Hungarian mathematics
Influental Hungarian mathematicians
(a brief overwiev)

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Dharma Gate Buddhist College (TKBF)
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1. About the authors (1/1)

Antal Dobosy (1941-)

- applied mathematician (development of an efficient software system for operational research, in teamwork);
- one of the founders of the Buddhist Mission and Church, and TKBF;
- teacher at TKBF and author of several books on Zen buddhism;
- mathematical course in former years: „Mathematics and Zen”;
- leader (abbot) of the Dharma Gate Zen Community.

István Gábor Fekete (1951-)

- associate professor at Eötvös Loránd University (ELTE);
- lectures on algorithms and data structures, logic and set theory;
- philosophical interest in mathematics (last years);
- follower of József Kaczvinszky’s Raja Yoga teaching.

Our joint intention

- restart the mathematical course in September 2018 (see pages 14-15).

2. Farkas and János Bolyai (1/3)

Farkas Bolyai (1775-1856)

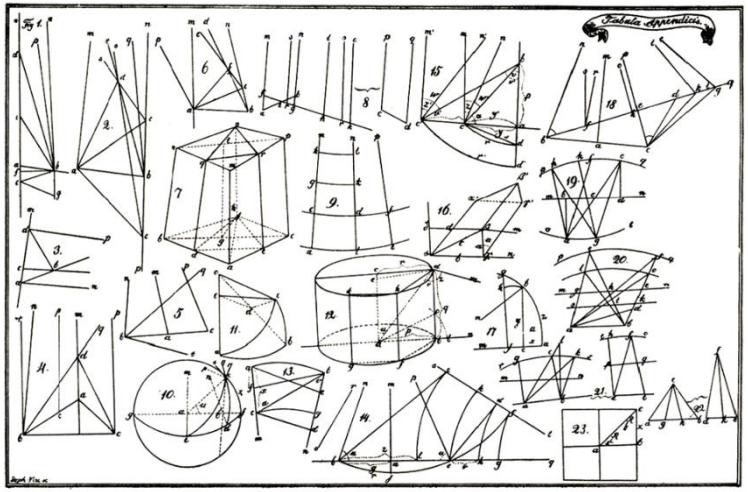
- The extremely talented student as a young man began to study mathematics systematically at German universities first in Jena and later in Göttingen. In these times Bolyai became a close friend of Carl Friedrich Gauss.
- Thereafter he accepted a teaching position for mathematics and sciences at the Calvinist College in Marosvásárhely.

- Bolyai's main interests were the foundations of geometry and the parallel axiom. His main work, the Tentamen, was an attempt at a rigorous and systematic foundation of geometry, arithmetic, algebra and analysis.
- His son, the similarily (or more) talented János, was born in 1802. The father first foreworned his son from the study of non-Euclidean geometry, but by 1830 he became enthusiastic enough to encourage his son to publish his path-breaking thoughts.

2. Farkas and János Bolyai (2/3)

János Bolyai (1802-1860)

- By the age of 13, he had mastered calculus and other forms of analytical mechanics, receiving instruction from his father.
- His most important contribution to mathematics is the development of non-Euclidian geometry („Appendix”) which finally solved the long-standing problem concerning the independence of Euclid's parallel postulate.



- Gauss („The Prince of Mathematics”) on reading the Appendix, wrote to a friend saying „I regard this young geometer Bolyai as a genius of the first order.”

2. Farkas and János Bolyai (3/3)

- In 1823, János Bolyai wrote to his father: „*I have discovered such wonderful things that I was amazed. Out of nothing I have created a strange new universe.*”
- In addition to his work in geometry, Bolyai developed a rigorous geometric concept of complex numbers as ordered pairs of real numbers.

Although he never published more than the 24 pages of the Appendix, he left more than 20,000 pages of mathematical manuscripts when he died. The very strong legacy of the „two Bolyai-s” is a great cultural value in Hungary.

3. G. and D. König, F. Riesz, L. Fejér (1/1)

The Hungarian mathematics becomes worldwide well known.

Gyula König (1849-1913)
After studies in Berlin and Heidelberg: prof. at 24 at the Bp. Univ. of Techn. Results in algebra, set theory, math. logic.

Frigyes Riesz (1880-1956)
He is the founder of functional analysis (with Banach). Outstanding results in function spaces, linear operators, topological spaces.

Dénes König (1884-1944)
After Göttingen prof. at the Bp. Univ. of Techn. Research in topology and graph theory (a book on graphs firstly in Hung.).

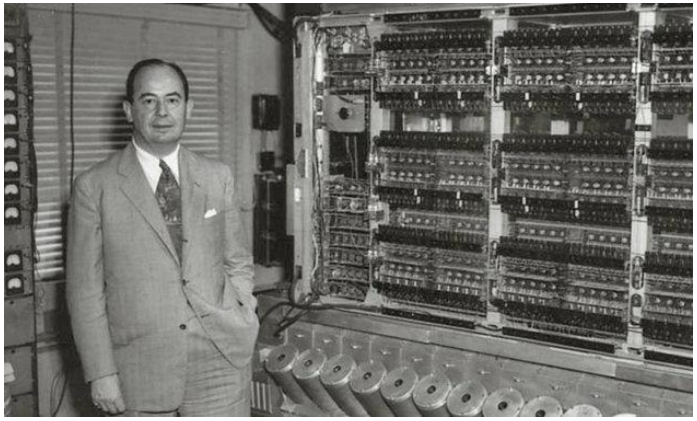
Lipót Fejér (1880-1959)
After studies in Berlin prof. at ELTE. Fejér's research concentrated on harmonic analysis and, in particular, Fourier series. Von Neumann's advisor.

5. *János (John von) Neumann* (1/2)

János (John von) Neumann (1903-1957)

- Neumann was generally regarded as the foremost mathematician of his time.
- He had a very fast-working brain and photographic memory. "Keeping up with him was ... impossible. The feeling was you were on a tricycle chasing a racing car."
- He made major contributions to a number of fields, including mathematics (foundations of mathematics, functional analysis, operator algebras, geometry, topology, and numerical analysis, physics (quantum mechanics, hydrodynamics, and quantum statistical mechanics), economics (game theory), computing (von Neumann architecture, linear programming, self-replicating machines), and statistics.
- Subjective emphasis: in his PhD dissertation Neumann completely worked out G. Cantor's idea about the structure of different types of infinity (ordinal numbers of sets which are sets themselves; a master piece of ontology).

5. János (John von) Neumann (2/2)



- During World War II, Neumann worked on the Manhattan Project; he developed the mathematical models related explosions.
- After the war, he served on the General Advisory Committee of the United States Atomic Energy Commission, and many other institution.
- Neumann, theoretical physicist Edward Teller, mathematician Stanislaw Ulam and others worked out key steps in the nuclear physics involved in thermo-nuclear reactions and the hydrogen bomb.
- Neumann was a founding figure in computing. After EDVAS and the famous ENIAC, the 3rd computer that von Neumann designed was the IAS machine (Institute for Advanced Study in Princeton, New Jersey). Its faster version, named by IBM 701, formed the basis for the commercially successful IBM 704.

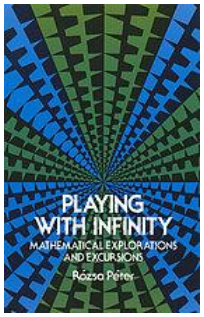
6. György Pólya, Rózsa Péter (1/1)

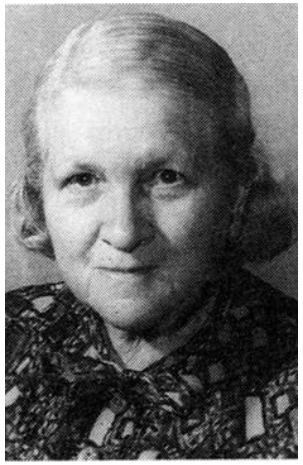
György Pólya (1887–1985)

- Contributions to combinatorics, analysis, probability theory.
- Prof. at ETH Zürich (1914-40) and at Stanford Univ. (1940-53).
- Influental work in heuristics and mathematics education.
- Books: (1) How to solve it; (2-3) Mathematics and Plausible Reasoning I-II. (4) Mathematical Discovery; (5) Mathematical Methods in Science

Rózsa Péter (1905-1977)

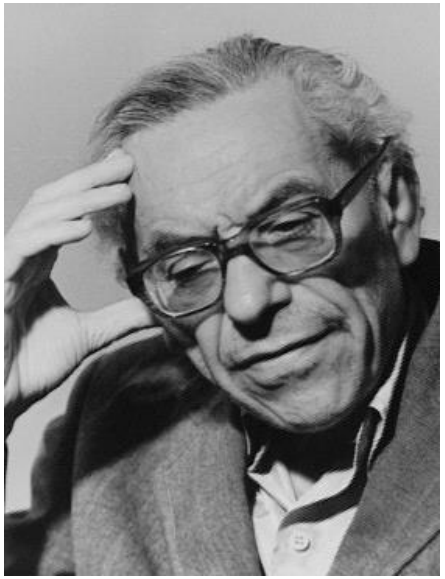
- Best known as the „founding mother of recursion theory”.
- She wrote a wonderful book „*Playing with Infinity: Mathematical Explorations and Excursions*”.
- Popular prof., known as "Aunt Rózsa" to her students.
- The first woman at Hungarian Academy of Sciences.
- She has the best translation of poem *Rainer Maria Rilke's Herbsttag* (among 26 translations).





7. Pál (Paul) Erdős (1/2)

Pál (Paul) Erdős (1913-1996)

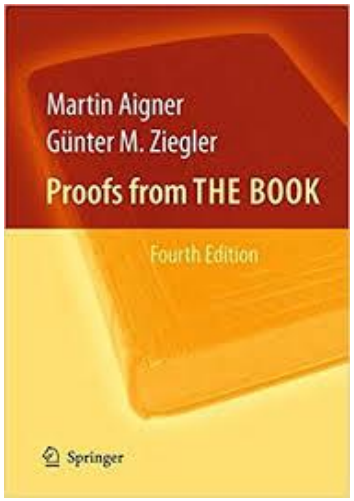


- Erdős was working in many fields of math., in particular combinatorics, graph theory and number theory.
- He published around 1500 papers throughout his career, more than any other mathematician in history, working directly with as many as 511 collaborators (Erdős no. 1).
- Outstanding results in analytic number theory, in development of Ramsey theory, the application of the probabilistic method and in extremal combinatorics.
- His friends created the Erdős number as a tribute. An Erdős number describes a person's distance from Erdős, based on their collaboration with him, or with another having their Erdős number. Approx. 10.500 mathematicians have 2.
- Erdős offered payments for solutions to unsolved problems from $25 to several thousand dollars.

7. Pál (Paul) Erdős (2/2)

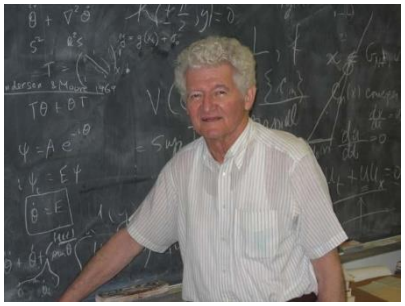
- Erdős practically had no private movables. His personal things fitted in a suitcase. His every day role (money, clothes, meal, tickets) was managed by friends.
- He always travelled with his mother as long as she lived.

Erdős and Terence Tao (1975-) in 1985.



- Erdős declared himself as a hard atheist. However, he often referred to "The Book" in which God keeps the most elegant proof of each mathematical theorem.
- „Proofs from THE BOOK" is a book of mathematical proofs by Martin Aigner and Günter M. Ziegler. The book is dedicated to Erdős. During a lecture in 1985, Erdős said, "You don't have to believe in God, but you should believe in The Book."

8. Péter Lax, Endre Szemerédi, László Lovász (1/1)



Péter D. Lax (1926-) Groundbreaking contributions differential equations, and integrable systems, fluid dynamics and shock waves, solitonic physics, hyperbolic conservation laws. Wolf Prize (1987), Norbert Wiener Prize (1975), Abel Prize (2005).

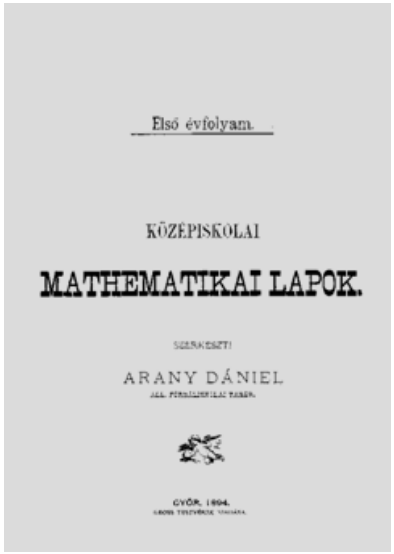
Endre Szemerédi (1940-)

Over 200 articles in the fields of discrete math., theor. computer science, combinatorics and discrete geometry. His best known result is the Szemerédi regularity lemma, being used for instance in property testing for graphs in the theory of graph limits. Abel Prize (2012), George Pólya Prize (1975).

László Lovász (1948-)

For his work in combinatorics he was awarded the Wolf Prize and the Knuth Prize (1999), and the Kyoto Prize (2010).
President of the International Mathematical Union (2007-2010).
Prof. at ELTE; President of the Hungarian Academy of Sciences.

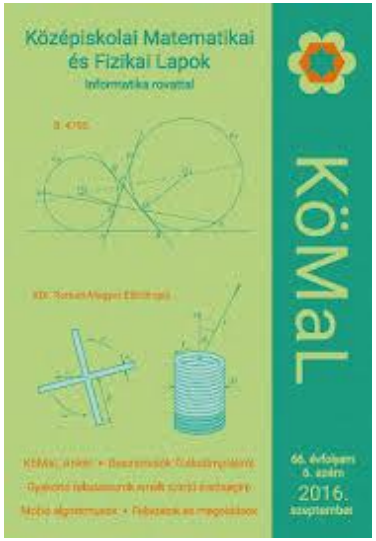
9. High School Journal for Mathematics and Physics – „KöMal” (1/1)



The 1st volume (1894)

KöMaL — the name is the Hungarian abbreviation for High School Journal for Mathematics and Physics — is a monthly periodical for high school students. It was created in 1894, by Dániel Arany.

The current issue (April 2018)



For generations there is a big challenge that students have their first mathematical experience by solving the problems posed every month in the journal.

10. Mathematics at TKBF (1/2)

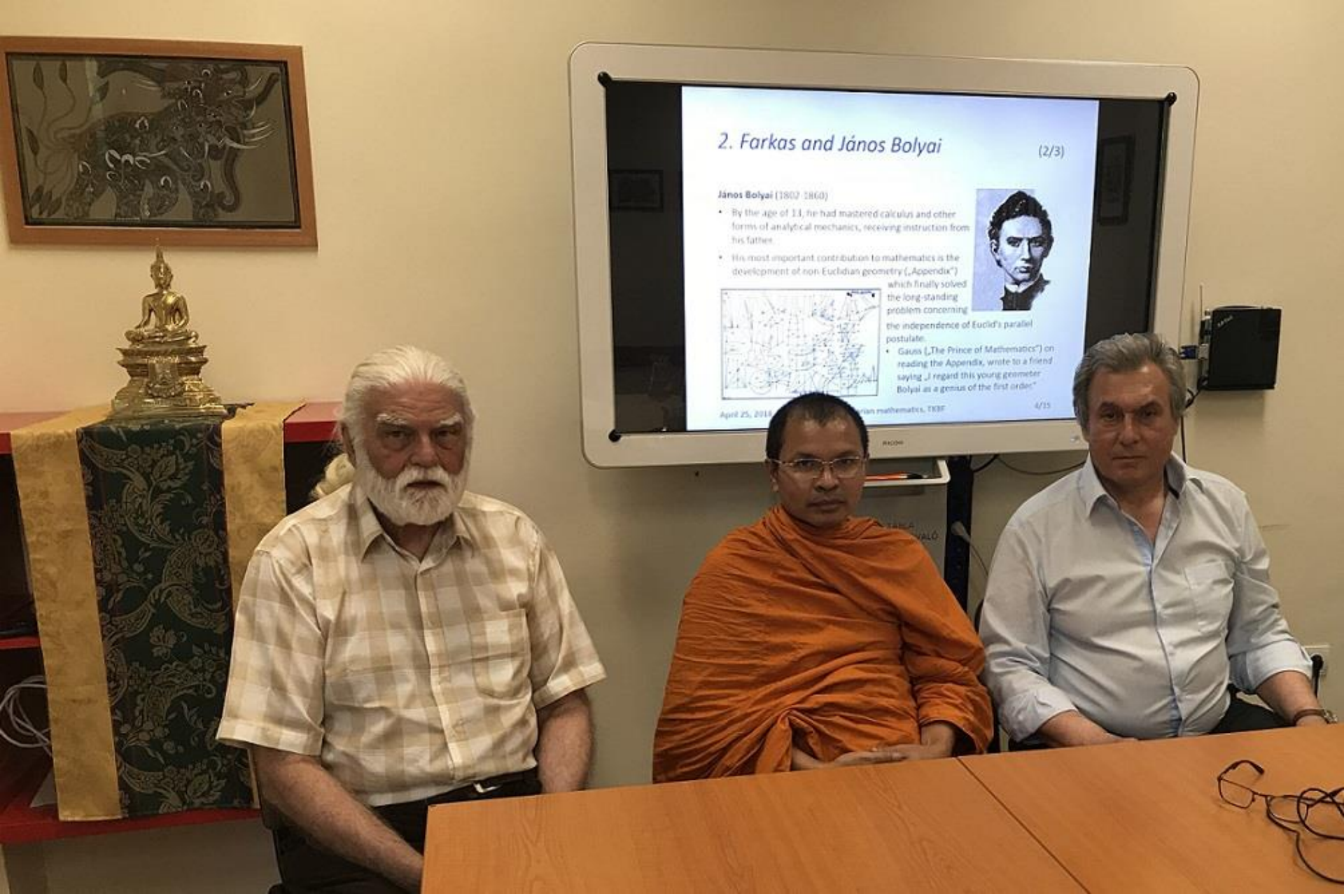
- An „old new" mathematical course will be started in Sept. 2018 at TKBF.
- It is the successor of „*Mathematics and Zen*" held by A. Dobosy.
- The new title is: „*Mathematics – science, philosophy and art*"
- Approach: broad view of the main topics, without some details, but professionally correct presentation of the important features.
- The course will be optional for students. By choosing the course, a problem solving seminar can also be taken; it offers more competency.
- Some topics:

  - Types of numbers (natural, integer, rational, real and complex numbers); - Geometry and the imagination; - Series, Fibonacci numbers, the golden ratio (in nature and art); - The different sizes of infinity; - Randomness and probability; - Cognitive psychology: the number of cognitive schemas by an expert; - Gödel's incompleteness theorems; - Fractals and their dimensions; - Bolyai's non-Euclidean geometry.

10. Mathematics at TKBF (2/2)

Some philosophical issues:

- Natural numbers {1, 2, 3, …}, the transcendental point of math.: „The natural numbers were given by God, all the rest can be the work of human.” (L. Kronecker)
- Math. can be built up using just sets, but the notion of „set” cannot be defined. The footing is out of mathematics.
- Every math. theory has „theorems” that can be neither proved, nor refuted. (Gödel)
- Math. is very cooperative but always remains fully intact: never tries to explain the e.g. randomness or the force of gravitation etc.
- Beside the „univers” and the „human being” math. is the only entity which earns the question about its origin. The thinking human gives a dual answer again: „it was created by God” vs. „evolutionary result of human brain”. And this never leads to any debate. ☺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