# Assignment 1: Generating permutations in lexicographic order.

Goal: Write a Python program to generate all the permutations of the characters in a string. This will give you a chance to review some simple Python constructs, i.e.. Strings and Lists and solidify your understanding of recursion.

Your program **must** meet the following specification. You are to write a Python function **perm_gen_lex** that:

- Takes a string as a single input argument. You may assume the string consists of distinct lower case letters (in alphabetical order). You may assume the input is a string of letters in alphabetical order.
- Returns is a **list** of strings where each string represents a permutation of the input string. The list of permutations must be in lexicographic order. (This is basically the ordering that dictionaries use. Order by the first letter (alphabetically), if tie then use the second letter, etc.
- Is well structured, commented, and easy to read. Contains a docstring explaining its purpose
- Is recursive and follows the pseudo code below.

```
Argument:     abc
Returns:      [abc, acb, bac, bca, cab, cba]
```

Pseudo code for a recursive algorithm to generate permutations in lexicographic order. **You must follow this pseudo code.**

```
If the string contains a single character return a list containing that string

Loop through all character positions of the string containing the characters to be
permuted, for each character
      Form a simpler string by removing the character
      Generate all permutations of the simpler string recursively
      Add the removed character to the front of each permutation of the simpler word, and
add the resulting permutation to a list

Return all these newly constructed permutations in a list
```

Submit you Python function in a file called **perm_lex.py** to Polylearn and your test program in **perm_lex_testcases.py**

Note: For a string with n characters, you program will return a list contain n! strings. Note that n! grows very quickly. For example : 15! is roughly $1.3*10^{12}$ . Thus it is probably not a good idea to test your program with long strings.