Python_Basics - Python Introduction for Research Analysis: Carpentries style

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Python_Basics

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1 Python Intro

Collaborative Pad from the workshop: https://pad.gwdg.de/iv52w1VBTkCXC9_8FtnLKg

[1]:
```
print("Hello world!")
```

```
Hello world!
```

1.1 Comments

[2]:
```
# This is a comment
print("Something")
```

```
Something
```

1.2 Data types

[3]:
```
# Value-Assignment
name = "Lovelace"
print(name)
```

```
Lovelace
```

[4]:
```
# String
first_name = "Ada"
print(name)
```

```
Lovelace
```

[5]:
```
# Integer
age = 37
print(age)
```

```
37
```

[6]:
```
# Float
size = 1.7123
print(size)
```

```
1.7123
```

[7]:
```
# Boolean
knows_math = True
print(knows_math)
likes_gardening = False
print(likes_gardening)
```

```
True
False
```

[8]:
```
# show type of a value
type(name)
```

[8]:
```
str
```

[9]:
```
# Jupyter Notebook returns only the last value
name
age
```

[9]:
```
37
```

[10]:
```
# If you want multiple values back, you can use print()
print(name)
print(age)
```

```
Lovelace
37
```

1.3 Operatoren

[11]:
```
# Additiona
5 + 5
```

[11]:
```
10
```

[12]:
```
# Multiplication
age * 100
```

[12]:
```
3700
```

[13]:
```
# concatinate strings
name + name
```

[13]:
```
'LovelaceLovelace'
```

[14]:
```
# String is chained together x times
name * 10
```

[14]:
```
'LovelaceLovelaceLovelaceLovelaceLovelaceLovelaceLovelaceLovelaceLovelaceLovelac
e'
```

[15]:
```
# Does not work: the + operator cannot be applied to the combination of types.
name + 10
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
/tmp/ipykernel_6908/3219680810.py in <module>
      1 # Does not work: the + operator cannot be applied to the combination of
 ↪types.
----> 2 name + 10

TypeError: can only concatenate str (not "int") to str
```

[16]:
```
name + "10" # in this cas 10 is a string
```

[16]:
```
'Lovelace10'
```

[17]:
```
# Division
size/age
```

[17]:
```
0.04627837837837838
```

[18]:
```
type(size)
```

[18]:
```
float
```

[19]:
```
number_of_articles = "50"
```

[20]:
```
# Geht nicht
number_of_articles / 10
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
/tmp/ipykernel_6908/1663578640.py in <module>
      1 # Geht nicht
----> 2 number_of_articles / 10

TypeError: unsupported operand type(s) for /: 'str' and 'int'
```

[21]:
```
# turn string into int
int(number_of_articles) / 10
```

[21]:
```
5.0
```

1.4 Functions and Methods

[22]:
```
len(name)
```

[22]: 8

[23]:
```
name.upper()
```

[23]: 'LOVELACE'

[24]:
```
# The String itself doesn't change
name
```

[24]: 'Lovelace'

[25]:
```
name.count("e")
```

[25]: 2

[26]:
```
# Method with two arguments
name.replace("lace", " is everywhere")
```

[26]: 'Love is everywhere'

1.5 Lists and Dictionaries

[27]:
```
# List
names = ["Lovelace", "Darwin", "Noether", "Hawking"]
```

[28]:
```
names[0]
```

[28]: 'Lovelace'

[29]:
```
names[1]
```

[29]: 'Darwin'

[30]:
```
names[2]
```

[30]: 'Noether'

[31]:
```
names[-1]
```

[31]: 'Hawking'

[32]:
```
names[0:3]
```

[32]: ['Lovelace', 'Darwin', 'Noether']

More info on slicing:

https://stackoverflow.com/questions/509211/understanding-slice-notation

This is a good visualisation:

```
                +---+---+---+---+---+---+
                | P | y | t | h | o | n |
                +---+---+---+---+---+---+
Slice position: 0   1   2   3   4   5   6
Index position:   0   1   2   3   4   5
```

[33]:
```
# Slicing
names[:2]
```

[33]:
```
['Lovelace', 'Darwin']
```

[34]:
```
# Slicing
names[2:]
```

[34]:
```
['Noether', 'Hawking']
```

[35]:
```
authors_and_birth_years = {"Lovelace": 1815,
                           "Darwin": 1809 ,
                           "Noether": 1882 ,
                           "Hawking": 1942}
```

[36]:
```
authors_and_birth_years["Darwin"]
```

[36]:
```
1809
```

[37]:
```
# Key is not defined => Error
authors_and_birth_years["DARWIN"]
```

```
---------------------------------------------------------------------------
KeyError                                  Traceback (most recent call last)
/tmp/ipykernel_6908/2554392620.py in <module>
      1 # Key is not defined => Error
----> 2 authors_and_birth_years["DARWIN"]

KeyError: 'DARWIN'
```

2 for-loop

[38]:
```
for person in names:
    print(person + " did awesome stuff.")
```

```
Lovelace did awesome stuff.
Darwin did awesome stuff.
```

```
Noether did awesome stuff.
Hawking did awesome stuff.
```

2.1 Conditionals

[39]:
```
temp = 20
if temp > 15:
    print("It's warm")
```

```
It's warm
```

[40]:
```
20 > 15
```

[40]: True

[41]:
```
20 > 70
```

[41]: False

[42]:
```
temp = 10
if temp > 15:
    print("It's warm")
```

[43]:
```
temp = 10
if temp > 15:
    print("It's warm")
else:
    print("It's cold")
```

```
It's cold
```

[44]:
```
temp = 15
if temp >= 25:
    print("It's hot")
elif temp >= 15:
    print("It's warm")
else:
    print("It's cold")
```

```
It's warm
```

[ ]: