Python Types I: Numbers and strings

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September 2, 2020
Python tutorials

1. Older version of Python tutorial, better for beginners Actually written by Guido van Rossum.
2. Current Python docs tutorial
3. Google’s Python class
>>> X = 3
>>> X
3
>>> type(3)
<class 'int'>
>>> type(X)
<class 'int'>
>>> X = 1.2
>>> type(1.2)
<class 'float'>
>>> type(X)
<class 'float'>
Type casting

```python
>>> (X, Y) = (3, 1.2)
>>> Z = 3 + 1.2
>>> type(X), type(Y)
(<class 'int'>, <class 'float'>)
>>> type(Z)
<class 'float'>
```
Python type hierarchy

```
  number
   /   \
integers float
   /     \
integer complex
   /     \
long
```

Python number types
Complex numbers

```python
>>> type(0j)
<class 'complex'>
>>> 0 == 0j
True
>>> X = 3j+2
>>> type(X)
<class 'complex'>
>>> from numpy import log
>>> log(-1 + 0j)   # Works for complex number
3.141592653589793j
>>> log(-1)        # Fails for real number
nan
```
String literals

```python
>>> X = "frog"
>>> type(X)
<class 'str'>
>>> Y = 'frog'
>>> type(Y)
<class 'str'>
>>> X == Y
True
```

When entering string literals, delimiters (’ ’ or “ “ or """" """") are necessary.
String literals with quotes marks

```python
>>> X = "The big dog laughed and said, 'Hello, Jeremy.'"
>>> Y = 'The big dog laughed and said, "Hello, Jeremy."'
>>> X == Y
False
```
Multiline strings

```python
>>> X = ""
...
... Beautiful is better than ugly.
... Explicit is better than implicit.
... Simple is better than complex.
... Complex is better than complicated.
... ""
```
Special characters in strings

```python
>>> Z = "x\ty"
>>> print(Z)
x y
>>> X = "\n Beautiful is better than ugly.\n Explicit is better than implicit.
 Simple is better than complex.\n Complex is better than complicated."
>>> print(X)

Beautiful is better than ugly.
Explicit is better than implicit.
Simple is better than complex.
Complex is better than complicated.
```

\t tab
\n new line
Concatenating strings

```python
>>> X = "The dog"
>>> Y = " barked"
>>> X + Y
# X + Y is a new string
'The dog barked'
>>> X
# X unchanged
'The dog'
>>> Y
# Y unchanged; strings are immutable
' barked'
```
Casting limitations

```python
>>> X = "The dog"
>>> Y = 3
>>> X + Y
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
TypeError: can only concatenate str (not "int") to str
```
Takeaways

1. All python data has a type
2. In these slides we looked at two data types: numbers and strings
3. Built-in python operations (like “+”) work only on certain types
4. The result of every python operation has to have a type, and when the operation has arguments of different types, python has to chose a type for the result. This is called casting.