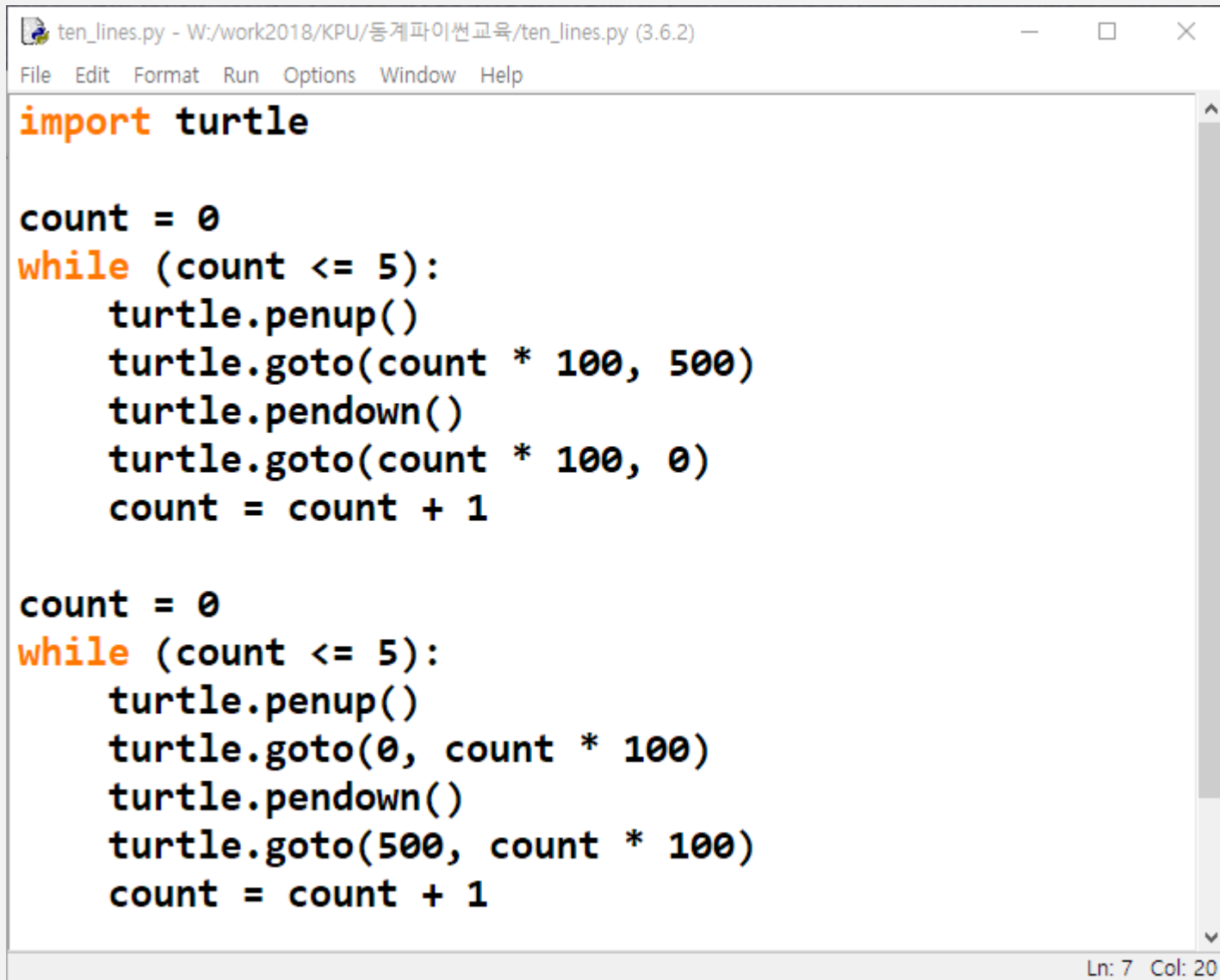
2D 게임 프로그래밍

이대현 교수

모눈 그리기(길이 500, 간격 100)



하나의 답안



```
ten_lines.py - W:/work2018/KPU/등계파이썬교육/ten_lines.py (3.6.2)
File Edit Format Run Options Window Help

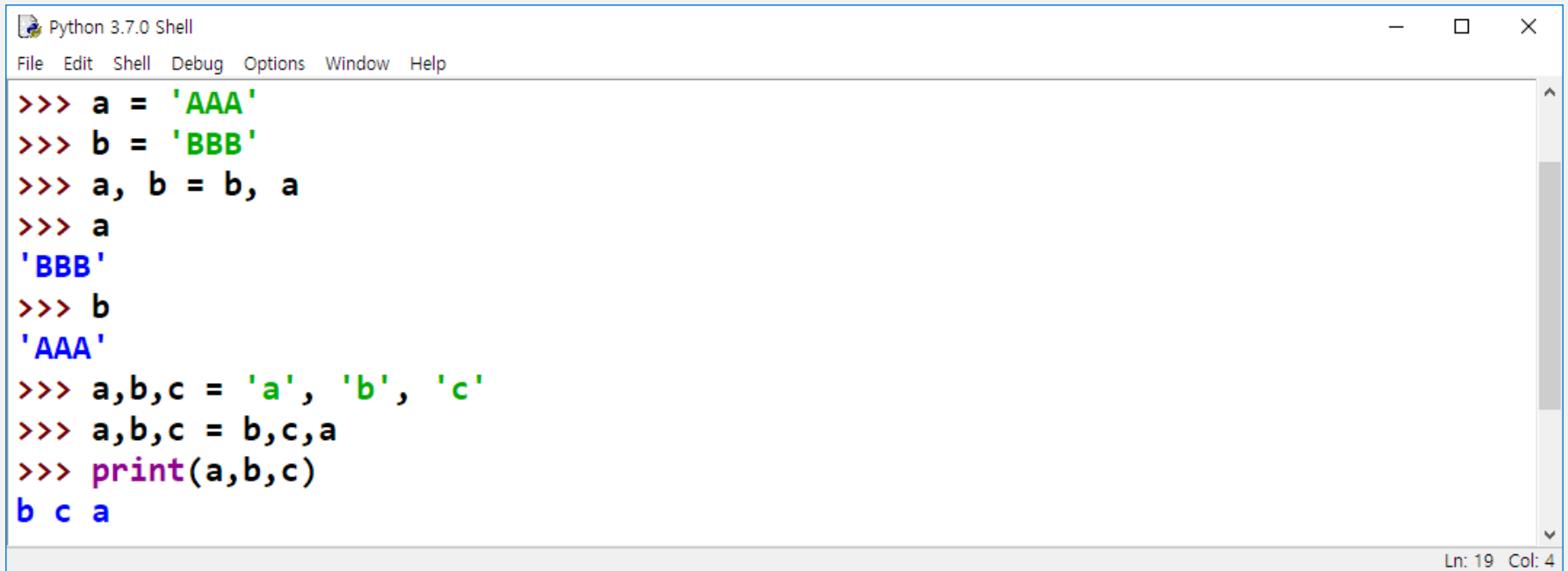
import turtle

count = 0
while (count <= 5):
    turtle.penup()
    turtle.goto(count * 100, 500)
    turtle.pendown()
    turtle.goto(count * 100, 0)
    count = count + 1

count = 0
while (count <= 5):
    turtle.penup()
    turtle.goto(0, count * 100)
    turtle.pendown()
    turtle.goto(500, count * 100)
    count = count + 1

Ln: 7 Col: 20
```

다중 대입



```
Python 3.7.0 Shell
File Edit Shell Debug Options Window Help
>>> a = 'AAA'
>>> b = 'BBB'
>>> a, b = b, a
>>> a
'BBB'
>>> b
'AAA'
>>> a,b,c = 'a', 'b', 'c'
>>> a,b,c = b,c,a
>>> print(a,b,c)
b c a
Ln: 19 Col: 4
```

거북이의 방향 설정

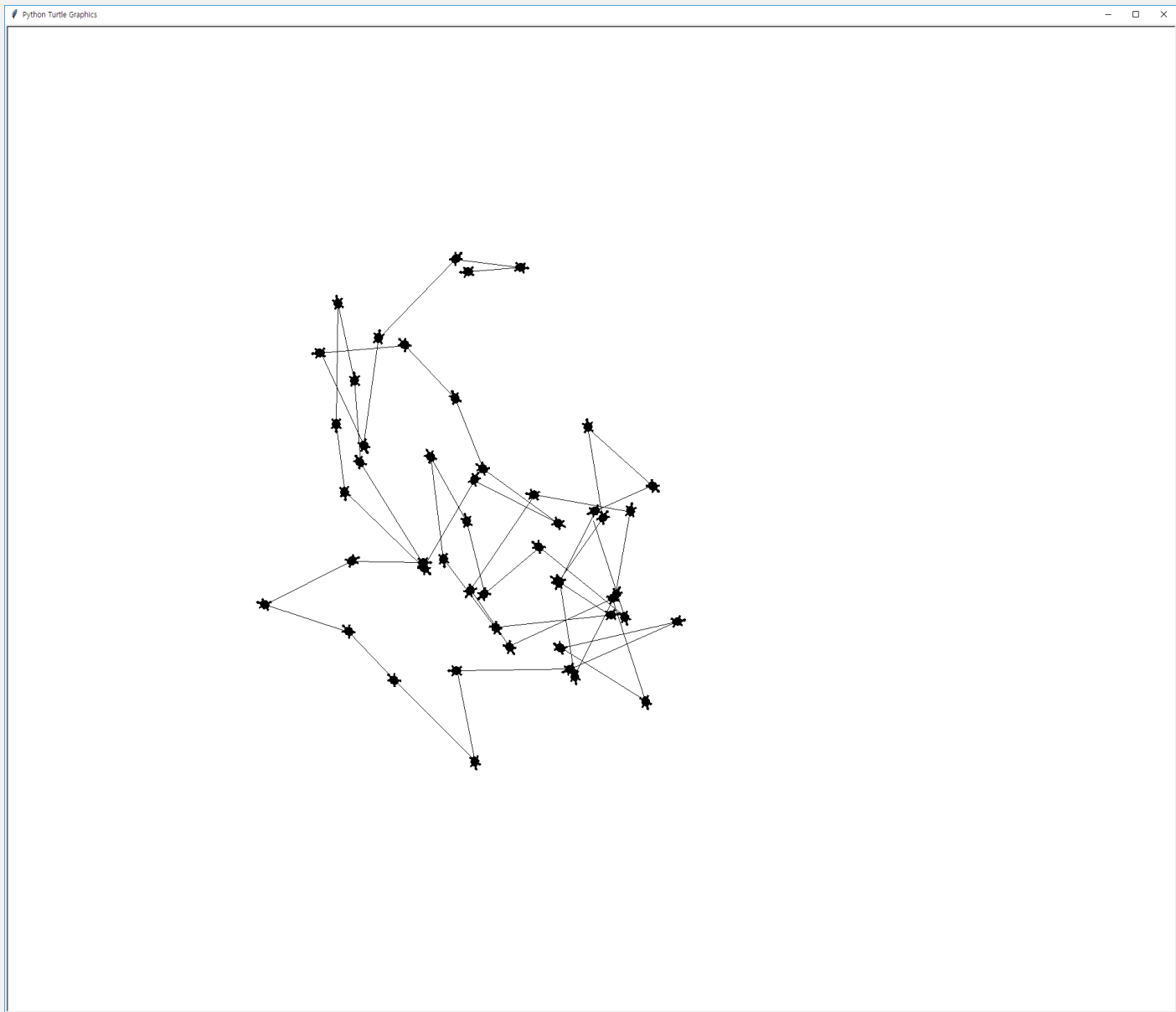
turtle.setheading(각도)

The image shows two windows from a Python 3.6.2 environment. The left window is the 'Python 3.6.2 Shell' with a menu bar (File, Edit, Shell, Debug, Options, Window, Help). It contains the following code and annotations:

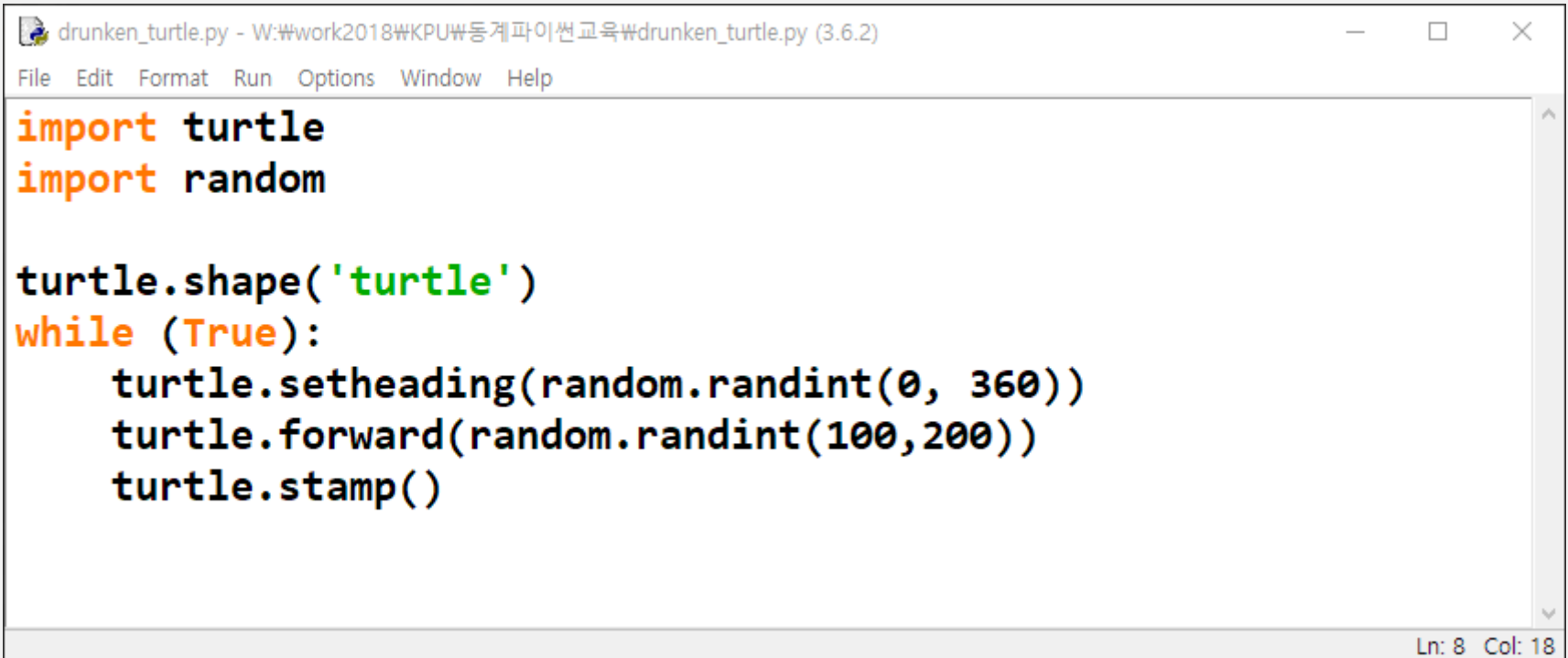
```
>>>
>>>
>>> import turtle
>>> turtle.setheading(90)   왼쪽
>>> turtle.setheading(0)   오른쪽
>>> turtle.setheading(180)  왼쪽
>>> turtle.setheading(-90)  아래쪽
>>> turtle.setheading(360)  오른쪽
>>>
>>>
>>>
>>>
>>>
```

The right window is titled 'Python Turtle Graphics' and displays a white canvas with a small black arrow (the turtle) pointing to the right.

술취한 거북이?



drunken_turtle.py

A screenshot of a Python IDE window titled "drunken_turtle.py - W:\work2018\KPU\등계파이썬교육\drunken_turtle.py (3.6.2)". The window has a menu bar with "File", "Edit", "Format", "Run", "Options", "Window", and "Help". The code is as follows:

```
import turtle
import random

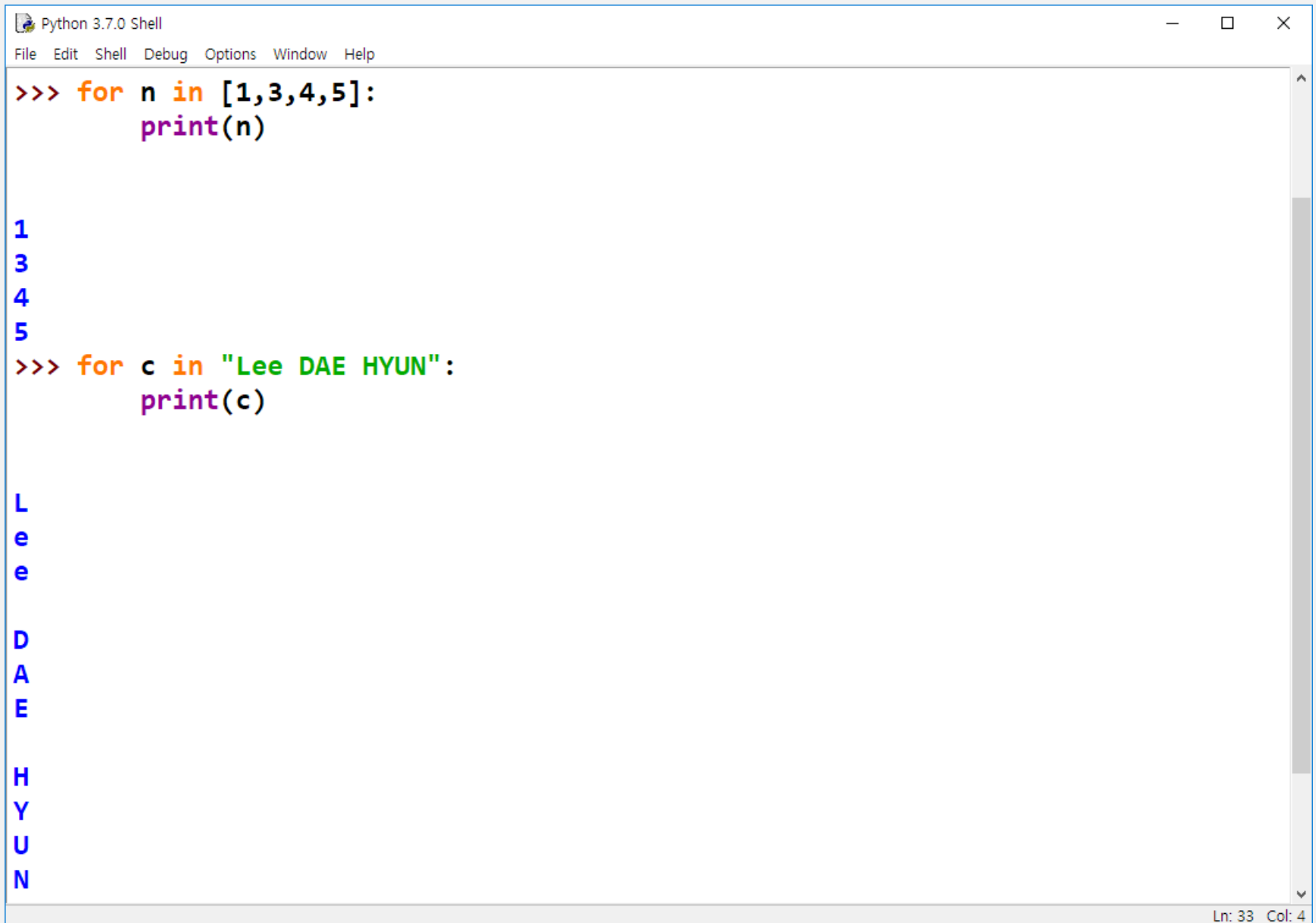
turtle.shape('turtle')
while (True):
    turtle.setheading(random.randint(0, 360))
    turtle.forward(random.randint(100,200))
    turtle.stamp()
```

The status bar at the bottom right shows "Ln: 8 Col: 18".

문법: for 반복문

- 집합적 데이터의 각 요소를 하나씩 꺼내서 반복적으로 처리

```
for 변수 in 리스트(또는 튜플, 문자열):  
    수행할 문장1  
    수행할 문장2  
    ...
```

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

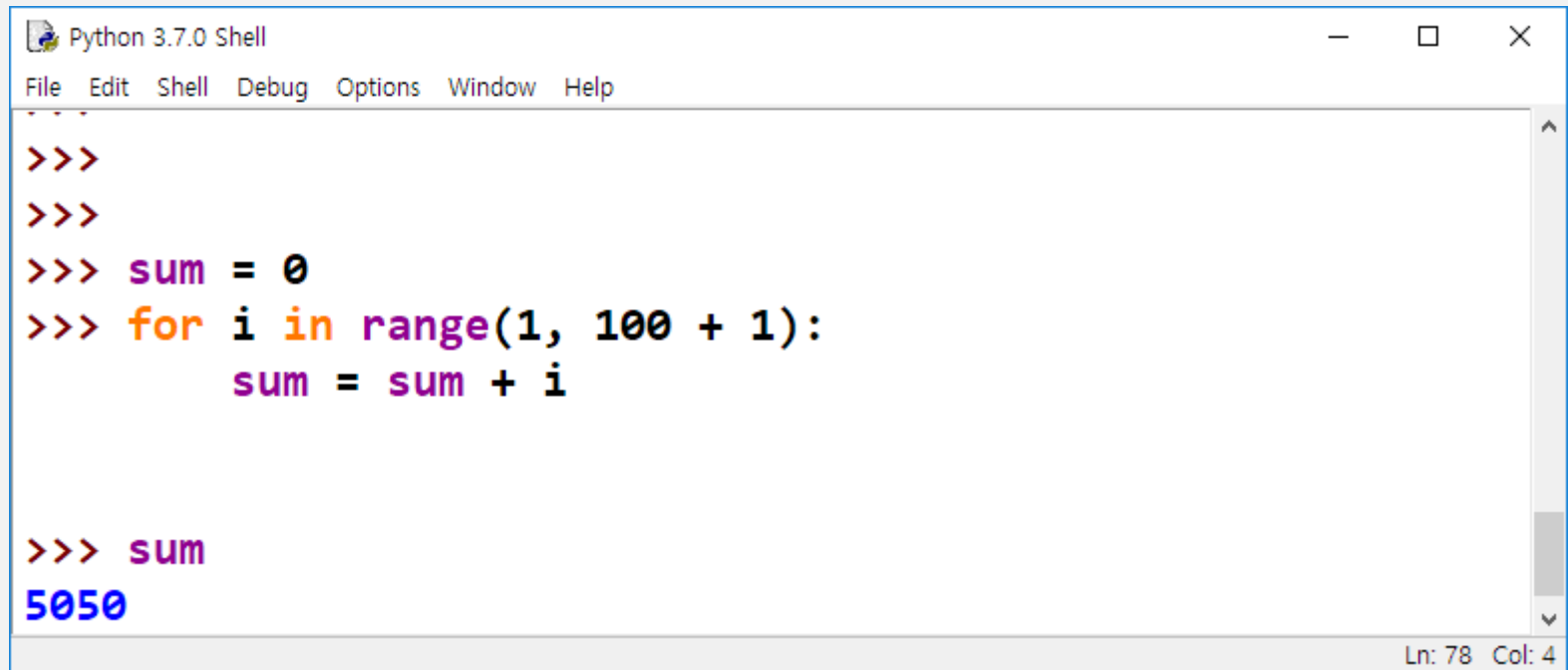
>>> for n in [1,3,4,5]:
    print(n)

1
3
4
5

>>> for c in "Lee DAE HYUN":
    print(c)

L
e
e
D
A
E
H
Y
U
N

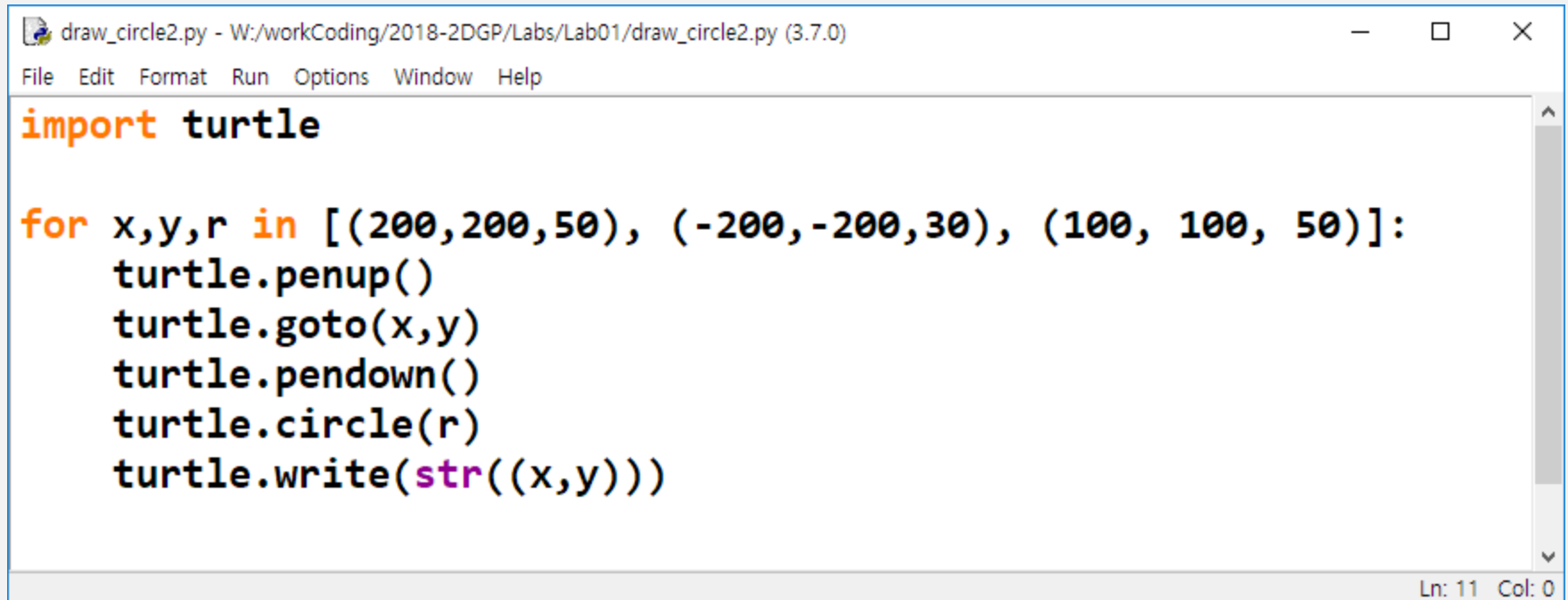
Ln: 33 Col: 4
```



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 Python script. The script starts with two empty lines, followed by the assignment `sum = 0`. Then, there is a `for` loop: `for i in range(1, 100 + 1):`, with the body `sum = sum + i` indented. After the loop, the variable `sum` is printed. The output of the script is `5050`. The status bar at the bottom right of the window shows "Ln: 78 Col: 4".

```
>>>
>>>
>>> sum = 0
>>> for i in range(1, 100 + 1):
>>>     sum = sum + i
>>>
>>> sum
5050
```

Ln: 78 Col: 4

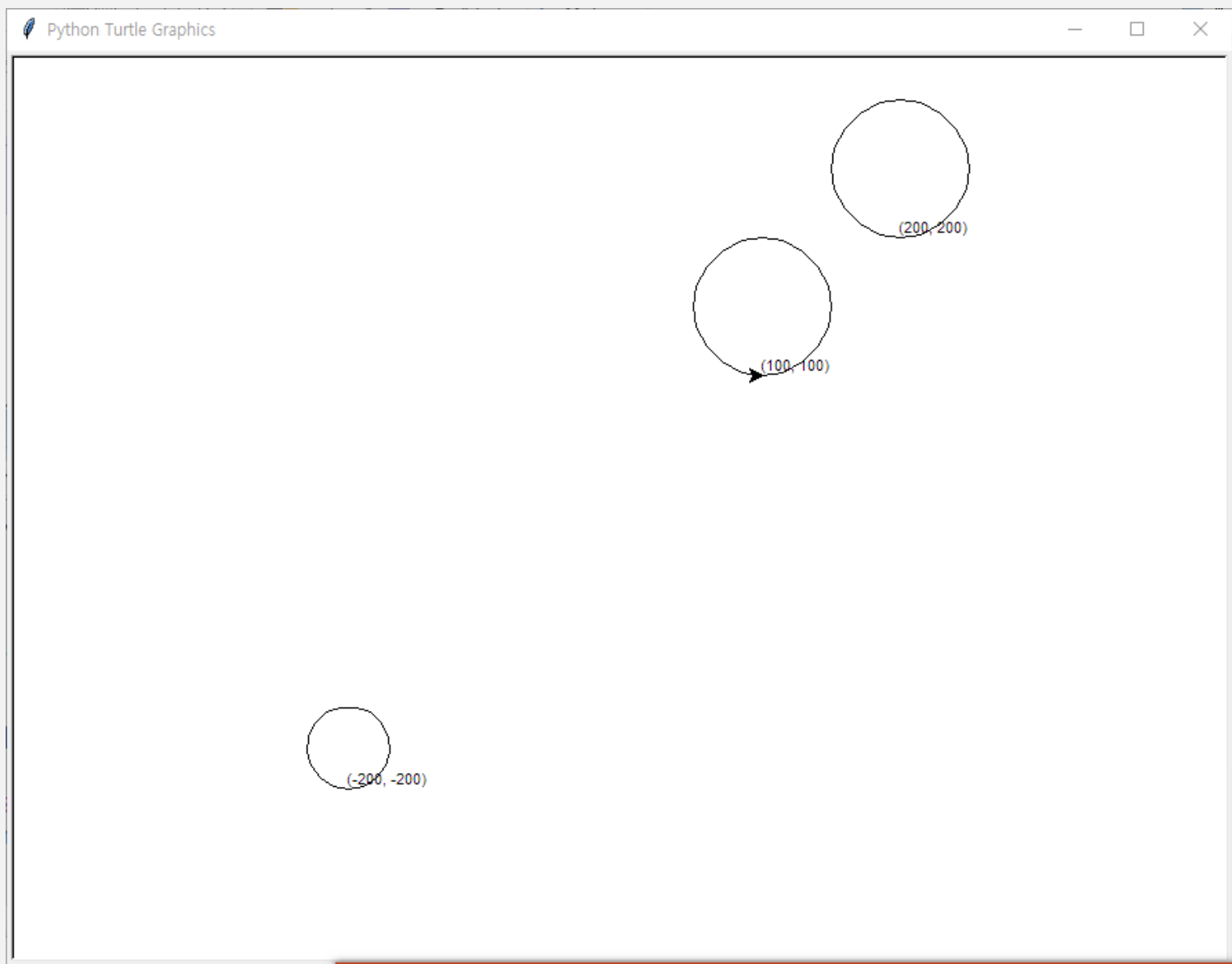


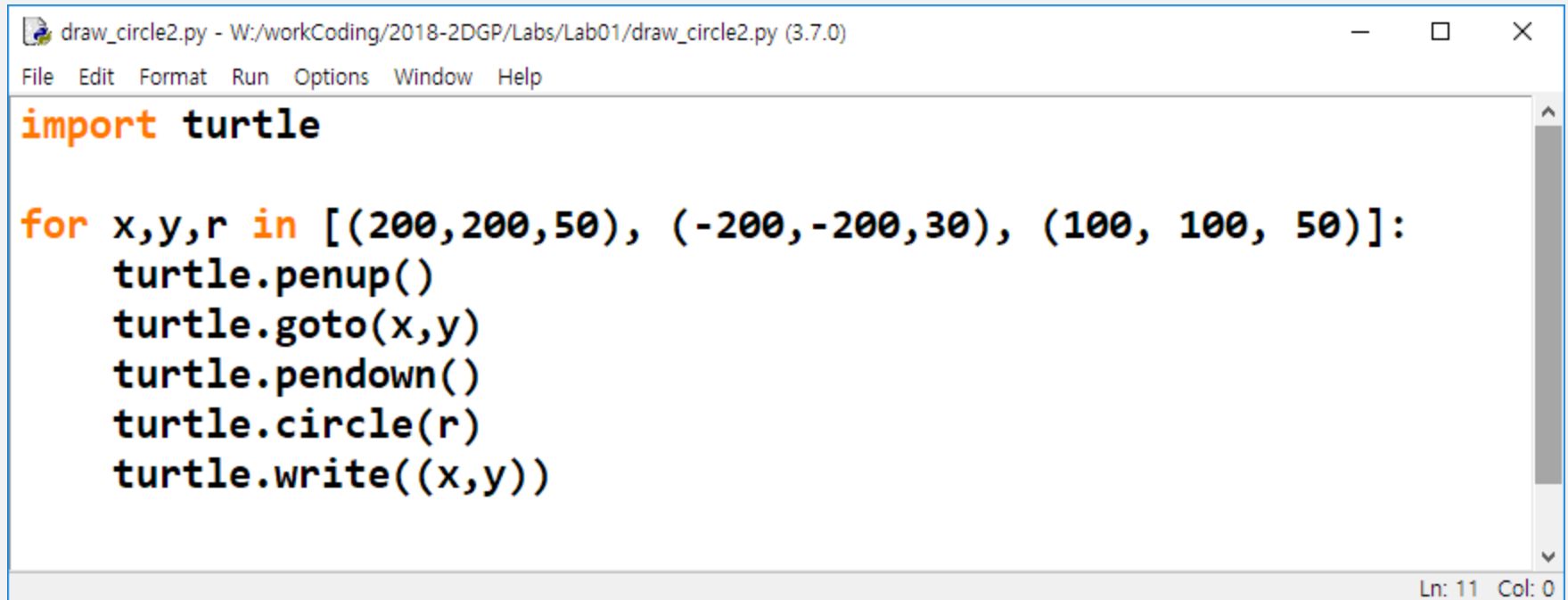
The image shows a screenshot of a Python IDE window. The title bar reads "draw_circle2.py - W:/workCoding/2018-2DGP/Labs/Lab01/draw_circle2.py (3.7.0)". The menu bar includes "File", "Edit", "Format", "Run", "Options", "Window", and "Help". The code editor contains the following Python code:

```
import turtle

for x,y,r in [(200,200,50), (-200,-200,30), (100, 100, 50)]:
    turtle.penup()
    turtle.goto(x,y)
    turtle.pendown()
    turtle.circle(r)
    turtle.write(str((x,y)))
```

The status bar at the bottom right indicates "Ln: 11 Col: 0".





The image shows a screenshot of a Python IDE window. The title bar reads "draw_circle2.py - W:/workCoding/2018-2DGP/Labs/Lab01/draw_circle2.py (3.7.0)". The menu bar includes "File", "Edit", "Format", "Run", "Options", "Window", and "Help". The code editor contains the following Python code:

```
import turtle

for x,y,r in [(200,200,50), (-200,-200,30), (100, 100, 50)]:
    turtle.penup()
    turtle.goto(x,y)
    turtle.pendown()
    turtle.circle(r)
    turtle.write((x,y))
```

The status bar at the bottom right indicates "Ln: 11 Col: 0".

함수(function)

- 수학에서 함수는, 어떤 수식을 정의한 것.

$$f(a, b) = a + b$$

$$f(3,4)=?$$

$$f(100,10)=?$$

프로그래밍에서 함수(function)란?

- 어떤 특정한 일을 처리하는 기능을 모아놓은 것, 수학적인 함수도 구현 가능.
- 일반적으로 라이브러리, 모듈은 여러 개의 함수들로 구성됨.
- 프로그래머는 자기만의 함수를 만들 수 있음.
- 함수의 이름은 그 함수의 기능을 정확히 나타내는 것이 좋음.

```
turtle.forward(100)  
turtle.right(90)  
turtle.undo()
```

문법: 함수 정의 - 함수를 만들기

```
def 함수명(매개변수):  
    <수행할 문장1>  
    <수행할 문장2>  
    ...
```


add 함수 만들기

a와 b 두개의 값을 받아서,

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

a와 b를 더해, sum을 계산

sum의 값을 되돌려줌(return)

함수 정의임을 뜻함.

함수 이름

인수: 외부에서 전달되는 값

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

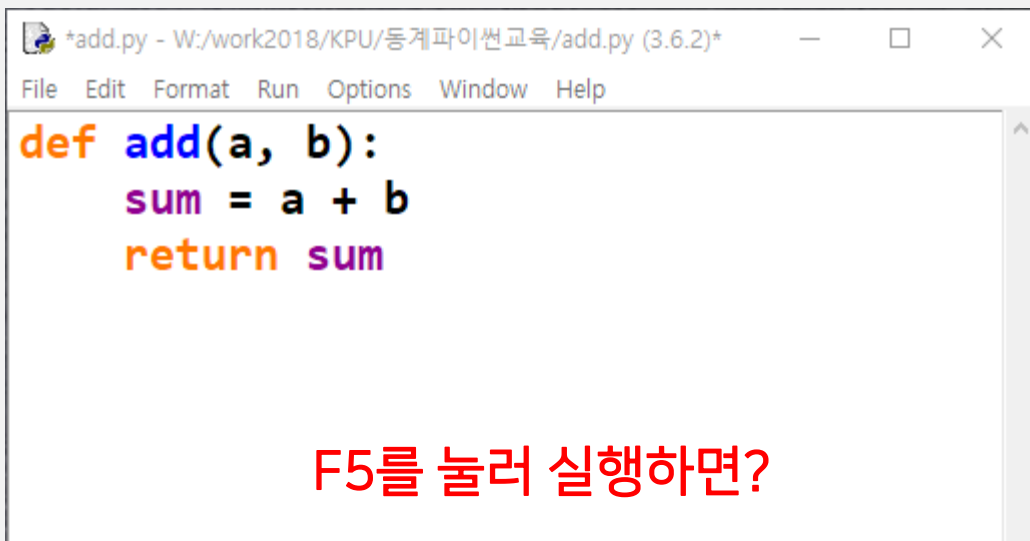
들여쓰기(indentation)

*** 매우 중요 ***

함수가 호출될 때 실행됨.

함수 정의, 그 자체로는 실행되지 않음.

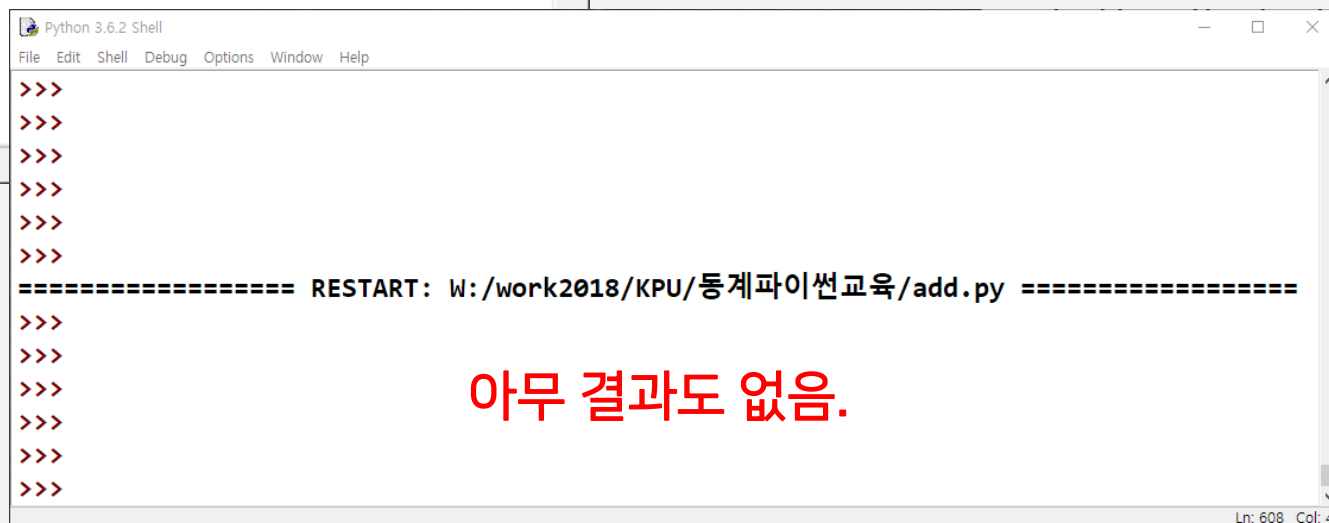
add.py



A screenshot of a text editor window titled '*add.py - W:/work2018/KPU/등계파이썬교육/add.py (3.6.2)*'. The menu bar includes File, Edit, Format, Run, Options, Window, and Help. The code content is as follows:

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

F5를 눌러 실행하면?



A screenshot of a Python 3.6.2 Shell window titled 'Python 3.6.2 Shell'. The menu bar includes File, Edit, Shell, Debug, Options, Window, and Help. The shell shows several empty prompt lines (">>>>") followed by a restart message:

```
>>>  
>>>  
>>>  
>>>  
>>>  
>>>  
>>>  
===== RESTART: W:/work2018/KPU/등계파이썬교육/add.py =====  
>>>  
>>>  
>>>  
>>>  
>>>  
>>>
```

아무 결과도 없음.

함수를 실행하려면, 함수 호출을 해야 함.

add.py

```
*add.py - W:/work2018/KPU/동계파이썬교육/add.py (3.6.2)*
File Edit Format Run Options Window Help

def add(a, b):
    sum = a + b
    return sum

result = add(100, 10)
print(result)
```

함수 호출

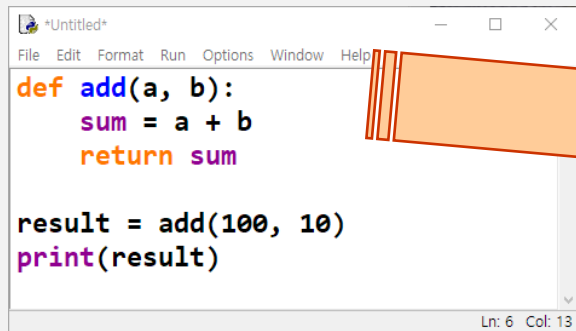
F5를 눌러 실행하면?

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

>>>
>>>
>>>
>>>
>>>
>>>
>>>
===== RESTART: W:/work2018/KPU/동계파이썬교육/add.py =====
110
>>>
>>>
>>>
>>>
>>>
```

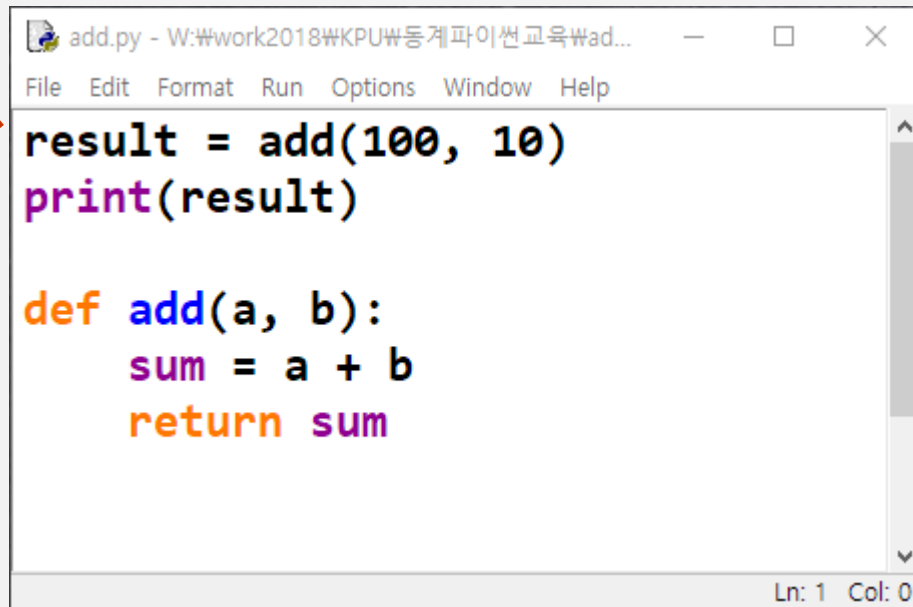
결과가 출력됨.

함수를 호출하려면, 함수 정의가 먼저 되어 있어야 함.



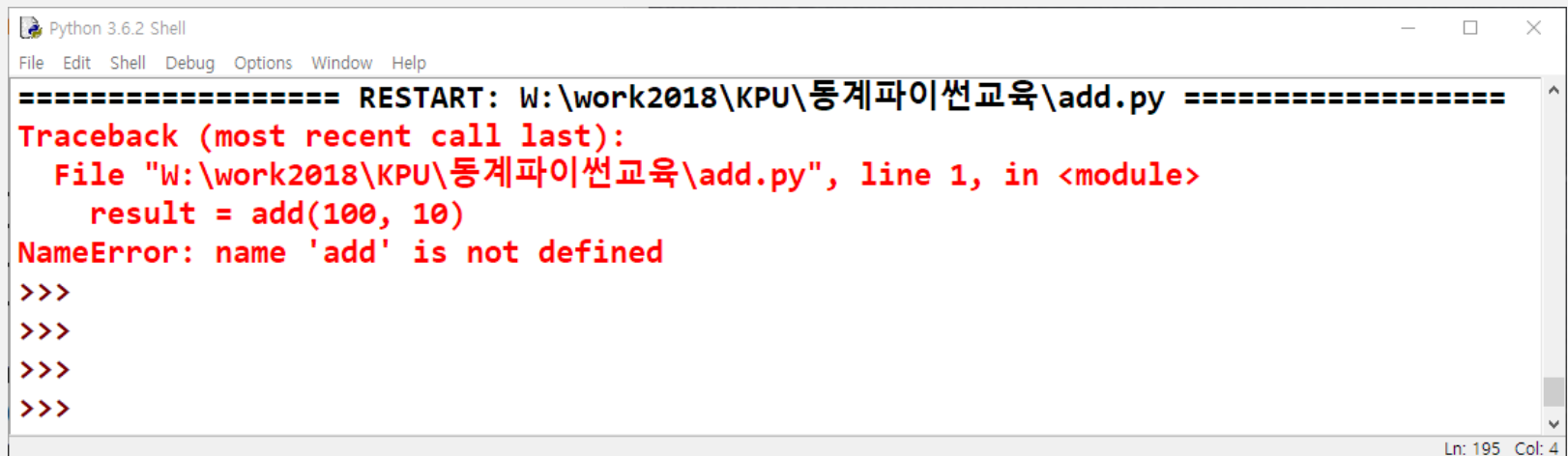
```
def add(a, b):  
    sum = a + b  
    return sum  
  
result = add(100, 10)  
print(result)
```

Ln: 6 Col: 13



```
result = add(100, 10)  
print(result)  
  
def add(a, b):  
    sum = a + b  
    return sum
```

Ln: 1 Col: 0



```
==== RESTART: W:\work2018\KPU\통계파이썬교육\add.py =====  
Traceback (most recent call last):  
  File "W:\work2018\KPU\통계파이썬교육\add.py", line 1, in <module>  
    result = add(100, 10)  
NameError: name 'add' is not defined  
>>>  
>>>  
>>>  
>>>
```

Ln: 195 Col: 4

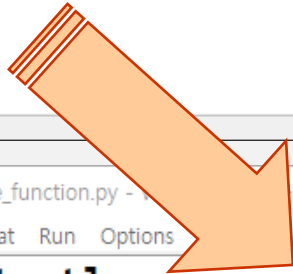
함수는 여러 작업을 모아서 하나로 처리할 수 있게 해 줘.

```
drunken_turtle.py - W:\work2018\KPU\등계\파이썬교육\drunken_turtle.py (3.6.2)
File Edit Format Run Options Window Help

import turtle
import random

turtle.shape('turtle')
while (True):
    turtle.setheading(random.randint(0, 360))
    turtle.forward(random.randint(100,200))
    turtle.stamp()
```

Ln: 8 Col: 18



```
random_turtle_function.py - W:\work2018\KPU\등계\파이썬교육\random_turtle_function.py (3.6.2)
File Edit Format Run Options Help

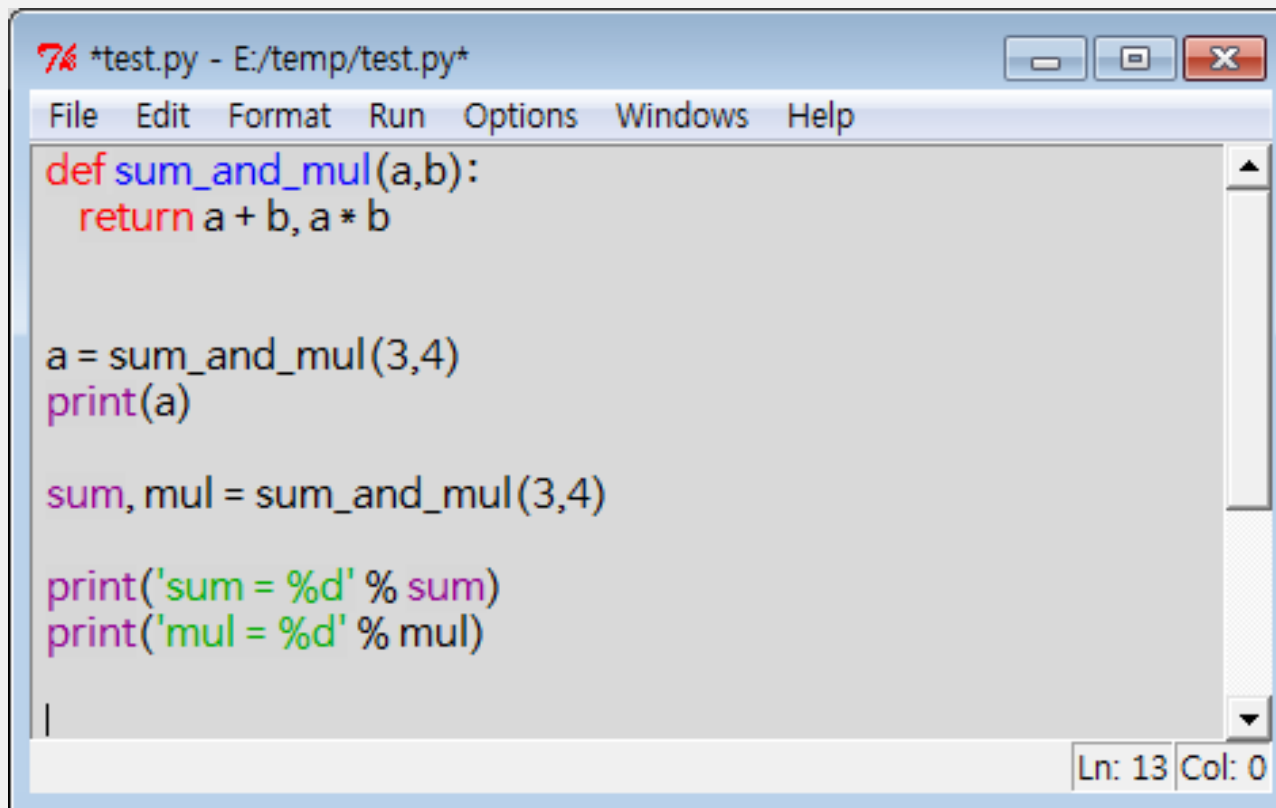
import turtle
import random

def drunken_move():
    turtle.setheading(random.randint(0, 360))
    turtle.forward(random.randint(100,200))
    turtle.stamp()

turtle.shape('turtle')
while (True):
    drunken_move()
```

Ln: 7 Col: 18

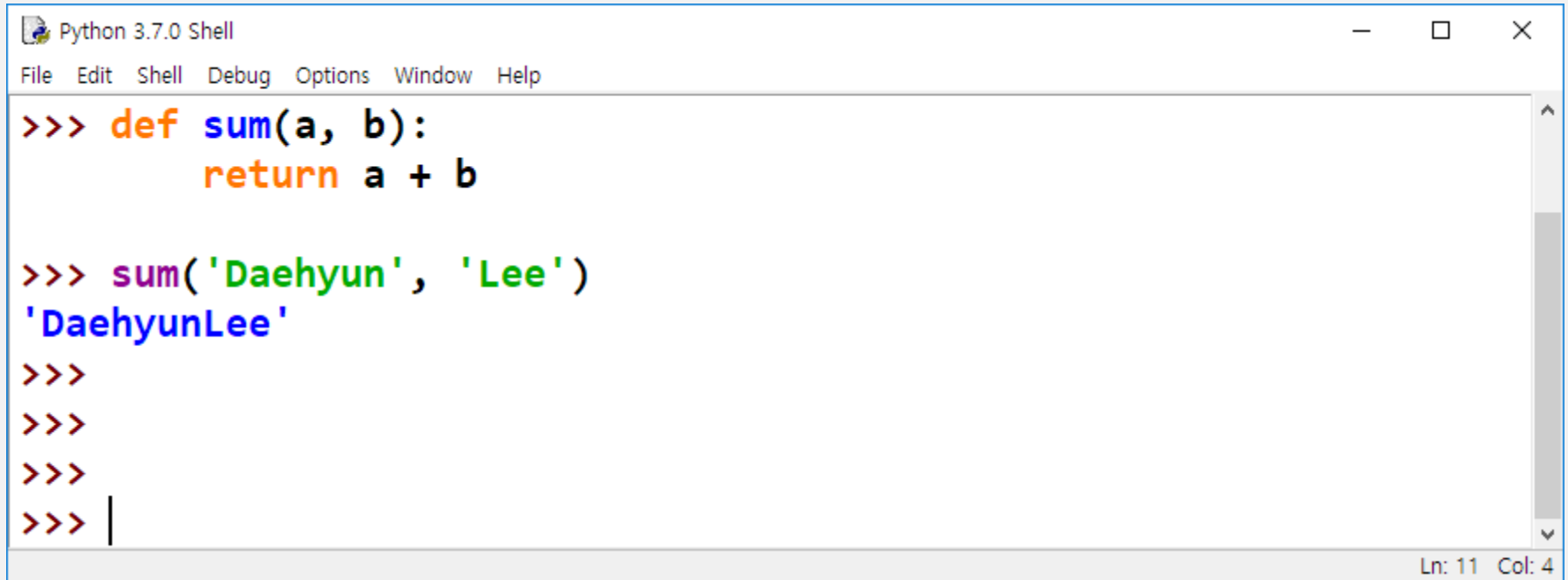
여러 개의 return 값 가능

A screenshot of a Python IDE window titled '*test.py - E:/temp/test.py*'. The window has a menu bar with 'File', 'Edit', 'Format', 'Run', 'Options', 'Windows', and 'Help'. The code editor contains the following Python code:

```
def sum_and_mul(a,b):  
    return a + b, a * b  
  
a = sum_and_mul(3,4)  
print(a)  
  
sum, mul = sum_and_mul(3,4)  
  
print('sum = %d' % sum)  
print('mul = %d' % mul)
```

The code is color-coded: 'def' is blue, 'return' is red, 'a' and 'b' are blue, 'a + b' and 'a * b' are red, 'a = sum_and_mul(3,4)' is black, 'print(a)' is purple, 'sum, mul = sum_and_mul(3,4)' is purple, 'print('sum = %d' % sum)' is green, and 'print('mul = %d' % mul)' is purple. The status bar at the bottom right shows 'Ln: 13 Col: 0'.

인자의 타입에 따라 자동으로 연산 기능이 결정



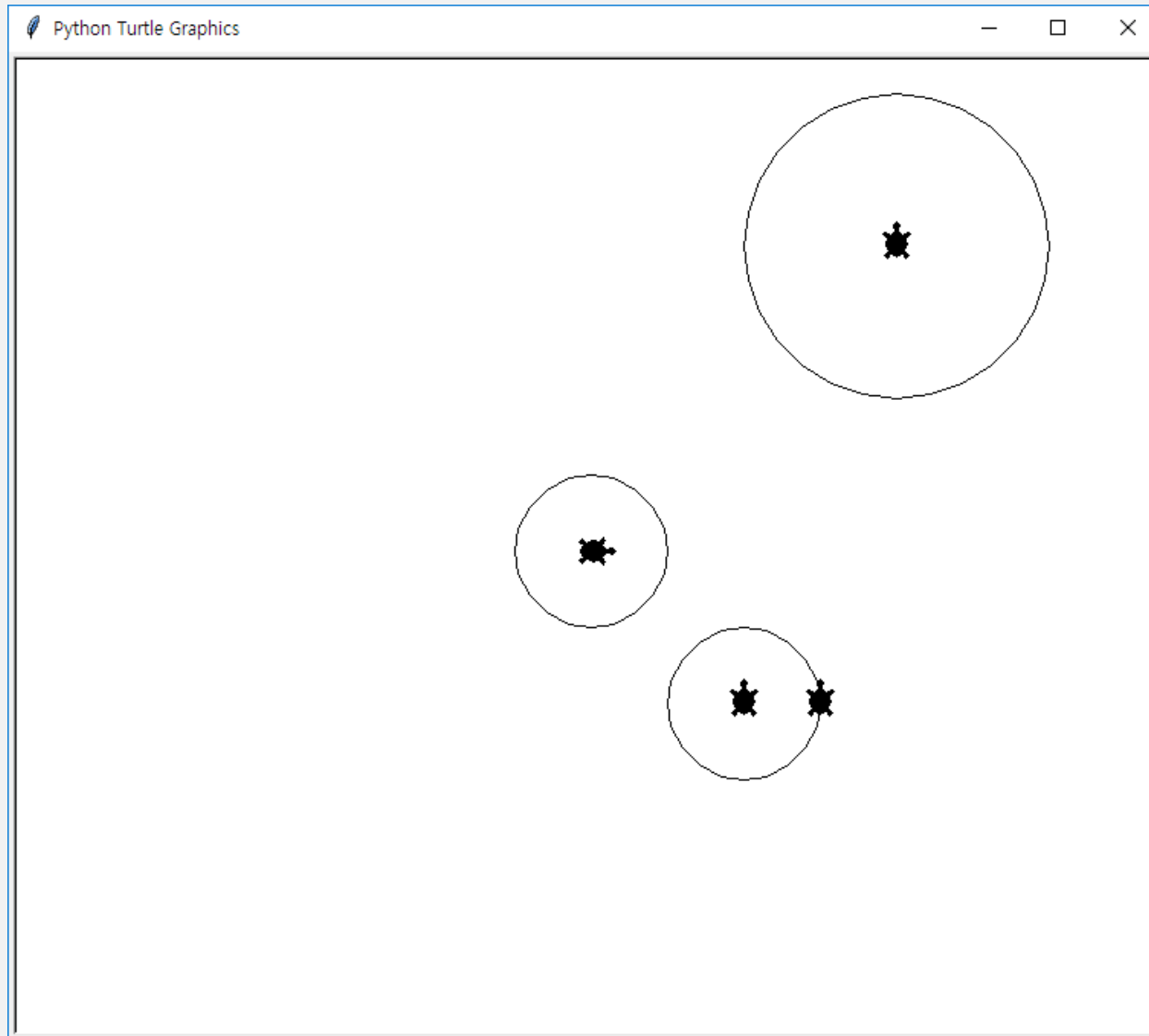
```
Python 3.7.0 Shell
File Edit Shell Debug Options Window Help

>>> def sum(a, b):
        return a + b

>>> sum('Daehyun', 'Lee')
'DaehyunLee'
>>>
>>>
>>>
>>> |
```

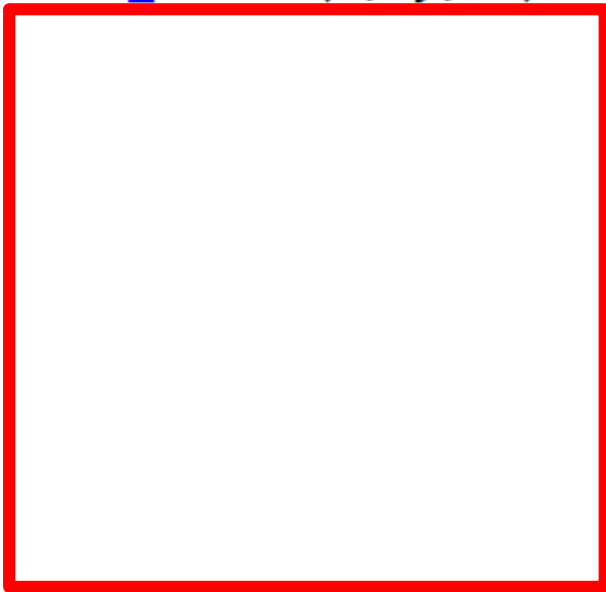
Ln: 11 Col: 4

실습과제 #2-1(0.3점): 지정 위치 중심으로 원 그리는 함수 만들기



```
*draw_circle.py - W:/work2018/KPU/등계파이썬교육/draw_circle.py ...
File Edit Format Run Options Window Help

import turtle

def draw_circle(x, y, r):
    

turtle.shape("turtle")
draw_circle(0, 0, 50)
draw_circle(200, 200, 100)
draw_circle(100, -100, 50)

Ln: 15 Col: 0
```

거북이를 키 입력을 통해서 조정하기

- onkey() 함수를 이용하여, 키 입력에 따라 반응하는 함수를 연결.
- listen() 함수를 이용해서, 거북이가 키 입력을 확인할 수 있게 함.

move 라는 이름의 함수가 호출됨.

`turtle.onkey(move, 'w')`

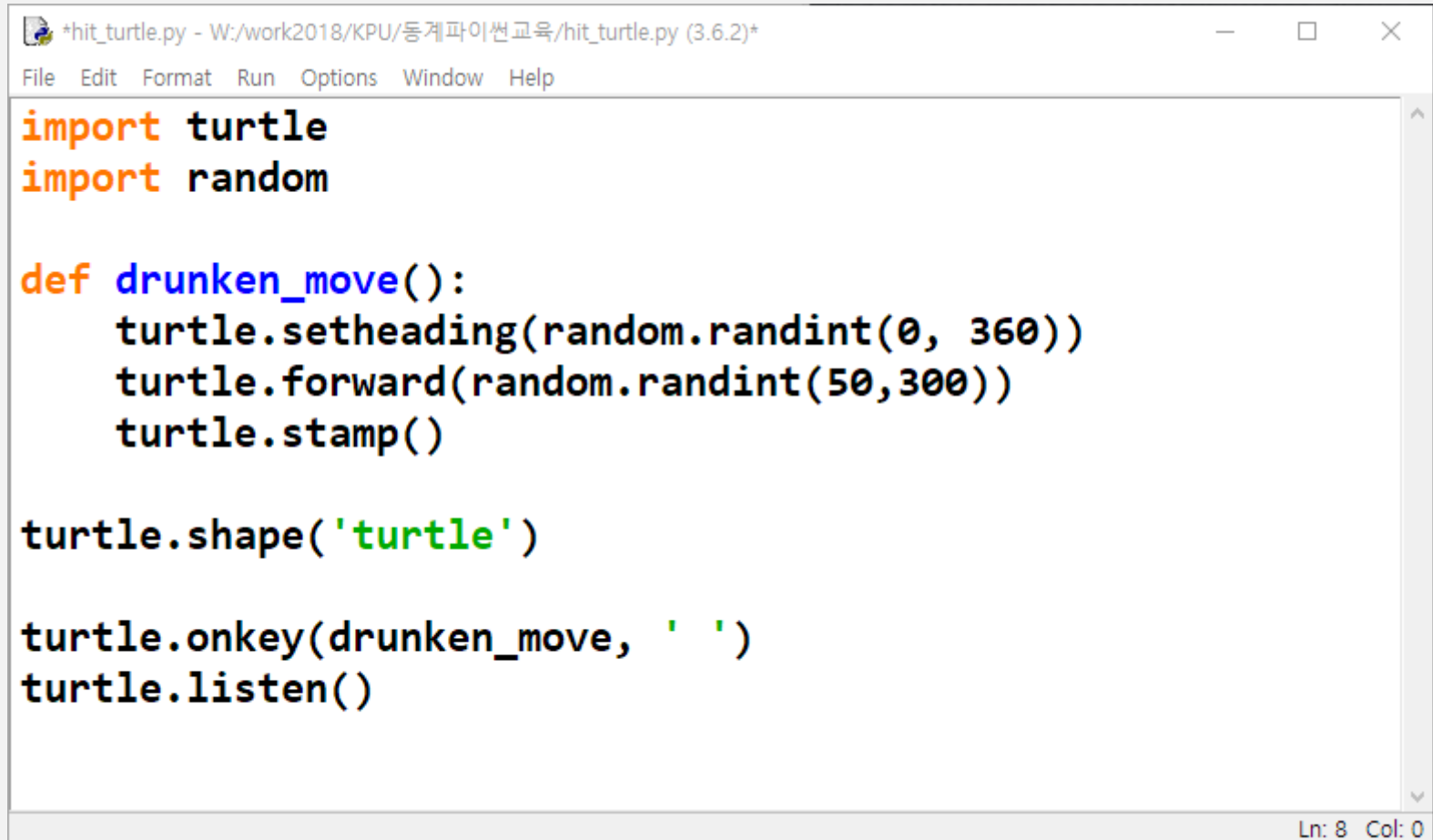
`turtle.listen()`

w 키를 누르면,

거북이가 키 입력을 들을 수 있게 함.

기호	뜻
'w'	w 키
'a'	a 키
's'	s 키
'd'	d 키
' '	스페이스 키
'Escape'	ESC 키

거북이 채찍질하기



The image shows a screenshot of a Python IDE window titled "*hit_turtle.py - W:/work2018/KPU/동계파이썬교육/hit_turtle.py (3.6.2)*". The window contains the following Python code:

```
import turtle
import random

def drunken_move():
    turtle.setheading(random.randint(0, 360))
    turtle.forward(random.randint(50, 300))
    turtle.stamp()

turtle.shape('turtle')

turtle.onkey(drunken_move, ' ')
turtle.listen()
```

The status bar at the bottom right of the window indicates "Ln: 8 Col: 0".

ESC 키를 누르면 다시 시작



```
*hit_turtle.py - W:/work2018/KPU/동계파이썬교육/hit_turtle.py (3.6.2)*
File Edit Format Run Options Window Help

import turtle
import random

def drunken_move():
    turtle.setheading(random.randint(0, 360))
    turtle.forward(random.randint(50, 100))
    turtle.stamp()

def restart():
    turtle.reset()

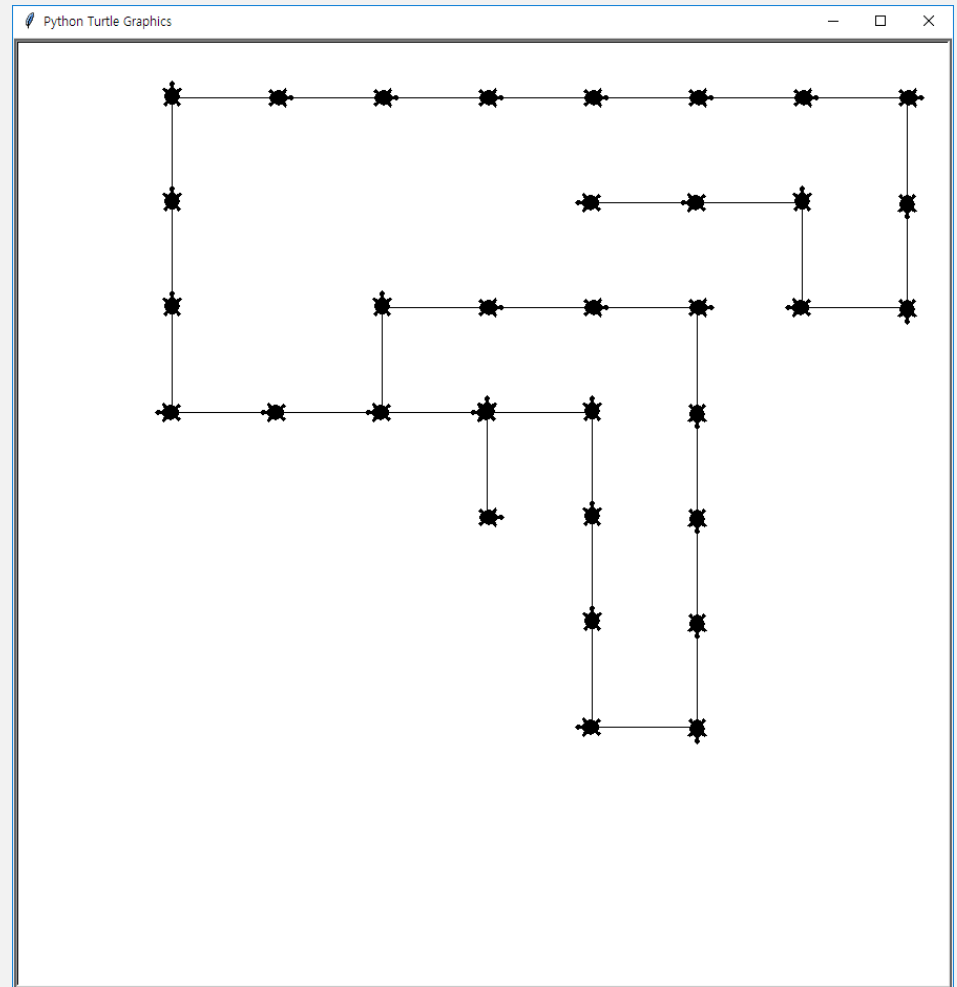
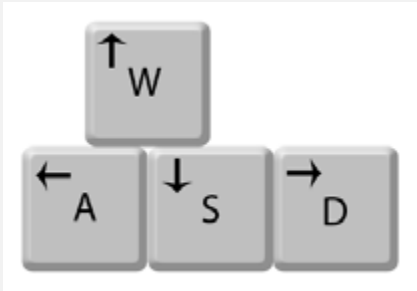
turtle.shape('turtle')

turtle.onkey(drunken_move, ' ')
turtle.onkey(restart, 'Escape')
turtle.listen()

Ln: 6 Col: 37
```

실습과제#2-2(0.7점): 거북이를 “WASD”키로 조종하기

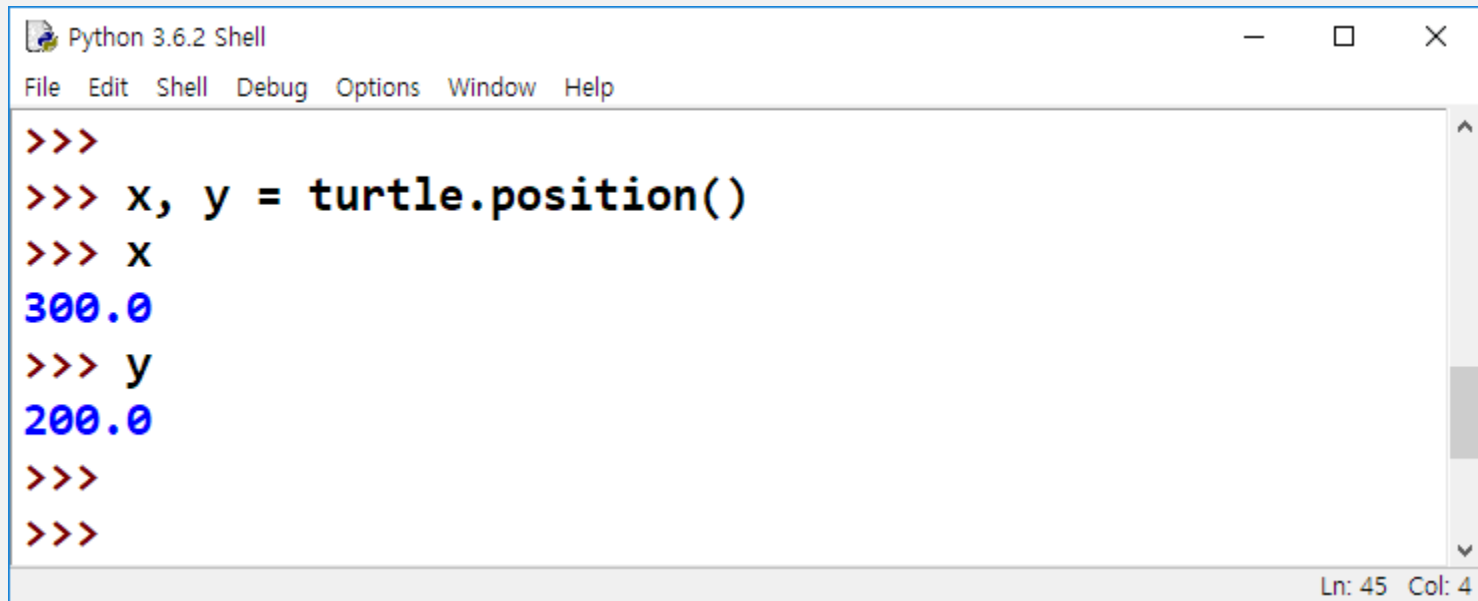
- WASD를 이용하여, 거북이를 상하좌우로 이동할 수 있음.한번 이동 거리는 50포인트
- ESC 키를 누르면 처음부터 다시 시작함.



심화 개별 학습

심화과제: 원 따먹기 게임

- 무작위 위치에 원이 만들어짐.
- 거북이를 이동시켜서 원에 닿으면, 다시 게임 시작
- global 변수를 쓸 줄 알아야 함.
- 거북이의 현재 위치는 `turtle.position()`으로 알아낼 수 있음.

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 is a text editor showing a Python REPL session. The prompt '>>>' is shown three times. The first two prompts are followed by the code 'x, y = turtle.position()' and 'x' respectively. The output for 'x' is '300.0'. The third prompt is followed by 'y', and the output for 'y' is '200.0'. The prompt '>>>' is shown again twice. The status bar at the bottom right of the window shows 'Ln: 45 Col: 4'.

```
Python 3.6.2 Shell
File Edit Shell Debug Options Window Help
>>>
>>> x, y = turtle.position()
>>> x
300.0
>>> y
200.0
>>>
>>>
```