CS345A: Algorithms -II
Users Online : 7

Quiz 4

Due on : 22/11/2021 12:30

Instructions

- Exam opens at: 22/11/2021 11:40
- You are given an extra 10 minutes after due time to submit your exam.
- However, please note that any submissions made after the due time are marked as late submissions.

Quiz 4

Question:

Instructions: Attempt exactly one of the following 2 questions.

Question 1 *Potential function* (2.5 mark)

Recall the problem of incrementing the binary counter discussed in the class.

The aim was to show that the total number of bit flips during a sequence of n increment operations on a binary counter initialized to 0 is O(n We showed it using some potential function. Can we use the following potential function to show that the amortized number of bit flips during any increment operation will be O(1) ?

Potential function : The length of the longest suffix of 1's in the counter.

You must give precise and formal arguments to justify your answer for this problem.

Question 3 *Nearest charged particle* (7.5 marks).

There are n positively charged particles arranged evenly on the circumference of a circle. We label any arbitrary particle as p1 and then, traversing the circle in clockwise direction from p1, we label the remaining particles as p2,...,pn. You are given an array Q[1..n] such that Q[i] stores the charge of particle pi. You have to compute array N[1..n] such that N[i] stores the index of the particle that is nearest to pi and has charge smaller than that of pi, if exists; otherwise N[i] stores -1. Design an O(n) time algorithm to compute N.

Note: No marks if your algorithm takes more than O(n) time.

Due time is over.