Permutations 2   X87168_en

Some genome rearrangements change the order of the nucleotides in a nucleic acid sequence, resulting in a permutation of the nucleic acid sequence. For example, TATATA is a frequent rearrangement of TATAAT. An interesting problem is the generation of all the permutations of a genomic sequence of length n.

Write pseudocode, Python code, and C++ code for the permutations problem. The program must implement and use the permutations function in the pseudocode, which must be recursive and is not allowed to perform input/output operations. Make two submissions, including the pseudocode as a comment to both the Python and the C++ code.

Input

The input is a string s (a genomic sequence) over the alphabet $\Sigma = \{A, C, G, T\}$.

Output

The output is a sorted list of all the permutations of s, without repetitions.

Sample input 1

```
ACGT
```

Sample output 1

```
ACGT
ACTG
AGCT
AGTC
ATCG
ATGC
CAGT
CATG
CGAT
CGTA
CTAG
CTGA
GACT
GATC
GCAT
GCTA
GTAC
GTCA
TACG
TAGC
TCAG
TCGA
TGAC
TGCA
```

Sample input 2

```
TATAAT
```

Sample output 2

```
AAATTT
AATATT
AATTAT
AATTTA
ATAATT
```

```
                                              TAATTA
ATATAT                                        TATAAT
ATATTA                                        TATATA
ATTAAT                                        TATTAA
ATTATA                                        TTAAAT
ATTTAA                                        TTAATA
TAAATT                                        TTATAA
TAATAT                                        TTTAAA
```

Hint

There are at most $n!$ permutations of a genomic sequence of length n.

Problem information

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