Homework 2
CS5046

Due by 5:30PM, February 16, 2004
Submit by email to murali@cs.vt.edu

In this homework, you will implement a class that creates, stores, and process a single amino-acid sequence. When possible, all your methods must ensure that the values of the parameters passed are sensible and print an appropriate error message if they are not.

Problem 1 Implement a class called AminoAcidSequence that will store a single amino acid sequence.

1. (40 points) Implement three constructors for this class. The first takes no arguments. The second one takes a String as an argument; the string is the amino acid sequence to be stored. The third constructor takes a positive integer k (your parameter should have a meaningful name) as argument, generates a random amino acid sequence of that length, and stores that sequence. Hint: It is important that the sequence be chosen uniformly at random from all $20^k$ sequences of length $k$. Keep in mind that we typically represent an amino acid by a specific character but the Random class in Java cannot generate a random character.

2. (40) Implement a mutate() function that randomly mutates the amino acid at a random position in the sequence. Implement an overloaded mutate() function that takes the position for the mutation as a parameter.

3. (20 points) Implement a getSequence() accessor that returns the stored sequence. Overload the accessor to take a single integer as parameter and return the amino acid at that sequence. Implement another overloaded getSequence() accessor that takes two integers as parameters and returns the amino acid subsequence between (and including) those two positions. Hint: What will your method do if the first integer is greater than the second?

Notes and Tips

- The hints I have given are meant to help you think about the various issues you have to consider in your implementations. You may find it useful to include comments in your code that detail why you made a particular design decision.

- Do not forget to include full documentation for your source code as described in Chapter 5.10 of Barnes and Kölling.

- Create a folder called <YourName>-Homework2 and use a separate file inside this folder for the source code for each class in each problem.

- Remember to compile your code and to test it in the same way that we have been interacting with classes in BlueJ.

- Submit your homework by emailing the files containing the source code to me. I prefer it if you can zip the entire folder and send the zipped folder to me. If doing so is difficult, just email me the individual files as attachments.