Python Home Work 1

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Problem 1:

(a) [1,2,3,...,19,20]

```
In [3]: a = list(range(1,21))
        print(a)
```

```
[1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20]
```

(b) [20,19,...,2,1]

```
In [4]: b = a[:]  # or b = a.copy()
        b.reverse()
        print(b)
```

```
[20, 19, 18, 17, 16, 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1]
```

(c) [1,2,3,...,19,20,19,18,...,2,1]

```
In [5]: c = a[:]+b[1:21]
        print(c)
```

```
[1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20,
19, 18, 17, 16, 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1]
```

*For parts (d) and (e) try the syntax “N * [val1,val2]” and the del command.*

(d) [4,6,3, 4,6,3,...,4,6,3] where there are 10 occurrences of 4.

```
In [6]: d = [4,6,3]*4
        print(d)
```

```
[4, 6, 3, 4, 6, 3, 4, 6, 3, 4, 6, 3]
```

(e) [4,6,3, 4,6,3,...,4,6,3,4] where there are 11 occurrences of 4, 10 occurrences of 6 and 10 occur- rences of 3.

```
In [8]: e = [4,6,3]*10+[4]
        print(e)
        del e
```

```
[4, 6, 3, 4, 6, 3, 4, 6, 3, 4, 6, 3, 4, 6, 3, 4, 6, 3, 4, 6, 3, 4, 6,
3, 4, 6, 3, 4, 6, 3, 4]
```

Problem 2:

```
In [9]: import numpy as np

        num_list=[x*0.1+3 for x in range(0, 31)]
        new_list=[np.exp(x)*np.cos(x) for x in num_list]
        print(new_list)
```

```
[-19.884530844146987, -22.178753389342127, -24.490696732801293, -26.773
18244299338, -28.969237768093574, -31.011186439374516, -32.819774760338
504, -34.30336011037369, -35.35719361853035, -35.86283371230767, -35.68
773248011913, -34.68504225166807, -32.693695428321746, -29.538816297262
983, -25.032529229039966, -18.97523315495896, -11.157417389647478, -1.3
620985182057503, 10.632038010191998, 25.046704998273, 42.0992010625384,
61.99663027669454, 84.92906736250268, 111.06158604202605, 140.525075052
78749, 173.40577640857734, 209.73349424783467, 249.46844055885668, 292.
4867067371227, 338.5643778585117, 387.3603402909308]
```

Problem 3:

```
In [11]: list_3 = [2**x/x for x in range(1,26)]
         print(list_3)
```

```
[2.0, 2.0, 2.6666666666666665, 4.0, 6.4, 10.666666666666666, 18.2857142
85714285, 32.0, 56.888888888888886, 102.4, 186.1818181818182, 341.33333
33333333, 630.1538461538462, 1170.2857142857142, 2184.5333333333333, 40
96.0, 7710.117647058823, 14563.555555555555, 27594.105263157893, 52428.
8, 99864.38095238095, 190650.18181818182, 364722.0869565217, 699050.666
6666666, 1342177.28]
```

Problem 4: Re-use your list from 1(a) as variable a. It has length n. Create these lists:

(a) [a0 – an, a1 – an-1,...,an-a0]

```
In [12]: list_4_a = [a[x]-a[-1-x] for x in range(len(a))]
         print(list_4_a)
```

```
[-19, -17, -15, -13, -11, -9, -7, -5, -3, -1, 1, 3, 5, 7, 9, 11, 13, 1
5, 17, 19]
```

(b) A Boolean list where even values of a are True and odd values are False: [False, True,...].

```
In [13]: boolean = [(x % 2)==0 for x in a]
         print(boolean)
```

```
[False, True, False, True, False, True, False, True, False, True, Fals
e, True, False, True, False, True, False, True, False, True]
```

Problem 5: Write a Python script that will open the file lorem.txt. The script will read the file and compute these quantities:

(a) The number of strings whose lengths are: between 1 and 4, between 4 and 7, and 8 or greater.

(b) The number of capitalized characters in the file.

In [17]:

```
import re

## read file:
with open('lorem.txt','r') as f:
    all_lines = f.readlines()
    f.close()

#delimiters = ['\n', ' ', ',', '.', '?', '!', ':', ';']
#words = re.split(r'[;,\s,.,:]\s*', all_lines[0])
#print(words)
#words = [re.split(r'[;,\s,.,:]\s*', line) for line in all_lines]

## solution for a:
words = []
for line in all_lines:
    words.extend(re.split(r'[;,\s,.,:]\s*', line))

words_4 =[]
words_7 =[]
words_8 =[]
words_0 =[]
for x in words:
    if len(x)>=1 and len(x)<=4:
        words_4.append(x)
    elif len(x)>4 and len(x)<=7:
        words_7.append(x)
    elif len(x)>=8:
        words_8.append(x)
    else:
        words_0.append(x)

print("The number of strings whose lengths are between 1 and 4 is: %s" %
(len(words_4)))
print("The number of strings whose lengths are between 4 and 7 is: %s" %
(len(words_7)))
print("The number of strings whose lengths are 8 or greater is: %s" % (l
en(words_8)))
```

```
The number of strings whose lengths are between 1 and 4 is: 376
The number of strings whose lengths are between 4 and 7 is: 409
The number of strings whose lengths are 8 or greater is: 215
```

In [15]:

```
## solution for b:
match = []
for line in all_lines:
    match.extend(re.findall('([A-Z])',line))

print("The number of capitalized characters in the file is: %s" % len(ma
tch))
```

```
The number of capitalized characters in the file is: 129
```