UIUC ICPC Spring Coding Contest Editorial

1 A - A Simple Geometry Problem

2 B - Barfoosia Tax Return

This is an ad hoc problem. You can use if-else branch to determine the total amount of tax, and take the difference between it and the withheld tax to find out the amount refunded/owed.

3 C - Common Mistake

4 D - Dull Game

5 E - Enclose These Cows

Consider directed edges between all pairs of poles. We want to pick those directed edges that has all cows on its left side. Then a cycle formed by these edges is a valid enclosing fence, and the problem reduces to finding the shortest cycle in a directed graph, which can be done with Floyd in $O(N^3)$. Overall complexity is $O(MN^2 + N^3)$.

6 F - Featured Animals

Placing animals from left to right is a Markov process, so we can use matrix multiplication. Let state vector have ith element representing the number of configurations when the current cage contains type i animal. Transition matrix is the one matrix except where corresponding adjacent types are forbidden, in which case the matrix element is zero. We must zero out some state vector elements in certain stages because these cages forbid some types of animals. Time complexity is $O(NM^2)$.

We can optimize with fast matrix exponentiation. This will give us time complexity $O(M^3 K \log \frac{N}{K}) = O(M^3 K \log N)$. We can further precompute base matrices, yielding time complexity $O(M^3 \log N + M^2 K \log \frac{N}{K}) = O((M + K)M^2 \log N)$.

7 G - Greedy String Match

8 H - Hard Combinatorics

9 I - Impossible Task

10 J - Just A Hike!

11 K - Kindle the Bonfire

12 L - Land of Fantasy

13 M - Macrosoft