**Program: (Pure)Mathematics**

Imagination: 1.the act or power of forming mental images of what is not present.  
                     2.the act or power of forming a mental image of something not present to the senses or not previously known or experienced.  
                                 ---Webster’s New World College Dictionary 4th edition

In the foregoing definition of the word “Imagination”, the most important aspect is undoubtedly creativity and originality. This was precisely what I had in my mind when I used this word to name the folk rock band that I launched in collaboration with two other undergraduates when I was a sophomore and in which I was the bass guitarist. For about one year, we composed our original songs and lyrics and gave a total of 14 performances on and off campus. We became the cover story of the magazine XX and were interviewed by the XX Cable Television Network.

Although I had to disband the band so that I could indeed concentrate on my studies when I became a junior student, this brief musical career gave full vent to my passionate creativity and imagination. The process of musical composition gave me the same pleasure as undertaking mathematical induction and deduction. In creating my music, I started with a motif, followed by a few segments to succinctly present my musical ideas, and finally expanded them into full-length structure with the rigorousness and harmony characteristic of equation derivation. For me, musical creation and mathematic exploration are not contradictory, but are essentially the same—they are all about the underlying order, structure and beauty of the seemingly random phenomena.

I displayed recognizable talents in mathematics after I entered XX Middle School, where classes were conducted in a seminar-like environment, it was I who was always the first to solve the questions and to go to the blackboard to explain the steps whereby the solution was obtained. The classical joke of the class was that I, instead of Mr. XX our mathematics teacher, was the person who did the real teaching.

But the most defining experience occurred when I happened to read the formula for calculating the area under the parabolic curve. I was enamored by the formula and was eager to know how it was derived. Failing to deduce the formula by myself, I raised this issue to Mr. XX, who refused to give me any instruction, saying that it might distract my attention and energy. But my stubbornness prevailed. Without referring to any materials, I spent weeks deriving the formula and after repeated failures my efforts paid off. I derived the equation, which I was surprised to find during my undergraduate education essentially similar to the Euclidean approach in the ancient Greece.

The impact of this experience proved profound. I started to realize the importance of imagination to mathematics and recognize my talent in this aspect. Before I completed my senior middle school, I had read Polya’s How to Solve It and other classics of mathematics, which bred in me the determination to take up mathematics as my major when I was admitted into XX in 1999.

What is special about my undergraduate program is that, instead of the usual 4-year duration, the students of XX up to the Grade 99 spend 5 years on their program. As a result, I have attended many more courses, which are also more difficult, than students in the succeeding grades. I have taken and am going to take 11 courses specifically for graduates. Having completed more than 200 credits for the first four years, I have laid a more solid foundation in my area of specialization and been exposed to a much wider range of specialized knowledge. My overall GPA, which is well over 3.0, has shown sustained ascendancy as I gradually shifted my focus from extracurricular activities in the first two years to formal academic study ever since then. In terms of my major, my GPA was 3.68 and I achieved the highest scores in the entire class in such courses as General Topology, Advanced Number Theory and Linear Algebra II. I have been awarded second-class scholarship once and among 50 students in my class my ranking is top 10.

Looking back on my past academic pursuit in mathematics, I find myself well grounded not only in classical Mathematics but also in specific subjects of modern mathematics. Analytic Number Theory by Prof. XX allowed me to master the fundamentals of Number Theory and to understand the celebrated remarks with which Gauss emulated the Number Theory. Prof. XX’ s course Communicative Algebra not only exposed me to the ideology and methodology of Algebra but also ushered me to contemporary mathematics and gave me introductive background to Algebraic Number Theory and Algebraic Geometry. Algebraic Geometry delivered by Prof. XX, made me really perceive the power and beauty of modern approaches in uncovering the identical or similar characteristics behind the apparently diverse issues. I am quite familiar with classics of mathematics such as Fermat’s Last Theorem by Edwards, Basic Number Theory by Andre Weil, Commutative Algebra by Boulbaki, which I self-studied. Such a comprehensive curriculum and my self-education have enabled me to master fundamental knowledge and develop specialized mathematical thinking.

Not contented with grasping established conclusions and existing knowledge taught in class and books, I have the habit of speculating on the underlying implications of the known axioms and of testing the known principles through different mathematical approaches. I also like to apply the knowledge of one subject to the solution of problems in another subject, like what I did in using the techniques of Matrix theory to simplify and work out a problem in Algebraic Number Theory. In addition, while working on difficult problems, I made it a point not to consult any hints in order not to be confined by established conventions. In this way, I have repeatedly tasted the joy of exploring new territories and letting my imagination soar.

As an undergraduate, I am particularly proud of my two achievements. The first is the Undergraduate Research Program of XX titled “XX” in which a classmate and I came under the direction of Prof. XX. In this privileged three-person environment, we had in-depth discussions on several selected topics of Number Theory and had extensive exchanges of views and skills with Prof. XX. We offered totally new approaches to some problems in Algebraic Number Theory and my classmate and I published two papers in a Journal of Mathematics of our department. For this reason our group was awarded the honor Outstanding Student Research Program and I was awarded the Silver Medal for National Science Talents Base. In another development, Prof. XX, based on his intimate understanding of my knowledge in Algebraic Number Theory, invited me to give lectures for two weeks on the subject to graduate students whom he was teaching the course Analytical Number Theory. This was the first time in XX that an undergraduate gave lessons to graduates and naturally it created quite a sensation.

I first learned about the University of XX in I Want to Be Mathematician by P. XX, who talked about the academic atmosphere and the academic achievements of the faculty there. When I tried through a variety of channels to further know about your university, I came to learn your school motto XXX. I became deeply impressed by it represents the objective that I have always been pursuing. Your program has a very strong faculty in the field of XX, a fact which is acknowledged worldwide. I am particularly interested in XXXXX. Some of my alumni have undertaken graduate programs at your university and they have given unanimous and most enthusiastic praises of your program. D. Hilbert once claimed, “I despise the mathematician who studies a board with an auger in his hand and bores a hole in the thinnest part.” I like to face challenges and take on difficult undertakings by pursuing a Ph. D. program in pure mathematics. Ever since then I have regarded your University, with a high ranking in the field of mathematics among all the American universities, as my primary choice.

In my proposed program, I like to concentrate on Algebra, Algebraic Geometry and Algebraic Number Theory, three mainstream subjects of mathematics. Specifically, I am interested in Elliptic Curves, Cyclotomic Fields, and K-Theory. In choosing to study in XX, I wish to learn the latest developments in interdisciplinary studies in the fields that I am interested in. I can also keep informed of the major research findings in recent years. After completing your Ph. D. program, I plan to take up a teaching and research career in a major Chinese university, perhaps my Alma Mater. I will feel satisfied only when I have made fruitful achievements in my scholarly pursuit.