Department of Electrical and Computer Engineering
North South University

Midterm Examination
Fall 2020
CSE 373
Section 3

Time: 1 hour + 10 minutes (to upload the answer script) Total Marks 35

Instructions

1. Answer ALL questions
2. You should turn on the camera during the examination time.
3. Answers need to be handwritten
4. Each page should contain the name and id of the student
5. The answer script needs to be uploaded via google classroom
6. You should compile your answers to a single pdf file. The name of the pdf file should be "your name"

1 Solve the following recurrence using recursion tree method 10 marks

$T(n) = T(n/3) + c$, $n > 1$
with the base case
$T(n) = c$, $n = 1$

2 State the worst case situation in a naive quicksort algorithm. Write down the recurrence in the worst case situation (You do not need to solve the recurrence). Explain how this problem is tackled in randomized quicksort algorithm 3 + 3 + 4 = 10 marks

3 You are in charge of a theater hall. You have received a number of requests for different activities to take place (which requires the use of the theater hall) to mark the birth of Sir Alan Turing. Many of these activities overlap and therefore cannot be simultaneously entertained. Your job is to come up with maximum number of activities that can be accommodated. The following table shows the start time and the finish time of different activities. Find which activities should you select? Two activities, *i* and *j*, are compatible if $s_i \geq f_j$ or $s_j \geq f_i$. You should clearly show your workings 10 marks

Activity/ i	1	2	3	4	5	6	7	8
Start time / s_i	9	11	13	8	14	15	10	16
Finish time / f_i	13	12	15	11	16	17	13	19

4 Both quicksort and mergesort uses divide and conquer approach to solve problems. Explain how they differ in terms of how they are divided and combined. 5 marks