```
#The Python Programming Language Functions

def add_numbers(x,y):
    return x+y

add_numbers(1,2)
```

```
3
```

```
def add_numbers(x,y,z=None):
    if z==None:
        return x+y
    else:
        return x+y+z

print(add_numbers(1,2))
print(add_numbers(1,2,3))
```

```
3
6
```

```
type('This is a string')
```

```
str
```

```
type(None)
```

```
NoneType
```

```
type(1)
```

```
int
```

```
type(1.0)
```

```
float
```

```
type(add_numbers)
```

```
function
```

```
x+3
```

```
---------------------------------------------------------------------------
NameError                                 Traceback (most recent call last)
<ipython-input-10-abe093c6df9c> in <module>()
----> 1 x+3

NameError: name 'x' is not defined

SEARCH STACK OVERFLOW
```

```
x+'3'
```

```
---------------------------------------------------------------------------
NameError                                 Traceback (most recent call last)
<ipython-input-11-f13bcf0b74cc> in <module>()
----> 1 x+'3'

NameError: name 'x' is not defined

SEARCH STACK OVERFLOW
```

```
x=(1,'a',2,'b')
```

```
type(x)
```

```
tuple
```

```
x=[1,'a',2,'b']
```

```
type(x)
```

```
list
```

```
x.append(3.3)
```

```
print(x)
```

```
[1, 'a', 2, 'b', 3.3]
```

```
for i in x:
    print(i)
```

```
1
a
2
b
3.3
```

```
i=0
while(i<len(x)):
```

```
    print(x[i])
    i=i+1
```

```
1
a
2
b
3.3
```

```
x+[3,4]
```

```
[1, 'a', 2, 'b', 3.3, 3, 4]
```

```
[1]*3
```

```
[1, 1, 1]
```

```
1 in x
```

```
True
```

```
x='This is a string'
```

```
x+3
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
<ipython-input-24-abe093c6df9c> in <module>()
----> 1 x+3

TypeError: must be str, not int

SEARCH STACK OVERFLOW
```

```
x+'3'
```

```
'This is a string3'
```

```
print(x[0])
```

```
T
```

```
print(x[0:1])
```

```
T
```

```
print(x[0:2])
```

```
Th
```

```
x[-1]
```

```
x[-4:-2]
```

```
'ri'
```

```
x[-1]
```

```
'g'
```

```
x
```

```
'This is a string'
```

```
x[:3]
```

```
'Thi'
```

```
x[3:]
```

```
's is a string'
```

```
x+'.'
```

```
'This is a string.'
```

```
x={'Chris':'Chris@smu.ac.kr','ksshin':'ksshin@smu.ac.kr'}
```

```
x['Chris']
```

```
'Chris@smu.ac.kr'
```

```
for name in x:
    print(x[name])
```

```
Chris@smu.ac.kr
ksshin@smu.ac.kr
```

```
for email in x.values():
    print(email)
```

```
Chris@smu.ac.kr
ksshin@smu.ac.kr
```

```
for name,email in x.items():
    print(name)
    print(email)
```

ksshin
ksshin@smu.ac.kr