25.12.2015

CENG113
Programming Basics
HOMEWORK #8

Write a python code by **NOT** using ***any additional library***. Please adapt your code scenario given below.

- 'nucleic_acid.txt' file contains nucleic acids(DNAs and RNAs) in a format given in the below:

  nucleic_acid.txt

  NA_1 NA_2
  .
  .
  .

- You should read nucleic acids from file and then find difference between them. After finding differences you should write back them to the same file with their differences. Functions details are given in the below.

Background Information:

- Deoxyribonucleic Acid (DNA) is double helix nucleic acid chain, but in this homework assume that it is single helix.
- Allowed nucleoside in DNA is Cytosine(C), Guanine (G), Adenine(A), Thymine(T)
- Ribonucleic Acid (RNA) is single helix nucleic acid chain.
- Allowed nucleoside in RNA is Cytosine(C), Guanine(G), Adenine(A), Uracil(U)

In this homework you are expected to write 6 functions. The functions jobs are given below.

Function #1: Your first function is responsible for checking whether nucleic acid that is read from the file is valid or not. This function must be implemented in a **RECURSIVE** way.

Function #2: Your second function is responsible for whether it is DNA or not. If it is DNA, the function should return **True** otherwise it should return **False.** This function must be implemented in a **RECURSIVE** way.

Function #3: This function is responsible for converting RNA to DNA. This function must be implemented in a **RECURSIVE** way.

rna2dna converting rules: G → C
C → G
A → T
U → A

Example: If RNA that should be converted to DNA is “CAUUCG”, function would create “GTAAGC”.

Function #4: This function is responsible for finding difference between two DNAs. This function must be implemented in a **RECURSIVE** way.

Example: If first DNA is "CATTCG" and second DNA is "ACT". The difference is should be 5.
CATTCG ~ ACT (Only T is common) so difference is 5.

Function #5: This function is responsible for reading nucleic acids from "nucleic_acid.txt" file. You can implement this function in an iterative or recursive way.

Function #6: This function is responsible for writing nucleic acids with their differences to the "nucleic_acid.txt" file. If nucleic acid that is read from the file is invalid, then you should assign **-1** as a difference for this nucleic acid. You should decide whether nucleic acid is valid or not in **Function #1**. You can implement **Function #6** in an iterative or recursive way.

Example:

Before implementation

```
nucleic_acid.txt

CATTCG ACT
GCTAC GCATTA
GTUCC CAT
XATTCG GTTC
```

After implementation

```
nucleic_acid.txt

CATTCG ACT 5
GCTAC GCATTA 4
GTUCC CAT -1
XATTCG GTTC -1
```

Due Date:30.12.15, 23:55

Submission Rules:

1. You should submit your codes through CMS.
2. Your homework should be named as **HW8_StudentID.py**. Students who do NOT follow these rules **WILL BE GRADED AS 0.**
3. Use comments in your code, otherwise you will lose some points.
4. Write your Name, Surname and Student ID as a comment in your code.