

# CS345A: Algorithms -II

## Users Online : 12



Submitted on 28/8/2021 07:55

### Instructions

- Exam opens at: 28/8/2021 07:00
- 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 1

#### Question:

#### IMPORTANT POINTS:

1. Attempt exactly one of the two questions given below. If you attempt both, you will get 0 marks.
2. As answer to a question, you have to just describe the algorithm in plain English or as a pseudocode. Nothing more is required. The algorithm must be complete, unambiguous, and formal.
3. You have to upload the solution on this portal by 8:00 AM. Note that 10 minutes after 7:50 AM should be used for uploading the solution to avoid any last minute rush.
4. Uploading the solution on the portal is the only option available to you. You **must not** send your solution by email to the instructor under *any* circumstances.

#### Question 1. **Local Minima in an Array** (marks=5)

There is an array A storing n distinct numbers. An index i of the array is said to be a local minima if the element stored at this index is smaller than its left neighbour as well as its right neighbour, if exist. Design an  $O(\log n)$  time algorithm to compute a local minima in A.

#### Question 2. **Killing your enemy** (marks=7.5)

There is a straight road that goes to infinity in both directions. There is a unique point on the road called origin which is marked as milestone 0. Starting from the origin, there is a hut located at each mile on this road in both directions (i) a hut at 1st milestone on the left of the origin, a hut at 2nd milestone on the left of the origin, and so on ... (ii) a hut at 1st milestone on the right of the origin, a hut at 2nd milestone on the right of the origin, and so on...

You have an enemy residing in a hut located at *some* milestone at time=0. The enemy starts moving along a **fixed direction** on the road with a speed of 1 mile/hour such that at the end of each hour, he is in a hut located at a milestone. There are landmines placed inside each hut. You are sitting inside a room located very very far from the road. At the end of each hour, you have to choose any hut on the road and blow a landmine located in the hut using remote control. If the hut you choose at the end of an hour happens to be the same as the hut in which the enemy is present at the end of the hour, the enemy gets killed. Unfortunately, you **do not know** the hut in which the enemy is present at time=0. You also **do not know** the fixed direction along which the enemy is moving.

Design an algorithm to kill the enemy. The time (in units of hours) taken by the algorithm to kill the enemy has to be  $O(d)$  where d is the distance (in miles) from the origin to the hut in which the enemy is present at time = 0.

# CS345A: Algorithms -II

## Users Online : 12

[quiz1 question1 100771.pdf](#)

**Grades:**

**Marks:** 5