CS 110 – Creative Problem Solving in Computer Science

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Homework 4

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This homework is about DNA and loops in Python.

Submission guidelines. Submit one Python file ending in .py with the solutions to all the problems. For the hand trace comment out your solution. The submission file should be an executable .py file. Files that fail to execute will not be graded.

Exercises

1. Read Chapters 2 and 3 of Computing for Biologists by Libeskind-Hadas and Bush.

2. (25 points) Write a Python function `rev_com` (s) that given a DNA string s returns the reverse complement of s.

   Test cases:

   ```
   >>> rev_comp ('')
   ''
   >>> rev_comp('ATTCGTCA')
   'TGACGAAT'
   >>> rev_comp('GTCA')
   'TGAC'
   ```

3. (25 points) Consider your solution in the previous exercise. Write a hand trace also known as execution of `rev_comp('GTCA')`.

4. (25 points) Write Python functions `countTATA`(DNA) which find and count TATA boxes in DNA string. Test cases:

```
>>> countTATA('CATAGGCTTACC')
0
>>> countTATA('')
0
>>> countTATA('CATATACGGCTATACC')
2
```

5. (25 points) Write Python functions `multiCountTATA`(lst) which find and count TATA boxes in the DNA strings of lst.

   Test cases:

```
>>> multiCountTATA(['CATATACGGCTATACC','ATAGGCTTAGC', 'TACGGCTATAC'])
2
0
1
>>> multiCountTATA([])
>>>
```