Python Homework #1: Exercises with lists, loops, and functions

1. Creating Python lists. There is more than one way to do these! To check out the available list methods in a Python console type you need a list object. An empty list [] will do :

```
dir([])
help([].extend)  # or any of the other listed methods.
```

For all of these you may **not** just type in the whole list. Find a way to generate them. Your script for part 1 can just print these lists out after they are generated:

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

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

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

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

Loops and function calls are very useful for the rest of the problems. The Python map and filter functions could also be useful – check the python.org documentation for those functions. Again, no typing in of the lists, they need to be generated or computed in Python code.

2. Create a list of the values of: $e^x \cos(x)$ for x=3, 3.1, 3.2, … 6.

3. Create a list of the values of: $\left[2, \frac{2^2}{2}, \frac{2^3}{3}, \ldots, \frac{2^{25}}{25}\right]$

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

(a) [$a_0 - a_n$, $a_1 - a_{n-1}$,...,$a_n - a_0$]

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

5. Write a Python script that will open the file *lorem.txt*. This is a bit of the "lorem ipsum", nonsense Latin that's used as a placeholder in publishing and graphic design. Hint: Python strings have a method or two that might be helpful or you could use regular expressions. 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.