Python Programming

551466 Machine Vision

Indentation and while space

```python
# My first Python program
name = input('What is your name?\n')
print ('Hi, %s.' % name)
print ('Welcome to Python.')
```

Comment

Statement

Module

Indentation and while space

```python
n = int(input ('Input an integer: '))

if (n > 0):
    print ('x is positive number')
    print ('Show number from 0 to %d' % (n - 1))

else:
    print ('x isn\'t positive number')

for i in range(n):
    print(i)
```

Indentation and while space

```python
n = int(input ('Input an integer: '))

# Invalid indent
if (n > 0):
    print ('x is positive number')
        print ('Show number from 0 to %d' % (n - 1))

# Valid indent
else:
    print ('x isn\'t positive number')

# Valid indent
for i in range(n):
        print(i)
```

Literals

- Integer Number
- Floating Point Number
- Character
- String
- Boolean

```
a = 1
b = -1.64E3
c = True
d = "marcuscode.com"
e = 'A'
```

Expressions

- Boolean Expression vs Expression

```python
a = 4
b = 5

# Boolean expressions
print(a == 4)
print(a == 5)
print(a == 4 and b == 5)
print(a == 4 and b == 8)

# Non-boolean expressions
print(a + b)
print(a + 2)
print(a * b)
print(((a * a) + (b * b)) / 2)
print("Python " + "Language")
```

```
True
False
True
False
9
6
20
20.5
Python Language
```

Keywords

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

Variable and Data Type

Data Type	Example
Integers	1, 2, 3
Float	1.1, 3.00004, 4.05e-3
Complex	1+5j, 3-1j, 100+9j
Strings	"AdaBrain", "SUT", "Python"
Boolean	TRUE, FALSE

Identify the Variables

```
a = 3
b = 4.92
c = "marcuscode.com"
c = 10.5
```

```
a, b = 1, 2
x = y = z = 10
print("a = " , a)
print("b = " , b)
print("x = " , x)
print("y = " , y)
print("z = " , z)
```

```
a =  1
b =  2
x =  10
y =  10
z =  10
```

Numbers

- Integer

```python
# Integer
a = 7
b = 3
c = a + b
d = a / b

print ('a = %d' % a)
print ('b = %d' % b)
print ('c = %d' % c)
print ('d = ', d)
```

```
a = 7
b = 3
c = 10
d =  2.3333333333333335
```

Numbers

- Floating Point

```
# Floating point number
speed = 34.12
pi = 22 / 7
height = 2.31E5
length = 1.3E-3


print ('speed = %f' % speed)
print ('pi = %f' % pi)
print ('height = %f' % height)
print ('length = %f' % length)
print (pi)
```

Note
$$E\Delta = \cdot 10^{\Delta}$$

```
speed = 34.120000
pi = 3.142857
height = 231000.000000
length = 0.001300
3.142857142857143
```

String

```python
name = "Mateo"
country = "Ukrain"
language = 'Python'
interest = 'Mountain Everest'
```

```python
sentent1 = "What's your name?"
sentent2 = 'I\'m Mateo.'
sentent3 = "He said \"I would learn Python first\"."   Escape character
sentent4 = 'His teach replied "Oh well!"'
print (sentent1)
print (sentent2)
print (sentent3)
print (sentent4)
```

```
What's your name?
I'm Mateo.
He said "I would learn Python first".
His teach replied "Oh well!"
```

String

```python
site = 'marcuscode' + '.com'
tutorial = 'Python' ' Language'
print(site)
print(tutorial)
```

```
marcuscode.com
Python Language
```

Lists (Array)

```python
# Declare lists
numbers = [1, 2, 4, 6, 8, 19]
names = ["Mateo", "Danny", "James", "Thomas", "Luke"]
mixed = [-2, 5, 84.2, "Mountain", "Python"]

# Display lists
print(numbers)
print(names)
print(mixed)
```

```
[1, 2, 4, 6, 8, 19]
['Mateo', 'Danny', 'James', 'Thomas', 'Luke']
[-2, 5, 84.2, 'Mountain', 'Python']
```

Lists (Array)

```python
# Declare lists
numbers = [1, 2, 4, 6, 8, 19]
names = ["Mateo", "Danny", "James", "Thomas", "Luke"]
mixed = [-2, 5, 84.2, "Mountain", "Python"]

# Display lists using the for loops
for n in numbers:
    print(n, end=" ")
print()


for n in names:
    print(n, end=" ")
print()


for n in mixed:
    print(n, end=" ")
print()
```

```
1 2 4 6 8 19
Mateo Danny James Thomas Luke
-2 5 84.2 Mountain Python
```

List (Array) : Index

```python
languages = ["C", "C++", "Java", "Python", "PHP"]

print("Index at 0 = ", languages[0])
print("Index at 3 = ", languages[3])
languages[0] = "Scalar"
print("Index at 0 = ", languages[0])
```

```
Index 0 =  C
Index 3 =  Python
Index 0 =  Scalar
```

Function for Variable

- type(variable)
- sys.getsizeof(variable)
- locals()

```
Size of a =  14
Type of a =  <class 'int'>
Size of b =  16
Type of b =  <class 'float'>
Size of c =  31
Type of c =  <class 'str'>
Size of d =  52
Type of d =  <class 'list'>
a is not exist
```

```python
import sys

a = 8
b = 13.4
c = "Python"
d = [1, 2, 3, 4]

print('Size of a = ', sys.getsizeof(a))
print('Type of a = ', type(a))

print('Size of b = ', sys.getsizeof(b))
print('Type of b = ', type(b))

print('Size of c = ', sys.getsizeof(c))
print('Type of c = ', type(c))

print('Size of d = ', sys.getsizeof(d))
print('Type of d = ', type(d))

del a
del b, c, d

if 'a' in locals():
    print("a is exist")
else:
    print("a is not exist")
```

Data Input and Print

```
print(value, ..., sep = ' ', end = '\n');
```

```python
print("Hello Python")
print("My name is Mateo")
print("Mercury", "Venus", "Earth")
name = "marcuscode.com"
year = 2017
print(name)
print(year)
```

```
Hello Python
My name is Mateo
Mercury Venus Earth
marcuscode.com
2017
```

Data Input and Print

```python
print(value, ..., sep = ' ', end = '\n');
```

```python
print("Mercury", "Venus", "Earth", sep=', ')
print("One", end=' ')
print("Two", end=' ')
print("Three", end=' ')
```

```
Mercury, Venus, Earth
One Two Three
```

Data Input and Print

```python
lang = "Python"
version = 3.6
print("%s language" % lang)
print("Version %f" % version)
print("%d" % 123)
print("%s %f %d" % (lang, version, 123))
```

```
Python language
Version 3.600000
123
Python 3.600000 123
```

Data Input and Print

```python
name = input("Enter your name: ")
print("Hello " + name)
```

```
Enter your name: Mateo
Hello Mateo
```

```python
a = int(input("Enter first number: "))
b = int(input("Enter second number: "))
print("a + b = %d" % (a + b))
```

```
Enter first number: 5
Enter second number: 3
a + b = 8
```

Operators

Assignment operator

Arithmetic operators

Comparison operators

Logical operators

Assignment Operator

```python
a = 3
b = 5.29
c = b
name = 'Mateo'
my_list = [2, 5, 8, 10, 24]
x, y = 10, 20
```

Arithmetic Operators

Operator	Name	Example
+	Addition	a + b
-	Subtraction	a - b
*	Multiplication	a * b
/	Division	a / b
//	Division and floor	a // b
%	Modulo	a % b
**	Power	a ** b

Arithmetic Operators

```python
a = 5
b = 3
print("a + b = ", a + b)
print("a - b = ", a - b)
print("a * b = ", a * b)
print("a / b = ", a / b)
print("a // b = ", a // b) # floor number to integer
print("a % b = ", a % b)    # get division remainder
print("a ** b = ", a ** b) # power
```

```
a + b =  8
a - b =  2
a * b =  15
a / b =  1.66666666666666667
a // b =  1
a % b =  2
a ** b =  125
```

Comparison Operators

Operator	Name	Example
<	Less than	a < b
<=	Less than or equal	a <= b
>	Greater than	a > b
>=	Greater than or equal	a >= b
==	Equal	a == b
!=	Not equal	a != b
is	Object identity	a is b
is not	Negated object identity	a is not b

Arithmetic Operators

```python
# Constant comparison
print('4 == 4 :', 4 == 4)
print('1 < 2:', 1 < 2)
print('3 > 10:', 3 > 10)
print('2 <= 1.5', 2 <= 1.5)
print()

# Variable comparison
a = 10
b = 8
print('a != b:', a != b)
print('a - b == 2:', a - b == 2)
print()
```

```
4 == 4 : True
1 < 2: True
3 > 10: False
2 <= 1.5 False

a != b: True
a - b == 2: True
```

Logical Operators

Operator	Example	Result
and	a and b	True if a and b are true, else False
or	a or b	True if a or b are true, else False
not	not a	True if a is False, else True

```python
print('Log in page')
username = input('Username: ')
password = input('Password: ')

if (username == 'mateo' and password == '3456'):
    print('Welcome Mateo, you\'ve logged in.')
else:
    print('Invalid username or password.')
```

```
Log in page
Username: mateo
Password: 3456
Welcome Mateo, you've logged in.
```

If-Else Statement

If

If Else

If Elif

If Condition

```
if expression:
    # statements
```

```python
n = 10
if n == 10:
    print('n equal to 10')


logged_in = False
if not logged_in:
    print('You must login to continue')


m = 4
if m % 2 == 0 and m > 0:
    print('m is even and positive numbers')


if 3 > 10:
    print('This block isn\'t executed')
```

```
n equal to 10
You must login to post
m is even and positive numbers
```

If-Else Condition

```python
n = 5
if n == 10:
    print('n equal to 10')
else:
    print('n is something else except 10')


name = 'James'
if name == 'Mateo':
    print('Hi, Mateo.')
else:
    print('Who are you?')


money = 300
if money >= 350:
    print('You can buy an iPad')
else:
    print('You don\'t have enough money to buy an iPad')
```

```
n is something else except 10
Who are you?
You don't have enough money to buy an iPad
```

If Elif Condition

```python
print('Welcome to marcuscode\'s game')
level = input('Enter level (1 - 4): ')

if level == '1':
    print('Easy')
elif level == '2':
    print('Medium')
elif level == '3':
    print('Hard')
elif level == '4':
    print('Expert')
else:
    print('Invalid level selected')
```

```
Welcome to marcuscode's game
Enter level (1 - 4): 4
Expert
```

```
Welcome to marcuscode's game
Enter level (1 - 4): 7
Invalid level selected
```