
Noctem Virtual II Sample Problem Solutions

Division 2: Anuj Can't Code

Solution:

We can think of Anuj's score as the sum of the initial points of all problems minus the total amount of points that degrade as he takes the contest. To maximize Anuj's score, we need to minimize the number of points that he loses due to decay. Observe that a problem that degrades faster should always be solved before a problem that degrades slower, as switching the order will only result in more points being lost. As a result, we can simply sort the problems in descending order by degrading speed, giving us the order in which Anuj should solve them to obtain an optimal score.

Solution Credits: Steven Tan

Division 1: Hedge Maze

Solution:

Take any path that goes from start to finish that isn't clear (there are hedges in it and therefore cannot be travelled). Notice that the number of hedges that must be cut in order for this path to be clear is simply the number of hedges it goes through. Our goal therefore is to find a path with a minimal number of hedges in it, because that will then be the minimum number of hedges that need to be cut down in order to have a clear path. We can model this as a shortest path problem. Squares with hedges are weighted with 1, and empty squares are weighted by 0. We can now run a dijkstra or a 0-1 BFS to give us the path with minimal hedges in it, which solves the problem.

Solution Credits: Steven Tan