HW1

Total: 20pts

Due: 3:29PM Tuesday Jan 28th.

You can work on this assignment in a team of two students. Write the author’s names in the program as comments. Follow Javadoc comments if you use java programming language.

Please note that you need to have both the pseudocode and the implementation for full credits.

A palindrome is a text string that is exactly the same as its reversal, such as O, DAD, DEED, and RACECAR. A prefix of a string is a substring that the string starts with. Design an algorithm to find the longest prefix of a given string that is a palindrome. For example, the longest palindrome prefix of MINIMUM is MINIM, and the longest palindrome prefix of SKYFALL is the single letter S.

1. (2pts) Name your algorithm longestPalindromePrefix, write it in pseudocode and include it in the program as comments. Your algorithm should have a string parameter and returns a string as follows.
2. (4pts) Implement the algorithm.

2. Design an algorithm to find the longest palindrome substring of a given string. For example, the longest palindrome substring of string ITSARACECAR is RACECAR, and the longest palindrome substring of string ITSACAR is ACA.

1. (2pts) Name your algorithm longestPalindromeSubstring, write it in pseudocode and include it in the program as comments. Your algorithm should have a string parameter and returns a string.
2. (4pts) Implement the algorithm.

3. Humans have 23 pairs of chromosomes, while other primates like chimpanzees have 24 pairs. Biologists claim that human chromosome #2 is a fusion of two primate chromosomes that they call 2a and 2b. We wish to verify this claim by locating long nucleotide chains shared between the human and primate chromosomes.

The longest common substring of two strings is the longest contiguous string that is a substring of both strings. For example, the longest common substring of DEADBEEF and EA7BEEF is BEEF. If there is a tie for longest common substring, only one of them needs to be found.

1. (2pts) Design an algorithm that finds and returns the longest common substring in two given strings. Name your algorithm longestCommonSubstring, write it in pseudocode and include it in your program as comments. The algorithm takes two string parameters, and returns a string.
2. (4pts) Implement the algorithm.

4. (2pts) A driver program StringAlgs.java and a few test cases is available on the course website. Help information is also available by running “java StringAlgs”. Your algorithms are supposed to work with StringAlgs.java without changing the main method, class name, method invocation, and usage.

Turn in instructions. Add your three methods inside StringAlgs.java and turn the resulting StringAlgs.java in through turnin system.