The Program

June 13 - 30, 2005
Monday - Thursday
8:30 AM - 4:00 PM

The program consists of four parts: (1) a three-week long class, "Explorations in Number Theory," (2) lunch, where participants get to know each other and the program staff, and where they have the opportunity to discuss mathematics in an informal setting, (3) afternoon workshops and problem sessions on a variety of topics, (4) a computer lab, scheduled to meet the needs of the morning and afternoon sessions. In the computer lab, students will explore number-theoretic questions using the flexible and powerful Python language (no background in Python needed).

The morning class is a rapid three-week introduction to Number Theory, one of the deepest and most exciting branches of modern mathematics. We start with properties of prime numbers and methods for finding integer solutions to equations, then quickly develop enough background to state and discuss unsolved problems and applications to modern technology. One of these applications is cryptography, the science of sending secret messages. Cryptography and the number theory it depends on is an active area of research which is also vital to our national security. Students will learn to encode and decode messages which they send to each other.

The afternoon workshops and talks cover topics such as knot theory, combinatorics and discrete probability, and discrete dynamical systems. They give students an idea of the great range of ideas, problems, and applications in mathematics.

Problem sessions are integrated into both the morning class and the afternoon workshops. Participants work both individually and in groups and are assisted by program staff, including faculty and graduate students. These sessions give all participants direct experience in problem solving and in communicating the results of their work.

The lunch break provides students with an opportunity to get to know each other and the program staff outside the classroom.

Theorem (Euclid): There are infinitely many primes.
Goldbach Conjecture:
Every even number greater than 2 can be written as the sum of two primes.

\[ 100 = 53 + 47 \]

The Summer Mathematics Program for High School Students at the University of Utah provides outstanding students an opportunity to develop their talents to the fullest. By presenting intriguing puzzles, challenging problems and powerful ideas, the program stimulates curiosity, develops the intellect, and lays a strong foundation for future work in mathematics, the sciences, or science related careers.

- Participants will receive three university credits in mathematics.
- We will arrange for students who live far from the University to stay with a host family.
- Prerequisites for the Summer Mathematics Program for High School Students are algebra, geometry, and trigonometry. Calculus is not required.
- Preference will be given to students between their junior and senior years.
- All program costs are paid by a National Science Foundation VIGRE grant and the U of U Department of Mathematics.

Find at least three positive integer solutions to the equation:

\[ x^2 - 103y^2 = 1 \]

Contact Information

For more information contact:

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Preference will be given to applications received by

April 1, 2005

Please send all application materials to "Summer Mathematics Program for High School Students" at the address above.

For information on other youth programs at the University of Utah visit
http://www.smartkids.utah.edu