   

Claremont McKenna College, Spring 2018
MATH 175: Number Theory

$$\zeta(x) = 1 + \frac{1}{2^x} + \frac{1}{3^x} + \frac{1}{4^x} + \cdots = \sum_{n=1}^{\infty} \frac{1}{n^x}$$

Instructor: Lenny Fukshansky, Adams Hall 218, (909) 607 - 0014, lenny@cmc.edu
Time: Mondays and Wednesdays, 2:45 – 4:00 pm

Prerequisite: MATH 60 or instructor's consent. I am happy to talk to anybody interested in this course, and in particular to discuss if their background is sufficient.

Text (required): "Number Theory" by George E. Andrews, Dover Publications, 1994. Additional notes and materials may be provided as needed.

Course Description: Number Theory is a beautiful subject with ancient history, which was one of the very original areas of mathematics in existence and has always played a central role in it. Legendary mathematicians such as *Fermat*, *Euler*, *Gauss*, *Riemann*, *Dirichlet*, and many others have actively worked in Number Theory and greatly contributed to its development. It has been especially in the spotlight in the recent years in connection with the proofs of *Fermat's Last Theorem* and *Kepler's Conjecture*, work on the *Riemann Hypothesis* and distribution of prime numbers, and many other important advances. In 2000, the influential Clay Mathematical Institute compiled a list of seven "*Millenium Problems*", which are arguably the most important open problems in all of mathematical sciences; two of these remarkable problems, worth a million dollars each, are in Number Theory. One striking feature that distinguishes Number Theory from some of the other areas of mathematics is that many of its most deep and fundamental problems are actually very easy to state, which allows appreciation of its beauty even with a limited mathematical background.

The goal of the present course is to give an introduction to the subject and some of its methods. The topics covered will include the fundamental theorem of arithmetic, Euclid's algorithm, congruences, Diophantine problems, quadratic reciprocity, arithmetic functions, and distribution of primes. If time allows, we may also discuss some geometric methods, coming from lattice point counting, such as Gauss's circle problem and Dirichlet divisor problem, as well as some connections of number theory to coding theory, cryptography, and computational complexity theory.

Grading: Based on regular homework assignments, a midterm, and a final.

Registration is open to students from all of the Claremont Colleges, and I will be happy to talk to anyone interested in this course!