More Python Types & Functions

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Programming for Scientists

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Python

1. Basic types: int, float, list
2. Control flow: for, while, if, else, elif
List Indexing

students = ['Luis', 'Rita', 'Sabah', 'Grace']
print students[0]
print students[1:2]
print students[1:]
print students[-1]
print students[-2]
A = (0, 1, 2)
B = (1,)

print A[0]
print len(B)
Tuples are like immutable lists.
Dictionaries

- Dictionaries are associative arrays.

```python
gene2ensembl = {}
gene2ensembl[‘SMAD9’] = ’ENSG00000120693’
gene2ensembl[‘ZNF670’] = ’ENSG00000135747’

print gene2ensembl[‘SMAD9’]
```
```python
gene2expression = {
    'SMAD9': 12.3,
    'ZNF670': 4.3,
}

print len(gene2ensembl)
print gene2ensembl.keys()
```
numbers = set([1, 2, 5])
print 3 in numbers
numbers.add(4)
print numbers
numbers.add(1)
print numbers
print numbers | set(['Rita'])
print numbers - set([2, 3])

Output:
False
set([1, 2, 4, 5])
set([1, 2, 4, 5])
set([1, 2, 4, 5, 'Rita'])
set([1, 4, 5])
None object

None
Object Identity

- A is B
- A is not B
Exercise

A = []
B = []
A.append(1)
B.append(1)

print (A == B)
print (A is B)

This prints:
(a) True    (b) False    (c) False    (d) True
True       True        False      False
Consider the following code:

```python
g2g = {
    'PBANKA_000230': ['GO: 0003899'],
    'PBANKA_000370': ['GO: 0016740'],
    'PBANKA_010060': ['GO: 0030430'],
    'PBANKA_010080': ['GO: 0008270'],
}
```

(In real life, this would have 2420 entries)
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How do you look up GO term for gene PBANKA_00230?
Exercise Break

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}
```

(In real life, this would have 2420 entries)

How do you look up GO term for gene PBANKA_00230?

(a) g2g[0]  (b) g2g['PBANKA_00230']  (c) g2g[00230]
List Comprehensions

name = [ <expr> for <name> in <sequence> if <condition> ]

maps to

name = []
for <name> in <sequence>:
    if <condition>:
        name.append(<expr>)
List Comprehensions Example

squares = [x*x for x in xrange(1, 20)]
evensquares = [x*x for x in xrange(1, 20) if (x%2) == 0]

squares = []
for x in xrange(1, 20):
    squares.append(x*x)

evensquares = []
for x in xrange(1, 20):
    if (x%2) == 0:
        evensquares.append(x*x)
def greet():
    print 'Hello World'
    print 'Still Here'

greet()
greet()
greet()
print 'Now here'
greet()
def greet(name):
    print 'Hello {0}'.format(name)

greet('World')
greet('Luis')
greet('Kim')
```python
def max(xs):
    '''
    M = max(xs)
    
    Returns the maximum of "xs"
    '''
    M = xs[0]
    for x in xs[1:]
        if x > M:
            M = x
    return M
```
Multiple Assignment

\[ A, B = 1, 2 \]

Assign multiple elements at once.
def greet(name, greeting='Hello '):
    
greet(name, greeting='Hello ')

Greets person by name

Parameters

---------
name: str
    Name
greeting: str, optional
    Greeting to use

print greeting, name

ret = greet('World')
Sequences

for value in sequence:

Sequences

- Lists
- Tuples
- Sets
- Dictionaries

...