Matthew Roh (노현제)

Student, Problemsetter at *Codeforces*

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Education

Seoul National University of Science and Technology Mar 2023 – present
Industrial and Information Systems Engineering (Major)
IT Convergence Software Program (Double Major)

- Total GPA of $3.65/4.5$, Major GPA of $3.89/4.5$ ($123/130$ credits taken)
- Working on Thesis: Surveying New Methods of Plagiarism Detection in Competitive Programming
- Working on Thesis: Long Induced Cycles in Leaper Graphs

Interests

I am interested in real-life and contest applications of various optimization concepts. Many of these concepts are often overlooked in competitive programming, such as **Linear Programming**, **Convex Optimization**, and **Integer Programming**. There are also heuristic methods that are currently used in heuristic contests, such as **Simulated Annealing**, **Hill Climbing**, and **Beam Search**. I wish to find ways to apply these concepts in fields where they were previously overlooked, such as combinatorial problems that require asymptotic upper or lower bounds, or competitive programming problems where previously **Greedy** algorithms or **Dynamic Programming** were preferred due to guaranteed worst-case performance. In addition, I plan to extend my interests to real-life fields where problems arise in real-life constraints and real-life objectives.

Experience

Contest Coordinator, 한국정보기술진흥원 (*KITPA*) Mar 2025 – Sep 2025

- Leading role in problemsetting team of the algorithm contest for teenagers
- Supervised the preparation of 21 problems throughout 3 contests

Coauthor, Asia-Pacific Informatics Olympiad 2025 May 2025

- Coauthored problem A ("*Hack!*")
- Problem statement can be found in GitHub (github.com/apio2025/apio2025_tasks)

Problemsetter, ICPC Asia West Regionals 2024 - 2025 Dec 2024 – Mar 2025

- Proposed problems for Kanpur, Amritapuri, Chennai Regionals and Asia West Finals
- Some of the problems are also used in 3rd Universal Cup Stage 33: India (qoj.ac/contest/1954)

Problemsetter, OCPC Fall 2024, Summer 2025 Aug 2024, June 2025

- (Co)authored one contest in 2024 Summer and one in 2025 Summer
- Helped many teams practice for ICPC World Finals

Coauthor, ICPC NAC 2026 Aug 2024, June 2025

- Proposed Problem B ("*Boss Rush*")
- Problem analysis can be found in nac.icpc.global/problems/2026/nac2026_solutions.pdf

Problemsetter, *Codeforces* Aug 2023 - present

- (Co)authored several contests on *Codeforces*

Remarkable Problems

Five Steiner (OCPC 2025 Summer, Potluck Contest 2)

You are given five points on a plane. A steiner tree of a set of points is a tree that spans the given points alongside any arbitrary number of additional points. Find the minimum weight steiner tree in $\mathcal{O}(\log^2(\varepsilon^{-1}))$ time.

Hack! (Asia-Pacific Informatics Olympiad 2025)

There is a hash table consisting of n buckets, where integer x is stored in bucket $(x \bmod n) + 1$. When a new integer is added to a bucket with b elements in it, the number of collisions increases by b.

By giving k distinct integers to the jury, you can find the number of collisions that happened while inserting those k integers in a new hash table of n buckets.

Find a way to compute the value of n using at most $\mathcal{O}\left(\sqrt{\max(n)}\right)$ insertions throughout all queries.

Inverse Minimum Partition (Codeforces Round 1058)

For some sequence b of k positive integers, the cost of the sequence is defined as follows:

$$\text{cost}(b) = \left\lceil \frac{b_k}{\min(b_1, b_2, ..., b_k)} \right\rceil$$

Assume that you partition a sequence c into one or more contiguous subsequences. For such a partition, the total cost of the partition is defined as the sum of costs of each sequence in the partition.

Compute the minimum total cost to partition a sequence a of n positive integers in $\mathcal{O}(n)$ time.

Boss Rush (ICPC NAC 2026)

There are n monsters labeled $1, 2, ..., n$. Each monster attacks every d seconds, and monster i's first attack is at second f_i.

When a monster attacks, you can *parry* the attack and eliminate the monster immediately. However, you can only parry one monster at once, and after one parry you cannot parry again for w seconds. In other words, if you performed a parry at second t, the earliest time you can parry again is $t + w$.

Determine the earliest time you can eliminate all n monsters.

Certificates & Proficiency Tests

- **Industrial Engineer Information Processing** (정보처리산업기사): December 24, 2025
- **ADsP** (데이터분석 준전문가): March 22, 2024
- **TOEFL** Score **5.0**/6.0: March 7, 2026