Solutions – IDI Open 2019

March 30th 2019

Job Expenses

- Remove all positive numbers from the sequence
- Sum the negation of the remaining numbers
- $N = 0$ can introduce edge cases in integer parsing

Solved by 63 teams
First solution after 3 minutes

Delimiter Soup

- Keep a stack of opening delimiters (`([{`)
- Whenever a closing delimiter (`)]}`) is found, pop the top of the stack and check if they match
- If they do not match or if the stack is empty, print it and its location
- Print `ok so far` if you don't run into any errors

Solved by 57 teams
First solution after 7 minutes

Excavator Expedition

- Set the value for Amka's house to 1, all other nodes to ∞
- For each node n in toposorted order
  1. Let $x = 1$ if the n is a construction site, $x = -1$ otherwise
  2. Set the value of n to $\max(\mathit{children}) + x$
- Print the value of Nanouk's grandparent's house
- NB: Doing this recursively will likely blow the stack

Solved by 16 teams
First solution after 20 minutes

Coffee Date

- Run Dijkstra from Erika and Leah's home to all other nodes
- Hard part: Calculate when the next bus arrives
- Note that you may take a bus that started before Erika and Leah left their home

Solved by 11 teams
First solution after 41 minutes

Helpful Currents

- Dynamic programming: Start at the bottom row and go upwards
- Toposort each row, or do two passes in each direction to cover all edges
- NB: $ans \mod 1\,000\,003 = 0$ does not imply you should print out `begin repairs`, you need a separate check for that

Solved by 9 teams
First solution after 89 minutes

Bit 4 Bit

- For `copy`: Make a new node with input as left and right children
- For `replace`: Make a new tree, but copy the nodes you modify
- Query it like a normal segment tree, but be aware of big integers
- Since A_i and B_i may be over 2^{100}, C/C++ users need to process the input numbers bit for bit (hence the name). Java/Python can do it via big integers.

Solved by 5 teams
First solution after 124 minutes

Apostrophe Catastrophe

- Let p and m be the number of $+$ and $-$'es in I
- Then $|O| = (p-1)x + (m-1)y + |I|$, where x denote the length of an encoded plus, and y denote the length of an encoded minus
- Try for all lengths of pluses and minuses, and find the first occurrence of both in O
- If all pluses and minuses in O are identical, then this is a valid solution

Solved by 4 teams
First solution after 121 minutes

if_then_else

- Essentially write a small interpreter
- No need to implement a full-blown parser, splitting each line + string comparison is sufficient
- Brute force with `@a` from 0 to $2^{12} - 1$, see which one prints the right answer

Solved by 4 teams
First solution after 208 minutes

Game Suggestions

- Flow problem: Maximise flow via friend $\rightarrow$ suggestion $\rightarrow$ category
- Split suggestion nodes into 2 to limit flow to at most 1

Solved by 3 teams
First solution after 121 minutes

Forest Evolution

- Make one convex hull for pines and one for aspens
- Make a new polygon by taking the union of these hulls
  - Sutherland-Hodgman is probably the easiest to implement
- Print the size of this new polygon

Solved by 2 teams
First solution after 238 minutes