FE 520 Assignment 1

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Required question (100 pts)

Before finishing this homework, please look into the official document of attributes of *list*, *tuple*, and *dictionary*. For example, executing *dir(dict)*, look into the return value without underscore ('clear', 'copy', 'fromkeys', 'get', 'items', 'keys', 'pop', 'popitem', 'setdefault', 'update', 'values') in official document [here](#).

1. (25 pts) Consider a sequenced list (or inversed sequence list) and an inserted number. Define a function with two arguments, one is the sequenced list, another one is the inserted number. Please insert the number in the list with right place, and output both the new list and the old list.

   Example:
   Input:
   List = [1 , 2 , 4 , 9 , 17 , 25 , 53]
   InsertNum = 13
   Output:
   NewList = [1 , 2 , 4 , 9 , 13 , 17 , 25 , 53]
   OldList = [1 , 2 , 4 , 9 , 17 , 25 , 53]

   Note that you are required to use loop to find the position, manually finding the position will get zero point.

2. (25 pts) A ball falls freely from a certain height. After each bounce, it bounces back to half of its original height, then it falls again. Define a function with two arguments, one is the original height, another one is the number of bounces. Print how many meters it bounces after the number of specific landing. Return the total distance the ball traveled.

   Example:
   Input:
   OriginalHeight = 100
   NumLanding = 2
   Output:
   Print: after twice bounce, the ball bounces back to 25 meters height.
   Return: 100+50+50+25=225 (You only need to return "225")

   Test your function with different combinations of input. You are encouraged to check the input, and try to use keyword **raise**, to raise errors if the input is illegitimate.

3. (50 pts) Consider following dictionary, dict = {'a': 97, 't': 116, 'w': 119, 'c': 99, 'b': 98, 'e': 101, 'd': 100, 'g': 103, 'f': 102, 'i': 105, 'h': 104, 'k': 107, 'j': 106, 'm': 109, 'l': 108, 'o': 96, 'n': 110, 'q': 113, 'p': 112, 's': 115, 'r': 114, 'u': 117, 'v': 118, 'y': 121, 'x': 120, 'z': 122}. This dictionary is the ASCII with corresponding lower case letter.

   1. Sort the key of *dict* from 'a' to 'z'
   2. Find and correct a wrong value with corresponding key.
   3. Create an upper case letter and corresponding ASCII in a new dictionary by using *for* loop.
   4. Combine lower case and upper case letter with ASCII in a new dictionary.
   5. Switch the value of *dict* to hexadecimal number

   You can more detail information of ASCII table from here.

   Hint: 1) Sort() method has been implemented for Python list. 2) There is built-in function to turn decimal number to hexadecimal number. 3)

If you have any problem with Python basic data structures or their attributes, GOOGLE IT FIRST!! For instance, if you don't know what Python Dict's attributes are, google 'python dictionary', and you will find the [official docs](#).

Bonus questions (10 pts):

Finish the [problem 1](#) (Two Sum) and [problem 7](#) (Reverse Integer) on Leetcode. Submit a screenshot of your submission detail where you can see a runtime distribution, and submit the file code also.

Submission Requirement:

1. For all the problems in this assignment you need to design and use **Python 3**, output and present the results in nicely format.
2. Please submit a written report (pdf), where you detail your results and copy your code into an Appendix. You are required to submit a single python file and a brief report. Your grade will be evaluated by combination of report and code.
3. You are strongly encouraged to write comment for your code, because it is a convention to have your code documented all the time. In your python file, you need contain both function and test part of function.
4. Python script must be a '.py' script, Jupyter notebook '.ipynb is not allowed.
5. Do NOT copy and paste from others, all homework will be firstly checked by plagiarism detection tool.