
# Homework 0: Python Review

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**Due date:** Tuesday Jan 23 2018, before lecture.

In this homework you will complete a couple of simple exercises in order to show your understanding with Python. If these exercises are challenging or new to you, you may want to reconsider taking the class and/or brush up on your Python skills.

**For the following exercises you are not allowed to use any Python packages (i.e. Numpy, Pandas, etc.).**

## Lists

Create an empty Python list called 'a' in the cell below.

```
In [1]: a=list();a
```

```
Out[1]: []
```

Store all values between 1-100 (inclusive) with increments of 3 (i.e. 1, 4, 7...) in 'a'.

In [2]:
```
a = list(range(1,101,3));a
```

Out[2]:
```
[1,
 4,
 7,
 10,
 13,
 16,
 19,
 22,
 25,
 28,
 31,
 34,
 37,
 40,
 43,
 46,
 49,
 52,
 55,
 58,
 61,
 64,
 67,
 70,
 73,
 76,
 79,
 82,
 85,
 88,
 91,
 94,
 97,
 100]
```

Create another list called 'a2' with numbers from 2-46 (inclusive) with increments of 0.5 (i.e. 2, 2.5, 3...).

In [3]:
```
a2 = list([x*0.5 for x in range(4,93)]); a2
```

```
Out[3]: [2.0,
         2.5,
         3.0,
         3.5,
         4.0,
         4.5,
         5.0,
         5.5,
         6.0,
         6.5,
         7.0,
         7.5,
         8.0,
         8.5,
         9.0,
         9.5,
         10.0,
         10.5,
         11.0,
         11.5,
         12.0,
         12.5,
         13.0,
         13.5,
         14.0,
         14.5,
         15.0,
         15.5,
         16.0,
         16.5,
         17.0,
         17.5,
         18.0,
         18.5,
         19.0,
         19.5,
         20.0,
         20.5,
         21.0,
         21.5,
         22.0,
         22.5,
         23.0,
         23.5,
         24.0,
         24.5,
         25.0,
         25.5,
         26.0,
         26.5,
         27.0,
         27.5,
         28.0,
         28.5,
         29.0,
         29.5,
         30.0,
```

```
30.5,
31.0,
31.5,
32.0,
32.5,
33.0,
33.5,
34.0,
34.5,
35.0,
35.5,
36.0,
36.5,
37.0,
37.5,
38.0,
38.5,
39.0,
39.5,
40.0,
40.5,
41.0,
41.5,
42.0,
42.5,
43.0,
43.5,
44.0,
44.5,
45.0,
45.5,
46.0]
```

Double every even integer element from list 'a'. Store the results back in 'a'.

In [4]:
```
a = a + [x*2 for x in a if x%2==0];a
```

Out[4]:
```
[1,
 4,
 7,
 10,
 13,
 16,
 19,
 22,
 25,
 28,
 31,
 34,
 37,
 40,
 43,
 46,
 49,
 52,
 55,
 58,
 61,
 64,
 67,
 70,
 73,
 76,
 79,
 82,
 85,
 88,
 91,
 94,
 97,
 100,
 8,
 20,
 32,
 44,
 56,
 68,
 80,
 92,
 104,
 116,
 128,
 140,
 152,
 164,
 176,
 188,
 200]
```

Add all numbers in 'a' except for the 2nd and 21st elements (the 2nd element here means the element at list index 1).

In [5]:
```
sum(a) - a[1] - a[20]
```

Out[5]:
```
3420
```

Calculate the mean of 'a'.

In [6]:
```
sum(a)/len(a)
```

Out[6]:
```
68.33333333333333
```

## Strings

Create an empty list called 'b'.

In [7]:
```
b = list(); b
```

Out[7]:
```
[]
```

Store the words in the sentence below as elements into the list 'b'.

'I am so excited about Data-X. It is important to be able to work with data.'

In [8]:
```
b = "I am so excited about Data-X. It is important to be able to work with dat
a.".split(' ');b
```

Out[8]:
```
['I',
 'am',
 'so',
 'excited',
 'about',
 'Data-X.',
 'It',
 'is',
 'important',
 'to',
 'be',
 'able',
 'to',
 'work',
 'with',
 'data.']
```

Return the count of the occurences of the lower-case letter 'e' in the list 'b'.

In [9]:
```
sum([x.count('e') for x in b])
```

Out[9]:
```
4
```

Replace every lower- or upper-case letter 'i' in the list b with a '1'.

In [10]:
```
b = [x.replace('i','1').replace('I', '1') for x in b]; b
```

Out[10]:
```
['1',
 'am',
 'so',
 'exc1ted',
 'about',
 'Data-X.',
 '1t',
 '1s',
 '1mportant',
 'to',
 'be',
 'able',
 'to',
 'work',
 'w1th',
 'data.']
```

Append the string "This is the end of the first HW." to the list 'b'.

In [11]:
```
b.append("This is the end of the first HW."); b
```

Out[11]:
```
['1',
 'am',
 'so',
 'exc1ted',
 'about',
 'Data-X.',
 '1t',
 '1s',
 '1mportant',
 'to',
 'be',
 'able',
 'to',
 'work',
 'w1th',
 'data.',
 'This is the end of the first HW.']
```

Print 'b' as ONE string backwards (starting with "WH tsrif...").

In [12]:
```
' '.join(x for x in b)[::-1]
```

Out[12]:
```
'.WH tsrif eht fo dne eht si sihT .atad ht1w krow ot elba eb ot tnatropm1 s1
t1 .X-ataD tuoba det1cxe os ma 1'
```

## Dictionaries

Put the following in a dictionary called 'codes':

Keys: 1001, 1002, 1003, 1004, 1005
Values: 'Alpha', Beta, 'Gamma, 'Delta', 'Tau'

then traverse the dictionary by its keys and change every value to be all lower case.

In [13]:
```
codes = {1001:'Alpha', 1002:'Beta', 1003:'Gamma', 1004:'Delta', 1005:'Tau'}; c
odes
```

Out[13]:
```
{1001: 'Alpha', 1002: 'Beta', 1003: 'Gamma', 1004: 'Delta', 1005: 'Tau'}
```

Delete 'alpha' from the dictionary.

In [14]:
```
del codes[1001]; codes
```

Out[14]:
```
{1002: 'Beta', 1003: 'Gamma', 1004: 'Delta', 1005: 'Tau'}
```

## Sets

Create a set called 'c' with the all the odd numbers less than 10.

In [15]:
```
c = set(range(1,10,2));c
```

Out[15]:
```
{1, 3, 5, 7, 9}
```

Create another set called 'd' with elements 2, 5, 10, 30.

In [16]:
```
d = set({2,5,10,30});d
```

Out[16]:
```
{2, 5, 10, 30}
```

Find the union between sets 'c' and 'd' and store this in a new set called 'e'.

In [18]:
```
e= (c|d); e
```

Out[18]:
```
{1, 2, 3, 5, 7, 9, 10, 30}
```

Find the intersection between sets 'c' and 'd'.

In [19]:
```
c & d
```

Out[19]:
```
{5}
```