UOIT/DC COMPUTER SCIENCE CLUB ANNUAL CONTEST 2012

The following problems are an amalgamation of various challenges from different problem domains, the point being that you need to think in order to solve them. Good Luck!

Submission Guidelines

- The contest submission deadline is **Jan 28, 2013**
- Put your solution to each problem in a separate folder **numbered from 1 to 4**
- Compress **all of your solutions** into one **zip or tar** file and name the file with your name (ie. jon_doe.zip)
- Email your solutions to **admin@cs-club.ca** with the message title **CONTEST**
- For contest hints, questions about the contest, or to find out more about the computer science club, please email us or join our mailing list https://groups.google.com/group/uoit_csc?hl=en

Contest Problems

1. The Word Hunt Problem
    a. Write a program that can find the first **index** of a word in any given input, for example such as finding the **index** of the word "club" in the sentence "This year's club contest is easy for regular club members!". Your program **must** be able to take a word to search for as input and then any inputted **ASCII** text to search through and then return the index of the first occurrence of the word specified.

    b. Most implementations, awarded to whomever provides the most implementations to the above problem. An implementation in assembly language will receive a bonus of **5x** the number of implementations (and will have a strong bias to win this award).

    c. Most creative solution, awarded to the person with the most creative solution to the problem.

2. The following website **http://cs-club.ca/contest/** displays a list of individuals stored in a

database who have solved problem 2. In order to receive credit for solving problem 2 you **MUST** add your name to the list of users who have solved problem 2, if your name is not listed on the results page then you will **NOT** be given credit for solving problem 2.

   a. **(BONUS)** If your name is the **ONLY** name listed on the results page of individuals who solved problem 2 then you will receive a **BONUS** point. As well, since everyone else is now **NOT** displayed on the results page they will **NOT** receive any points!

3. A Peculiar Problem, take any natural number, ***n***, if it is **even** divide it by 2 or if it is **odd** multiply it by 3 and add 1. If you repeat this process indefinitely, no matter what number you start with, you will always eventually reach 1. For example if you start with 5 you will get 16, 8, 4, 2, 1.
   a. Implement a solution that given a natural number will display the sequence of numbers at each step until it reaches 1. For example, if the number 5 is entered it would display the sequence 16, 8, 4, 2, 1

   b. Implement a solution that not only displays the sequence but also displays the sequence of prime numbers if and only if **EVERY odd** number (2 being an exception) in the sequence is prime. A simple example is 3, each **odd** number in the sequence (3 and 5) is prime, as well as 2 being prime.

   c. **(BONUS)** To whoever has the largest sequence of prime numbers if and only if **EVERY odd** number (2 being an exception) in the sequence is prime. **Submit the results of your program** (I don't want to have to run your program for months in order to get the sequence!)

4. Hnamus hvae an itanne eorrr cortcering aiblity to fix eorrr-ledan secnetnes, scuh as tihs one. In msot cesas we olny need the fsrit and lsat chatcarers to be in pcale in oedrr to be albe to raed the txet wtih llttie difuciflty.
   a. Imemelpnt a soitulon taht can tkae a sclbmared senetnce wehre **the fsrit and lsat chatcarers are in oedrr** as iupnt and ouptut the coerrct senetnce. For expmale **gevin the foiwollng txet as iupnt:** *"Olny srmat poelpe can raed tihs. I cdnuolt blveiee taht I cluod aulaclty uesdnatnrd waht I was rdanieg."* Yuor prrgoam **sluohd be albe to ouptut silimar to the foiwollng:** *"Only smart people can read this. I couldnt believe that I could actually understand what I was reading."*

   b. (**BUNOS**) Bunos mrak for the posren who cemos up wtih the msot opmital soitulon. By opmital I am reirrefng to peramrofnce/mromey/altiroghm opmital soitulon, unisg a diereffnt prommarging lagaugnes to "imorpve" peramrofnce (ie. C inetsad of Pothyn) wlil not hlep, I am loikong at the msot cevelr/opmital soitulon.