

Spring 2022 COP 4516 Team Final Contest Summary (by Arup Guha)

The first part of the summary will be a problem by problem analysis of how teams did in the contest and some observations about the problems. The second part will be an analysis of the teams and how they did. Here is the first, by problem:

Problem A: How Many Pieces of Candy?

Solved by: 0 out of 17 teams

Unfortunately, no one solved this problem in contest. Most teams that attempted it tried a brute force solution with a run time of $O(2^n)$, but since n was up to 100, this approach did not run fast enough to work.

Problem B: The King's Escape

Solved by: 3 out of 17 teams

First Solve: 138 minutes (Poppy)

Many teams started on this problem in the first hour and three teams were able to eventually debug their solutions. As discussed in the solution sketch, while the approach to solving this problem is straight-forward, the implementation is fairly ugly and has a high chance of implementation error, so it takes some careful coding and debugging skills to work through this problem, which Aster, Poppy and Chrysanthemum were able to do.

Problem C: Flowers

Solved by: 17 out of 17 teams

First Solve: 13 minutes (Wisteria)

This was definitively the easiest problem in the set. All teams solved this in between 13 and 51 minutes in the contest. Two teams had minor bugs, needing 3 submissions to get it correct but the other 15 teams solved this in one submission. Some care needed to be taken to do integer computations.

Problem D Small: Fractorial Small

Solved by: 16 out of 17 teams

First Solve: 7 minutes (Aster)

This was definitively the second easiest problem in the set. Just like problem C, there are some potential issues with floating point calculation so it's best just to keep to integer calculations and to notice that longs are required. A few teams had some issues, requiring anywhere from 2 to 5 submissions. Most of these stemmed from having some floating point numbers somewhere in their computation. The only team that didn't solve this problem had two separate approaches but both had minor bugs.

Problem D Large: Fractorial Large

Solved by: 0 out of 17 teams

No team had a serious submission to this problem. All submissions seemed to use the brute force strategy for the small, which can not work since the highest answer might go close to 10^{18} . Not to mention that the actual factorials of numbers that big can't be stored on a computer.

Problem E: Frogger

Solved by: 2 out of 17 teams

First Solve: 147 minutes (Larkspur)

This problem was one that teams waited to try, probably because of Escape, but a few teams came around to attempting it. Two of the four teams (Larkspur and Rose) that made a submission on this problem got it. This likely means that if more teams started on this earlier, more teams could have solved this problem.

Problem F Small: Trilots Small

Solved by: 2 out of 17 teams

First Solve: 128 minutes (Aster)

Aster got this problem utilizing the combination tool in python. On the small bounds, there's no need to do combinations since $9!$ is small enough to run in time. All orderings of the 9 points can be considered and redundant triangles can be forced. The second team that solved the problem, Larkspur, used a more tradition brute force method.

Problem F Large: Trilots Large

Solved by: 0 out of 17 teams

Both teams that solved the small version of this problem submitted their code for the large version, but neither team had the necessary optimizations for this to pass in time.

Contest Summary

The contest started out quickly, with nearly all teams realizing that the two easiest questions were flowers and fractorial small. Aster got on the board first at 7 minutes submitting a correct solution to fractorial small. Soon afterwards at the 13 minute mark, Wisteria solved flowers correctly. From that point on, over the next hour or so, there were many correct submissions on these two problems with all teams solving flowers and 12 teams correctly solving fractorial small by the 1 hour mark.

Starting at the one hour mark, there was a long lull in correct submissions. A full 27 minutes went by before Oleander solved fractorial small with its fifth submission. Over the course of the second hour, two more teams solved fractorial small and still only two unique problems had been solved.

Finally, at the 2:08 mark, Aster pulled through with a third problem, solving trilots small, maintaining first place but now with strictly more problems. They utilized the combination generator built into python to go through all combinations of triangles. Then, not too long after, at the 2:18 mark, Poppy solved escape with their fourth submission. They had thought they were getting a run-time error from an array not being big enough, but actually, it was a bug in reading in the input. (They were assigning the character in index 0 from the input string to each item on a row, instead of the character in the appropriate index.) After this single character fix, they got the problem correct!

Then, just a few minutes later, two more correct submissions came in! Aster solved escape after 5 submissions making some non-trivial fixes in their BFS code to get to four problems solved. One minute later, Larkspur solved the frogger problem to jump ahead of Poppy into second place. With 30 minutes left, Aster was in first place with 4 problems, Larkspur in second place with three problems and 233 penalty points and Poppy was in third place with three problems and 242 penalty points, a mere 9 penalty points behind.

In the same minute, 2 hours and 40 minutes into the contest, both Rose and Chrysanthemum solved problems to get to 3 problems solved. Rose solved frogger on their second submission to move to 4th place and Chrysanthemum solved escape (with only 2 submissions) to get to fifth place.

To close out the competition, Larkspur also solved trilots small with six minutes left in the competition to get to four problems. While this didn't change their rank (they stayed in second), they finished the contest with the same number of solved problems as the winner, Aster, and only got second place by a mere 10 penalty points (397 to 407).