NATIONAL UNIVERSITY OF SINGAPORE
SCHOOL OF COMPUTING
Mock Practical Examination for Semester 1, AY2022/23
CS2040 — Data Structures and Algorithms I

22 Oct 2022 Time Allowed: 1 hour

INSTRUCTIONS TO CANDIDATES

1. This is an OPEN book exam. You may refer to your notes and books but not anything that is stored electronically. You can find the Java API on the desktop of your PC.
2. You are given 1 hour for the Mock PE but for the first 10 minutes, you are supposed to read the question and design your algorithm. You should start coding only when you are told to do so.
3. You are not allowed to communicate with one another in anyway once the examination has started.
4. If you commit any dishonest act during the exam, you will be reported to the university disciplinary board.
5. Use the WinSSHTerm to connect and logon to the PE server (pe10x. x=1..8) using the plab account given to you. You should not use your own unix (SOC) account.
6. After login, you should find a subdirectory, ex1. In the directory you should find a .java file. You should develop your entire program in this file and not create additional file. At the end of the PE, we will only submit the file that we gave you at the beginning and ignore the rest of the files in your directories. If we are unable to transfer your program for grading, you will get 0 for the Mock PE.
7. You should open only two unix windows. One for editing and the other for compiling and testing. You are allowed to open another for the task state,emt. If you are found with any other window opened, you will be reported for cheating.
8. Your code must remain in your special exam account all the time. Transferring of your code to other systems (including diskette, laptop, desktop, mail server, web server, file server, etc) is strictly prohibited.
9. **Fill in your particulars in the header of the file. 10 Marks will be deducted if you fail to do so.**
10. To change directory from top directory to subdirectory ex1, type cd ex1. To go back to top directory, type cd
11. To compile your program, type javac programName.java
12. To run the program, type programName < testdatafile > outfile. 8 test data sets are given. You may create your own testdata files to test your programs.
13. Use the diff command to compare your output file with the standard output file for the test data.
14. You can use the check.sh script to run the tests in one go..
15. You do not need to do any submission. At the end of the PE, just logoff and shut down the PC.

Notes:

1. Make sure that you do the analysis and design properly. If necessary, spend more time to complete the design before you start coding.
2. Try to test the program part by part. You will get partial marks even if your program could not solve the entire problem. You should save your work from time to time to prevent any accidental loss.
3. 50% of the marks will be deducted if your program has syntax errors and 30% of marks for programming style will only be given if you score at least 20% for correctness.

4. Do not press CTRL-D at any time during the PE. If you do that, type fg to bring the job to the foreground.

5. If you encounter infinite loop while running your program, or your program seems to be not responding, CTRL-C.

ALL THE BEST!

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CS2040 AY 22/23 Semester 1, Mock PE – Museum

Museum

This question is graded for 3%.

Problem Statement:

Little Timmy is visiting the Dinosaur Museum! The museum has exhibits from , where each is denoted by . The museum can have

Timmy does not want to see during his trip, while trying to as possible. Therefore, he will choose to only of the museum that does

He wants to know what is the he can see from this visit. Can you help him?

Input:

An in a single line, denoting the in the museum.

In the next line, follow, denoting the)

Output:

In a denoting the he can see from this visit.

Example:

Sample Input 1:

1

Sample Output 1:

3

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CS2040 AY 22/23 Semester 1, Mock PE – Museum

Explanation:

For Sample Input 1, the that Timmy can visit are:

The that he can is 3.

Grading Bands:

- 1 <= n <= 200. If you solve the problem in $O(N^3)$ time, you will get 100%
- 1 <= n <= 3000. If you solve the problem in $O(N^2)$ time, you will get 100%
- 1 <= n <= 10^6. If you solve the problem in O(N) time, you will get 100%

**Note that in actual PE, the percentages will be different.*

Public Testcases:

- Testcases 1-7.in: 1 <= n <= 200.
- Testcase 8.in: 1 <= n <= 3000.
- Testcase 9.in: 1 <= n <= 10^6.