

## Assignment - #4:

- 1) Create all permutations of an input string with ***no duplicates***, if present.  
This means, you should shuffle all letters from the input in all possible orders.

```
permutations('a'); # ['a']
permutations('ab'); # ['ab', 'ba']
permutations('aabb'); # ['aabb', 'abab', 'abba', 'baab', 'baba', 'bbaa']
permutations('hello'); #
['hello', 'helol', 'heoll', 'hlelo', 'hleol', 'hlleo', 'hlloe', 'hloel', 'hlole', 'hoell', 'holel',
'holle', 'ehllo', 'ehlol', 'eholl', 'elhlo', 'elhol', 'ellho', 'elloh', 'elohl', 'elohl', 'eohl',
'eolhl', 'eollh', 'lhelo', 'lheol', 'lhleo', 'lhloe', 'lhoel', 'lhole', 'lehlo', 'lehol', 'lelho',
'leloh', 'leohl', 'leolh', 'llheo', 'llhoe', 'lleho', 'lleoh', 'llohe', 'lloeh', 'lohel', 'lohle',
'loehl', 'loelh', 'lolhe', 'loleh', 'ohell', 'ohlel', 'ohlle', 'oehll', 'oelhl', 'oellh', 'olhel',
'olhle', 'olehl', 'olelh', 'ollhe', 'olleh']
```

Write a function ***permutations ()*** which input a string and return the desired output.  
Use only Lists, Dictionaries, Tuples, Strings or Collections provided by Python.

**Bonus.** Create the permutations to include lowercase and uppercase letters.  
**Permutations2('ab');** # ['ab', 'ba', 'Ab', 'aB', 'bA', 'Ba', 'AB', 'BA']

- 2) Write a function, ***persistence ()***, that takes in a positive parameter number and returns its multiplicative persistence, which is the number of times you must multiply the digits in number until you reach a single digit.

Your program should include a ***Recursive call*** and a ***Global*** variable.

For example:

```
persistence (39) => 3      # Because 3*9 = 27, 2*7 = 14, 1*4=4
                          # and 4 has only one digit.
```

```
persistence (999) => 4    # Because 9*9*9 = 729, 7*2*9 = 126,
                          # 1*2*6 = 12, and finally 1*2 = 2.
```

```
persistence (4) => 0      # Because 4 is already a one-digit number.
```

**Make sure you will not use any of the external python libraries for any of the programs, if any external or 3<sup>rd</sup> party modules imported will not be considered for grading.**