**HCSSiM**

1. **List the math courses you will have completed by July (one per line).**

Algebra: polynomials, sequence and series, exponents and logarithms, permutations and combinations, complex numbers, equations and inequalities, and etc.

Geometry: plane, solid and analytic geometry

Number Theory

Circular Functions and Trigonometry

Vectors

Conic Sections

Statistics and Probability

1. **List the math courses you plan to take next year (one per line)**

Linear Algebra

Calculus

Discrete Mathematics

Series and Differential Equations

Matrices

Mathematical Modelling

1. **What mathematical activities have you enjoyed?** We consider juggling to be a mathematical activity.

Spider Solitaire was my favorite childhood game, and Sudoku books occupied my book shelves, they were my major source of entertainment. I also had tremendous fun learning abacus from my mother, a math teacher, and beating her in 24 Game. Klotski number game, a Chinese classic, is my all-time favorite. It has a n^n matrix with one space left blank. The position of numbers is disorganized and the player needs to recover it.

After three days of my initial contact with this game, my record improved from over one minute to 26 seconds. Constantly endeavoring for a higher record, I came across one puzzle particularly hard, where only two numbers were displaced and I only needed to switch the positions of 14 and 15. An arduous half-hour attempt resulted in zero progress, which pushed me to take a step back and think hard about the problem.

I came up with a new idea: first complete the outmost orders to make it become a 3\*3 matrix, then continue to make it become 2\*2. I tried this method on that unsolved puzzle, but still, the outcome was frustrating. I got a 3\*3 matrix where there is no solution, and it was proved by showing the number of inversions in the sequence was odd, and the Klotski was thus unsolvable. *What if mine has no solution neither? But how can I prove that with n=4?*

By investigating in the concept of inversion, I found that it the case of n=4, there are two possibilities: if the empty space is in an even line, then it’s solvable if the number of inversions is even, and if the empty space is in an odd line, then it is solvable if the number of inversions is odd. The concept of Inversion in a sequence: the parity of the number of inversions determines whether a Klotski puzzle is solvable.

My addiction to Klotski may contribute to the easy-to-follow rule of the game, but the most important reason is that I enjoyed the process of pushing my limits, and that by employing mathematical methods, I could surpass myself.

1. **What are your non-mathematical interests and hobbies?** Examples include but are not limited to Ultimate Frisbee, chess, music, Wack-a-Mole, sky-diving, etc.

I watched a herd of yaks returning home at sunset in Yellow Stone National Park; I hiked 15 hours to top Mount Huangshan in Anhui; I climbed an Iceland glacier laying my bare hands on the permafrost of a thousand-year history; I joined the monkeys for hot spring in a village deep into the mountains of Shirakawago; I kept vigil on a nameless lake in Norway for the splendid aurora; I suffered from seasickness in a fisher boat in Sri Lanka to study whales; Tents, woods, ice caves. Wind, snow and rain. But I wanted to test how far courage can take me.

Intimacy with the nature happens in many ways. When I don’t travel, I farm, the cropland full of yellow rape flowers in spring, the green watermelon resting under its vine in summer, the golden wheat bundled near the field in fall, and the grandma’s garden filled with white radish in winter.

After spreading the seeds into the soil, I took good care of them and waited to see the colors covering the field - from the refreshing green cabbage with fiber good for digestion to the energetic red peppers full of capsaicin to promote metabolism. Harvesting those colors from the field, I started to imagine how they could be cooked, bring people happiness and health.

Putting on the gloves and stepping into the field, I’m brought back to the very moment that I first touched the soft, moist soil. Laboring on land connects us to the Great Nature. For nature is where we came from, I find it home to rest our bodies and minds. Taking time from our intense lives to observe a plant gradually growing tall from sprouts, I savor that inner peace and joy. Like our ancestors, on land, we grow, share and bond.

1. **Have you previously attended any summer academic programs? If so which ones and in which years?** MathPath, BEAM, MathCamp, PROMYS, SUMaC, and MathILy are just a few examples.

No, I’ve not previously taken any summer academic program.

1. **How did you hear about us? Check all that apply (even just a little bit):**

* Alumn(i)
* **Teacher**
* Flyer/Brochure/Postcard
* **Our Website**
* Another Website
* A revelation whispered in my ear by Namagiri
* Others

[Optional] We’d love it if you could elaborate on the above question.

1. **Are there any questions you would like us to answer (aside from the Riemann Hypothesis)?** We can answer all other Riemann Hypothesis-related questions at the next session of HCSSiM.

I’d like to know if there’s any math studies or workshops at HCSSiM on discussing the connection between mathematics and architecture.

1. **Here’s the friendly-and-informative-letter portion of the application: Please explain why you are applying; cite, if possible, specific ideas, books, proofs, or problems which have particularly stimulated you, and indicate why you believe you would enjoy the Summer Studies.**

“All is number,” says Pythagoras.

Yes, life is like a mathematical function, simple at first glance but full of possibilities in hindsight. Since childhood, I have loved solving math problems, a hobby I obtained from playing math-related games. Over time, mathematical thinking has become an indispensable part of who I am.

Simply consider the function: y = a^x.

Assume “a” is greater than 1.

The graph will always pass the point (0,1).

This precision, a sense that outcomes are predetermined, may have a drag on people, making them content; they give up on looking for new a different possibility because they think they know the outcome.

This succinct, elegant mathematical function has inspired me to understand myself and the world.

1. “a” is who I was.

“a” is a constant. It’s the unwavering part of my identity.

I was brought up in a relatively less-developed town in the outskirt of Suzhou. Growing up here, I once assumed the rest of the world goes with the same slow pace. I’d left for a few months. As I returned home after seeing a bigger world, I viewed everything with a fresh perspective, recognizing patterns and nuance like I’d never before.

2. “x” is what I see, do, and feel …

In my world, “x” is a variable, always larger than 1.

I traveled a lot. For ten years my parents cut our daily expenses to give me tours around the world. Speaking little English, riding a motorcycle, sleeping in tents, I traveled through New Zealand, Iceland, Sri Lanka, Kenya and numerous wonderlands.

United World College has captivated me as much as the novelties on my journeys. In UWC, I met people from all over the world, some I’ve been to, some I’ve never heard of.

I learned from my Afghan roommate how their country is suffering from upheavals; how she’d watched her friends dying, and how fortunate she feels about being able to study here. I also learned about different religions. I greeted all the vegetarians around me. I joined forces with the LGBTQ movement.

As a proud UWCer, I’m pursuing my values, never afraid of the unknown.

3. “y” is who I will become.

Now I’ve seen parts of the world and known better whom I am as a person.

Mathematics is such a beautiful language that helps me to interpret myself and the surrounding world: Feeling hot can be expressed by regression (in sports), Bayes’ formula can be used for testing cancer treatment’s effectiveness (in medicine), wise decisions can be made based on the expectation (in lottery), and numbers can show the faults of an electoral system (in politics). If I want to figure out what Quantum mechanics is, the easiest way for me is to draw inspirations from uncertainty, wave function collapse, Schrodinger equation, and Quantum Bayesian model.

In this spirit, I conducted a project with statistics and probabilities to investigate the efficiency of different studying approaches. Subsequently, I applied my research results to help students in a local elementary school to improve their processes. In the future, I aspire to use mathematics to study different democratic systems, to enhance the fair distribution of educational resources, and to eliminate gender discrimination. In this respect, HCSSiM is such a good opportunity that will guide me to explore more beauties of mathematics - both theoretical mathematics and its applied tracks.

Besides, through attending math lectures and intensive training sessions, I will actively challenge myself with advanced topics and enhance my problem-solving skills. Given the opportunities to choose my own courses and attend workshops, I will be able to more profoundly explore the fields of my interest. By conversing with math lovers from all over the world, I can benefit from an atmosphere of creativity and exploration.

“Life is mathematics,” I’ll say at HCSSiM.