More Python Types & Functions

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Set Type

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  True  False  False
(b) False True  False  True
(c) False False  True  False
(d) True  False  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_000230?
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}
```

(In real life, this would have 2420 entries)

How do you look up GO term for gene PBANKA_000230?

(a) `g2g[0]`  
(b) `g2g['PBANKA_000230']`  
(c) `g2g[000230]`
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

\[
\text{squares} = [x^2 \text{ for } x \text{ in } \text{xrange}(1, 20)]
\]

\[
\text{squares} = []
\]
\[
\text{for } x \text{ in } \text{xrange}(1, 20):
\]
\[
\text{squares}.\text{append}(x^2)
\]
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')
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
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 ')
for value in sequence:
...

Sequences

- Lists
- Tuples
- Sets
- Dictionaries
- ...

...
Goals for next 15 minutes

- A quiz
- Do a few exercises.
- Play around.
- You can work alone, in pairs, in triples,...
- Looking up answers on the internet is technique, not cheating!
How do you access the first element of a list?
Assume list is a list:

1. `list[1]`
2. `list[0]`
3. `list[-1]`
4. `list(0)`
5. `list(-1)`
6. `list(1)`
How do you access the last element of a list? Assume list is a list:

1. `list[1]`
2. `list(-0)`
3. `list[-1]`
4. `list(-1)`
5. `list(1)`
6. `list[-0]`
Exercises
Object Identity

What is the difference between the following two code examples:

A)

A = [1, 2, 3]
B = [1, 2, 3]

B)

A = [1, 2, 3]
B = A

Write a small piece of code (should be 2 or 3 lines) that behaves differently if you insert it after each of the two segments above.
What is the difference between the following two code examples:

A)

```
A = [1, 2, 3]
B = [1, 2, 3]
```

B)

```
A = [1, 2, 3]
B = A
```

Write a small piece of code (should be 2 or 3 lines) that behaves differently if you insert it after each of the two segments above.

```
B[0] = 0
print A
```
1. Learn about the built-in function `sum`
2. Write an implementation of this function

def sum(xs, start=0):
    s = sum(xs, start=0)
    Returns the sum of all values in `xs` + `start` (which defaults to 0)
    for x in xs:
        start += x
    return start

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Learn about the built-in function `sum`

Write an implementation of this function

```python
def sum(xs, start=0):
    '''
    s = sum(xs, start=0)
    
    Returns the sum of all values in `xs` + `start` (which defaults to 0)
    '''
    for x in xs:
        start += x
    return start
```

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numbers = set([1, 2])
for i in xrange(5):
    numbers.add(i)
print len(numbers)

This prints:

- 7
- 6
- 5
- 4
Learning more

- Learn Python the Hard Way by Zed Shaw (online for free or pay money for hard copy)
- http://python.org