

THE UNIVERSITY



OF HONG KONG

Department of Mathematics

Y.C. Wong Lectures

Treasures in Mathematics: Wondrous Proofs

數學瑰寶：奇異的證明

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Abstract

The single most important trademark of the subject of mathematics is perhaps its emphasis on proofs. In the lifetime of a mathematician, he or she would have seen hundreds (or even thousands) of proofs. Not all proofs are equally memorable, but occasionally, we would come across some proofs which were so unique, so original, or so ingeniously conceived that we were left completely in awe. These wondrous proofs are the true treasures of mathematics.

In these lectures, we pay tribute to the theme of “wondrous proofs” by actually presenting some of them. To make the lectures accessible to both graduate and undergraduate students, I've chosen topics that involve only relatively elementary concepts and techniques. Yet, each of the chosen topics represents the beginning of something important in some parts of mathematics; namely, algebra, number theory, and combinatorics.

Lecture Plan (for Five Lectures)

- (1) The beginnings of Fermat's Last Theorem: Fermat's method of infinite descent illustrated by the equation $x^4 + y^4 = z^4$, and Sophie Germain's theorem on the "first case" of FLT.
- (2) The beginnings of the theory of division rings: Wedderburn's theorem on finite division rings.
- (3) (Two lectures) The beginnings of finite geometry and block designs: Latin squares, Euler's Conjecture, and the Bruck-Ryser theorem.
- (4) The beginnings of Matching Theory: Philip Hall's theorem for SDR (systems of distinct representatives).

Lecture 1	April 16, 2008 (Wednesday)	3:00 – 4:00pm
Lecture 2	April 18, 2008 (Friday)	3:00 – 4:00pm
Lecture 3	April 21, 2008 (Monday)	3:00 – 4:00pm
Lecture 4	April 25, 2008 (Friday)	3:00 – 4:00pm
Lecture 5	April 30, 2008 (Wednesday)	3:00 – 4:00pm

All lectures will be held in Room 517, Meng Wah Complex, HKU

Light refreshments will be available after each lecture

All are welcome