Section2 - Python Basics

1. Python Objects

In [20]:
```
num = 100
```

In [21]:
```
num_all = 1000
```

In [22]:
```
sum10 = 10
```

In [23]:
```
10sum = 10
```

```
  File "<ipython-input-23-7d8e6448b795>", line 1
    10sum = 10
       ^
SyntaxError: invalid syntax
```

In [24]:
```
_10sum = 10
```

In [25]:
```
syn$ = 100
```

```
  File "<ipython-input-25-46d250a86bd4>", line 1
    syn$ = 100
       ^
SyntaxError: invalid syntax
```

In [26]:
```
num
```

Out[26]:
```
100
```

In [27]:
```
type(num), id(num)
```

Out[27]:
```
(int, 4297369664)
```

In [28]:
```
n1 = "John"
```

In [29]:
```
type(n1), id(n1)
```

Out[29]:
```
(str, 4398845656)
```

In [30]:
```
n2 = "John"
```

In [31]:
```
type(n2), id(n2)
```

Out[31]:
```
(str, 4398845656)
```

In [32]:
```
x = 100
y = 100
id(x), id(y)
```

Out[32]:
```
(4297369664, 4297369664)
```

2. Numbers & Booleans

In [41]:
```
n1 = 100
```

In [42]:
```
type(n1)
```

Out[42]:
```
int
```

In [43]:
```
n1 = 99999999999999999999999999
```

In [44]:
```
type(n1)
```

Out[44]:
```
int
```

In [45]:
```
x = 2 ** 1000
```

In [46]:
```
x
```

Out[46]:
```
10715086071862673209484250490600018105614048117055336074437503883703510511249361224931983788156958581275946729175531468251871452856923140435984577574698574803934567774824230985421074605062371141877954182153046474983581941267398767559165543946077062914571196477686542167660429831652624386837205668069376
```

In [47]:
```
x = x + 1
```

In [48]:
```
x
```

Out[48]:
```
10715086071862673209484250490600018105614048117055336074437503883703510511249361224931983788156958581275946729175531468251871452856923140435984577574698574803934567774824230985421074605062371141877954182153046474983581941267398767559165543946077062914571196477686542167660429831652624386837205668069377
```

In [49]:
```
x = x * 2
```

In [50]:
```
x
```

Out[50]:
```
21430172143725346418968500981200036211228096234110672148875007767407021022498722449863967576313917162551893458351062936503742905713846280871969155149397149607869135549648461970842149210124742283755908364306092949967163882534797535118331087892154125829142392955373084335320859663305248773674411336138754
```

In [51]:
```
f = 100.5
```

In [52]:
```
type(f)
```

Out[52]:
```
float
```

In [55]:
```
x = 100
y = 10.5
```

In [56]:
```
x, y
```

Out[56]:
```
(100, 10.5)
```

In [57]:
```
z = x + y
```

In [58]:
```
z
```

Out[58]:
```
110.5
```

In [59]:
```
type(z)
```

Out[59]:
```
float
```

In [60]:
```
min( 10, 20, 30 )
```

Out[60]:
```
10
```

In [61]:
```
max(10, 20, 30)
```

Out[61]:
```
30
```

In [62]:
```
abs ( -100 )
```

Out[62]:
```
100
```

In [63]:
```
import math
```

In [64]:
```
x = 100
```

In [65]:
```
math.sqrt(x)
```

Out[65]:
```
10.0
```

In [66]:
```
math.factorial(5)
```

Out[66]:
```
120
```

In [67]:
```
1 * 2 * 3 * 4 * 5
```

Out[67]:
```
120
```

In [68]:
```
c = complex(10 + 20j )
```

In [69]:
```
type(c), c
```

Out[69]:
```
(complex, (10+20j))
```

In [70]:
```
c.real, c.imag
```

Out[70]:
```
(10.0, 20.0)
```

In [71]:
```
x = True
```

In [72]:
```
x, type(x)
```

Out[72]:
```
(True, bool)
```

In [73]:
```
x = true
```

```
---------------------------------------------------------------------
---------
NameError                                 Traceback (most recent c
all last)
<ipython-input-73-71e8a338ea89> in <module>()
----> 1 x = true

NameError: name 'true' is not defined
```

In [74]:
```
y = False
```

In [75]:
```
y, type(y)
```

Out[75]:
```
(False, bool)
```

In [76]:
```
x1 = 10 > 2
```

In [77]:
```
x1, type(x1)
```

Out[77]:
```
(True, bool)
```

In [78]:
```
y1 = 1 > 10
```

In [79]:
```
y1, type(y1)
```

Out[79]:
```
(False, bool)
```

3. Strings

In [82]:
```
s = 'Hello'
```

In [83]:
```
p = "I love 'Python' "
```

In [84]:
```
print(p)
```

```
I love 'Python'
```

In [85]:
```
p = "I love \"Python\" "
```

In [86]:
```
print(p)
```

```
I love "Python"
```

In [87]:
```
print("c:\some\name" )
```

```
c:\some
ame
```

In [88]:
```
print(r"c:\some\name" )
```

```
c:\some\name
```

In [92]:
```
s = """Python

is

a              nice language

to work"""
```

In [93]:
```
print(s)
```

```
Python

is

a               nice language

to work
```

In [95]:
```
s1 = "Hello"
s2 = " World"
```

In [96]:
```
s1 + s2
```

Out[96]:
```
'Hello World'
```

In [97]:
```
s = s1 + s2
```

In [98]:
```
s
```

Out[98]:
```
'Hello World'
```

In [99]:
```
'A' * 10
```

Out[99]:
```
'AAAAAAAAAA'
```

In [101]:
```
h = "Hello " * 100
```

In [102]:
```
h
```

Out[102]:
```
'Hello Hello Hello Hello Hello Hello Hello Hello Hello Hello Hello
Hello Hello Hello Hello Hello Hello Hello Hello Hello Hello Hello
Hello Hello Hello Hello Hello Hello Hello Hello Hello Hello Hello
Hello Hello Hello Hello Hello Hello Hello Hello Hello Hello Hello
Hello Hello Hello Hello Hello Hello Hello Hello Hello Hello Hello
Hello Hello Hello Hello Hello Hello Hello Hello Hello Hello Hello
Hello Hello Hello Hello Hello Hello Hello Hello Hello Hello Hello
Hello Hello Hello Hello Hello Hello Hello Hello Hello Hello Hello
Hello Hello Hello Hello Hello Hello Hello Hello Hello Hello Hello
Hello '
```

In [ ]:
```

```

6. Arithmetic Operators

In [97]:
```
2 ** 3
```

Out[97]: 8

In [98]:
```
2 * 2 * 2
```

Out[98]: 8

In [99]:
```
x = 10
y = 3
x ** y
```

Out[99]: 1000

In [100]:
```
10 * 10 * 10
```

Out[100]: 1000

In [101]:
```
10 /3
```

Out[101]: 3.3333333333333335

In [102]:
```
10 // 3
```

Out[102]: 3

In [103]:
```
25 / 4
```

Out[103]: 6.25

In [104]:
```
25 // 4
```

Out[104]: 6

In [105]:
```
10 % 3
```

Out[105]: 1

In [106]:
```
25 % 7
```

Out[106]: 4

7. Bitwise Operators

In [108]:
```
x = 10
```

In [109]:
```
x << 1
```

Out[109]: 20

In [110]:
```
# 1010 --> 10100 = 16 + 0 + 4 + 0 + 0 = 20
```

In [111]:
```
x << 2
```

Out[111]: 40

In [112]:
```
x
```

Out[112]: 10

In [113]:
```
x >> 1
```

Out[113]: 5

In [114]:
```
# 1010 --> 101 = 4 + 0 + 1 = 5
```

8. Comparison Operators

In [115]:
```
x = 10
y = 20
```

In [116]:
```
x < y
```

Out[116]: True

In [117]:
```
x > y
```

Out[117]: False

In [118]:
```
x <= y
```

Out[118]: True

In [119]:
```
x >= y
```

Out[119]: False

In [120]:
```
x == y
```

Out[120]: False

In [121]:
```
x != y
```

Out[121]: True

In [122]:
```
xx = 10.0
```

In [123]:
```
x, xx
```

Out[123]: (10, 10.0)

In [124]:
```
x == xx
```

Out[124]: True

In [125]:
```
x is xx
```

Out[125]: False

In [127]:
```
x, id(x), xx, id(xx)
```

Out[127]: (10, 4297366784, 10.0, 4395311464)

In [128]:
```
x is xx
```

Out[128]: False

In [129]:
```
y = 10
```

In [132]:
```
x, id(x), type(x), y, id(y), type(y)
```

Out[132]: (10, 4297366784, int, 10, 4297366784, int)

In [133]:
```
x is y
```

Out[133]: True

In [134]:
```
A = [ 10, 20, 30 , 40 ]
```

In [135]:
```
A
```

Out[135]: [10, 20, 30, 40]

In [136]:
```
10 in A
```

Out[136]: True

In [137]:
```
50 in A
```

Out[137]: False

In [138]:
```
s = "Hello World"
```

In [139]:
```
'e' in s
```

Out[139]: True

In [140]:
```
'k' in s
```

Out[140]: False

In [142]:
```
'Hello' in s
```

Out[142]: True

9. Assignment Operators

In [143]:
```
x = 10
```

In [144]:
```
x = x + 5
```

In [145]:
```
x
```

Out[145]: 15

In [146]:
```
x += 5
```

In [147]:
```
x
```

Out[147]: 20

In [148]:
```
x -= 5
```

In [149]:
```
x
```

Out[149]: 15

In [150]:
```
x *= 2
```

In [151]:
```
x
```

Out[151]: 30

In [152]:
```
x /= 3
```

In [153]:
```
x
```

Out[153]: 10.0

In [154]:
```
x **= 2
```

In [155]:
```
x
```

Out[155]: 100.0

In [156]:
```
x //= 7
```

In [157]:
```
x
```

Out[157]: 14.0

In [158]:
```
x = 10
```

In [159]:
```
x <<= 1
```

In [160]:
```
x
```

Out[160]: 20

In [161]:
```
x >>= 1
```

In [162]:
```
x
```

Out[162]: 10

10. Operator Precedence

In [179]:
```
10 - 4 * 2
```

Out[179]: 2

In [180]:
```
10 - 8
```

Out[180]: 2

In [181]:
```
( 10 - 4 ) * 2
```

Out[181]: 12

In [182]:
```
5 * 2 // 3
```

Out[182]: 3

In [183]:
```
5 * ( 2 // 3 )
```

Out[183]: 0

In [184]:
```
2 ** 3 ** 2
```

Out[184]: 512

In [185]:
```
2 ** 9
```

Out[185]: 512

In [186]:
```
( 2 ** 3 ) ** 2
```

Out[186]: 64

4. Container Objects

In [216]:
```
t = ( 1, 2, 3, 4 )
```

In [217]:
```
t
```

Out[217]: (1, 2, 3, 4)

In [218]:
```
type(t)
```

Out[218]: tuple

In [219]:
```
x = [ 10, 20, 30, "John"]
```

In [220]:
```
x
```

Out[220]: [10, 20, 30, 'John']

In [221]:
```
type(x)
```

Out[221]: list

In [222]:
```
s = { 10, 20, 30, 40 }
```

In [223]:
```
s
```

Out[223]: {10, 20, 30, 40}

In [224]:
```
type(s)
```

Out[224]: set

In [225]:
```
s = { "John":98, "Kris":95, "Gary":99 }
```

In [226]:
```
s
```

Out[226]:
```
{'Gary': 99, 'John': 98, 'Kris': 95}
```

In [227]:
```
type(s)
```

Out[227]:
```
dict
```

5. Mutability of Objects

In [228]:
```
L = [ 1, 2, 10.5, "Tom" ]
```

In [229]:
```
id( L)
```

Out[229]:
```
4397960456
```

In [230]:
```
L.append(100)
```

In [231]:
```
L
```

Out[231]:
```
[1, 2, 10.5, 'Tom', 100]
```

In [232]:
```
L[1] = 200
```

In [233]:
```
L
```

Out[233]:
```
[1, 200, 10.5, 'Tom', 100]
```

In [234]:
```
id(L)
```

Out[234]:
```
4397960456
```

In [235]:
```
t = ( 1, 2, 3, 4)
```

In [236]:
```
id(t)
```

Out[236]:
```
4389655480
```

In [237]:
```
t.append(5)
```

```
---------------------------------------------------------------------
---------
AttributeError                            Traceback (most recent c
all last)
<ipython-input-237-9262fbb92a36> in <module>()
----> 1 t.append(5)

AttributeError: 'tuple' object has no attribute 'append'
```

In [238]:
```
t[1] = 100
```

```
---------------------------------------------------------------------
---------
TypeError                                 Traceback (most recent c
all last)
<ipython-input-238-4f066cd5e53f> in <module>()
----> 1 t[1] = 100

TypeError: 'tuple' object does not support item assignment
```

In [239]:
```
n = 100
```

In [240]:
```
id(n)
```

Out[240]: 4297369664

In [241]:
```
n = 200
```

In [242]:
```
id(n)
```

Out[242]: 4297372864

In [243]:
```
s = "John"
```

In [244]:
```
id(s)
```

Out[244]: 4397927088

In [245]:
```
s = "Kris"
id(s)
```

Out[245]: 4397966984

In [ ]:
```

```