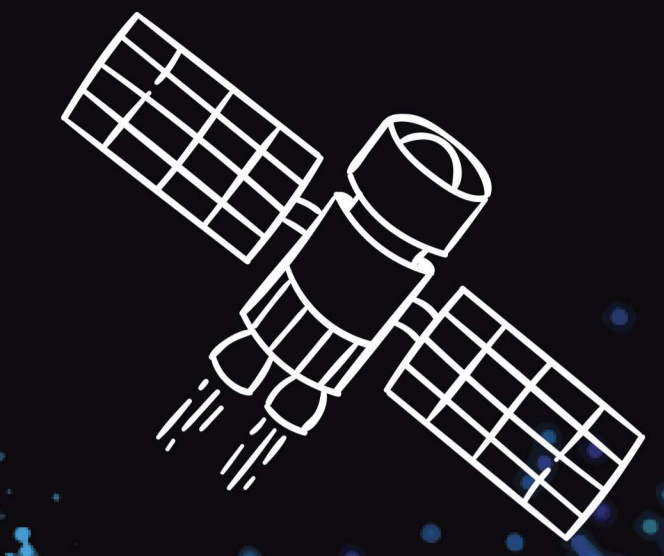




THE UNIVERSE OF MATHEMATICS

and some questions they help answer!



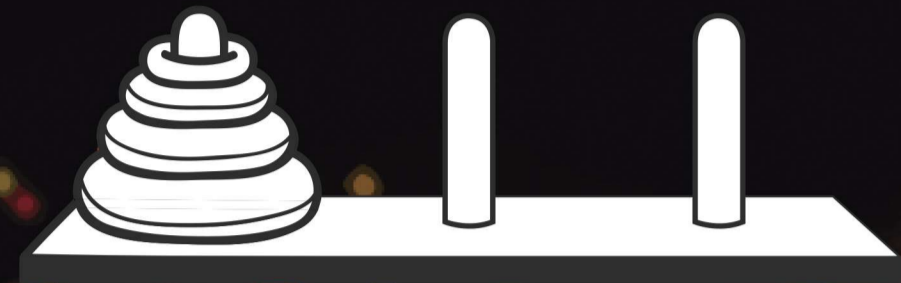
TOPOLOGY AND LOGIC

APPLICATIONS: THEORETICAL COMPUTER SCIENCE, BIOLOGY, PHYSICS, ROBOTICS

Computability

Logic

Does the barber of Seville shave himself?



Transcendence



Number theory

How to encrypt and decrypt a coded message?

ARITHMETIC

APPLICATIONS: CRYPTOGRAPHY, TELECOMMUNICATIONS

$$x^n + y^n = z^n$$

Diophantine geometry

How to measure the complexity of a number?

Langlands program

ALGEBRA AND GEOMETRY

APPLICATIONS: ART, ASTRONOMY, ARCHITECTURE

Algebraic geometry

Algebra

Is $A \times B$ always equal to $B \times A$?

Harmonic analysis



Dynamical systems

How does an ecosystem evolve over time?

Noncommutative geometry

How to do geometry in infinite dimensions?

Differential geometry



Partial differential equations

Optimization
Control theory

Numerical analysis and Scientific computing

What happens during a collision between two vehicles?



STATISTICS

How do you count protesters?

Multivariate analysis

Decision theory

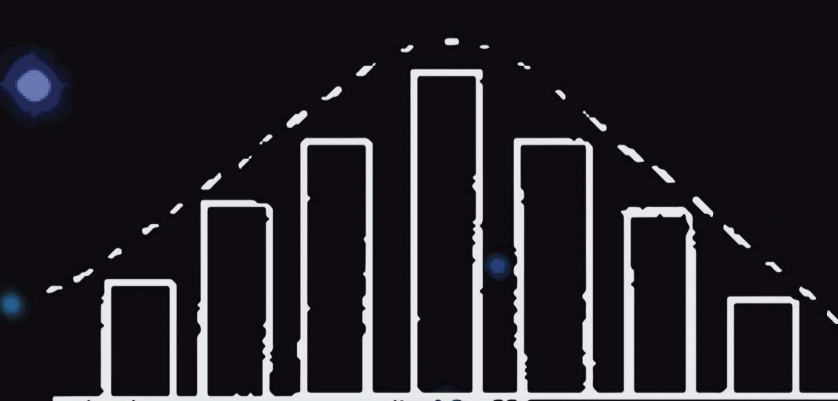


Artificial intelligence

PROBABILITY

What is the probability that two ministers have the same birthday?

Numerical probability



PROBABILITY AND STATISTICS

APPLICATIONS: BIOLOGY, ECONOMICS, FINANCE, RISK MANAGEMENT



Topology

Can you make a sphere with a piece of paper?

Algebraic topology

Homology

Knot theory



Combinatorics

Are there more ways to shuffle a deck of 52 cards or atoms on Earth?



Stochastic analysis

Markov processes

Discrete probability

ANALYSIS
APPLICATIONS: PHYSICS, ECOLOGY, ENGINEERING, BIOLOGY, RISK MANAGEMENT