

## Fuzzy Logic's Genesis: Tracing the Roots of Fuzzy Set Theory

The concept of fuzzy sets was introduced by Lotfi A. Zadeh in 1965 as an extension of classical set theory. Zadeh, a professor at the University of California, Berkeley, proposed fuzzy sets as a way to deal with uncertainty and vagueness in data and information.

### Inside The Issues

- National conference on Mathematical and Computational Science (NCMCS-2018)
- Field Medal Winners - 2018
- Women of Mathematics
- Unraveling the Mathematical Wonders of the Sydney Opera House

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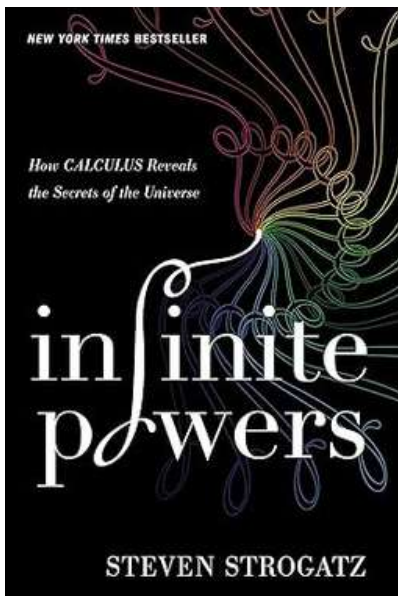
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# UNLOCKING KNOWLEDGE: EXPLORE, ENGAGE, AND ENLIGHTEN WITH OUR TEXTBOOK REVIEWS

## "Infinite Powers: How Calculus Reveals the Secrets of the Universe"



**Steven Strogatz**

"Infinite Powers: How Calculus Reveals the Secrets of the Universe" by Steven Strogatz is a captivating exploration of the profound impact of calculus on our understanding of the world. Strogatz, a distinguished mathematician and renowned educator, takes readers on an illuminating journey through the history, concepts, and applications of calculus, presenting complex mathematical ideas with clarity and elegance. Through engaging narratives, insightful anecdotes, and relatable examples, Strogatz reveals how calculus serves as the language of change and motion, enabling us to comprehend the dynamics of the universe at both the macroscopic and microscopic levels.

From the laws of motion formulated by Isaac Newton to the groundbreaking discoveries of Albert Einstein and beyond, Strogatz demonstrates how calculus has revolutionized fields such as physics, engineering, biology, economics, and even art. With a keen emphasis on intuition and visualization, "Infinite Powers" demystifies calculus, making it accessible and relevant to readers of all backgrounds. Whether discussing the calculus of variations, differential equations, or the fundamental theorem of calculus, Strogatz seamlessly weaves together historical context, mathematical theory, and real-world applications to provide a comprehensive and enlightening overview of this foundational branch of mathematics. Through Strogatz's masterful storytelling and infectious enthusiasm for the subject, "Infinite Powers" inspires readers to appreciate the beauty and utility of calculus while gaining a deeper understanding of the secrets that govern our universe. With its blend of intellectual rigor, accessibility, and sheer fascination, "Infinite Powers" is a must-read for anyone curious about the profound role of calculus in shaping our understanding of the natural world.

# INSIGHTS INTO THE 2018 FIELDS MEDAL LAUREATES

The Fields Medal has for a long time been regarded as the most prestigious award in the field of mathematics and is often described as the Nobel Prize of Mathematics. The official title for this prize is the International Medal for Outstanding Discoveries in Mathematics and it is given out once every four years to up to four mathematicians under the age of 40. The prize is given at the International Congress of the International Mathematical Union which is only held every four years and it is the most prestigious medal in the field of mathematics.



## WINNERS OF 2018



### ***Caucher Birkar***

For the proof of the boundedness of Fano varieties and for contributions to the minimal model program.



### ***Alessio Figalli***

For contributions to the theory of optimal transport and its applications in partial differential equations, metric geometry and probability.



### ***Peter Scholze***

For transforming arithmetic algebraic geometry over  $p$ -adic fields through his introduction of perfectoid spaces, with application to Galois representations, and for the development of new cohomology theories.



### ***Akshay Venkatesh***

For his synthesis of analytic number theory, homogeneous dynamics, topology, and representation theory, which has resolved long-standing problems in areas such as the equidistribution of arithmetic objects.

# UNVEILING THE WORLD OF MATHEMATICS COMPETITIONS

# 1.

## INTERNATIONAL MATHEMATICAL OLYMPIAD

The International Mathematical Olympiad (IMO) is an esteemed annual mathematics competition catering to high school students worldwide, inaugurated in 1959 in Romania. Its mission is to cultivate mathematical proficiency among youth while fostering international cooperation and understanding through amicable rivalry. The IMO is orchestrated by the IMO Advisory Board, comprising representatives from participating countries who select and train teams of up to six students to compete. Over two days, contestants tackle three intricate mathematical problems spanning various fields like algebra, geometry, number theory, and combinatorics. Success necessitates not only profound mathematical understanding but also ingenuity and problem-solving prowess. Following the competition, papers are assessed by a panel of judges to determine individual and team rankings, with top performers receiving gold, silver, or bronze medals, along with special accolades for exceptional solutions. Revered as one of the foremost mathematics competitions globally, the IMO serves as a springboard for many mathematicians and scientists, offering a platform for talented students to exhibit their skills on an international scale and forge connections with peers from diverse backgrounds.

## NATIONAL MATHEMATICS TALENT CONTEST

# 2.

The National Mathematics Talent Contest (NMTTC) is an annual competition held across countries such as India and Bangladesh, with the primary goal of nurturing and fostering interest in mathematics among young students. Although the specifics may vary by country, the NMTTC generally encompasses multiple stages: starting at the school level, where students tackle written tests or assignments; progressing to the regional level for top performers, where contests are held in various cities or districts; and culminating in the national level, featuring more challenging problems and heightened competition. Organized by mathematical societies, educational institutions, or government bodies, the NMTTC offers prizes like certificates, medals, and trophies to recognize outstanding achievements, alongside intangible benefits such as networking and personal growth in mathematics.

# UNVEILING THE WORLD OF MATHEMATICS COMPETITIONS

## 3.

### THE BHASKARACHARYA MATHEMATICS TALENT SEARCH COMPETITION

The Bhaskaracharya Mathematics Talent Search Competition (BMTSC) is an esteemed annual event in India, designed to uncover and nurture budding mathematical talent, paying homage to the renowned mathematician Bhaskaracharya. The competition unfolds across various tiers, starting at the school level, where students tackle written tests or assignments, progressing to district and state levels, and in some cases, culminating in a national-level showdown. Organized by educational institutions, mathematical societies, or governmental bodies, the BMTSC offers a platform for students to showcase their skills, with prizes ranging from certificates to scholarships. Beyond tangible rewards, participation in the BMTSC offers avenues for recognition, skill enhancement, and exposure to advanced mathematical concepts, contributing to the promotion of mathematics education across the nation.

### THE RAMANUJAN COLLEGE MATHEMATICAL SOCIETY NATIONAL MATHEMATICS COMPETITION

## 4.

The Ramanujan College Mathematical Society (RCMS) National Mathematics Competition is an annual event organized by Ramanujan College Mathematical Society, usually held at Ramanujan College, University of Delhi, India. The competition aims to promote interest and excellence in mathematics among students across the nation. It typically includes various rounds such as written tests, problem-solving sessions, and presentations, covering a wide range of mathematical topics. Participants often include undergraduate and postgraduate students from universities and colleges all over India. The competition provides a platform for students to showcase their mathematical skills, creativity, and problem-solving abilities, fostering a spirit of competition and collaboration in the mathematical community.

# CELEBRATING EXCELLENCE IN MATHEMATICAL ACHIEVEMENT

## WOLF PRIZE IN MATHEMATICS

The Wolf Foundation of Israel awards six different prizes each year and one of them is the Wolf Prize in Mathematics. This prize has been awarded since 1978 and it is also a very prestigious honor to receive one in the fields in which they are given.



## CHERN MEDAL

One of the newer prizes in mathematics is the Chern Medal, which began recognizing lifetime achievements for mathematicians in 2010, is awarded every four years. It is given out at the international congress of mathematicians and it includes a prize of \$250,000.

## CLAY MILLENNIUM PRIZES

The Clay Institute of Mathematics offers seven Millennium Prizes for solving seven of the most important unsolved problems in mathematics. One million dollars is awarded for the solution to each problem.



## CARL FRIEDRICH GAUSS PRIZE

The Gauss Prize is awarded every four years by the International Mathematical Union for outstanding mathematical contributions with significant impact outside of mathematics.



# WOMEN OF MATHEMATICS

Women of Mathematics Until very recently society dictated that it wasn't very respectable for women to be Mathematicians. In a patriarchal society where the world was dictated by the likes of men, women were oppressed if they had an opinion. Obviously, a woman establishing a theorem was unheard of. However, there were a few women who dared to go against the flow and their achievements demonstrate that women have as much to contribute to Mathematics as any of their male counterparts.



## »»» HYPATIA

Hypatia was certainly one of the earliest. She was born in 370 AD. She was the daughter of Theon, the last known member of the famed library of Alexandria. She followed his footsteps in the study of Mathematics and Astronomy. She collaborated with her father on commentaries of classical Mathematical works, translating them and incorporating explanatory notes, as well as creating commentaries of her own and teaching a succession of students from her home. A philosopher, a follower of Neoplatonism, a belief system in which everything emanates from the One, Hypatia was highly popular among crowds who listened to her public lectures about Plato and Aristotle

## SOPHIE GERMAIN <<<

Born in an Era of revolt and revolution, Sophie Germain was born in the year 1776. Paris was exploding with the revolution when young Sophie retreated to her father's study and began reading. After learning about Archimedes' death, she began a lifelong study of Mathematics and Geometry, even teaching herself Latin and Greek so that she could read classic works. Unable to study at the École Polytechnique because she was female, Germain obtained lecture notes and submitted papers to Joseph Lagrange, a faculty member, under a false name. When he learned she was a woman, he became a mentor and Germain soon began corresponding with other prominent Mathematicians at the time. She became the first woman to win a prize from the French Academy of Sciences, for work on a theory of elasticity despite not having formal training and access to resources that male Mathematicians had at that time. Her proof of Fermat's Last Theorem, though unsuccessful, was used as a foundation for work on the subject well into the twentieth century.



## »»» AUGUSTA ADA BYRON

Augusta Ada Byron, born on December 10, 1815, (later Countess of Lovelace) was brought up single-handedly by her mother after her father, poet Lord Byron was forced to leave England due to a scandal shortly after her birth. Her overprotective mother, who wanted her to grow up to be unemotional and unlike her father, encouraged her study of Science and Mathematics. As an adult, Lovelace began to correspond with the inventor and Mathematician Charles Babbage, who asked her to translate an Italian Mathematician's memoir analyzing his Analytical Engine (a machine that would perform simple Mathematical calculations and be programmed with punchcards and is considered one of the first computers). Lovelace went beyond completing a simple translation, however, and wrote her own set of notes about the machine and even included a method for calculating a sequence of Bernoulli numbers; this is now acknowledged as the world's first computer program.





## >>> **SOFIA VASILYEVNA**

Because Russian women could not attend university, Sofia Vasilyevna (1850-1891) contracted a marriage with a young paleontologist, Vladimir Kovalevsky, and they moved to Germany. There she could not attend university lectures due to societal norms, but she was tutored privately and eventually received a doctorate after writing treatises on partial differential equations, Abelian integrals, and Saturn's rings. Following her husband's demise, Kovalevskaya served as a lecturer in Mathematics at the University of Stockholm and later became the first woman in that region of Europe to receive a full professorship. 'She continued to make great strides in Mathematics, winning the Prix Bordin from the French Academy of Sciences in 1888 for an essay on the rotation of a solid body as well as a prize from the Swedish Academy of Sciences the next year'.

## **EMMY NOETHER** <<<

In 1935, Albert Einstein wrote a letter to the New York Times, praising profusely the recently deceased Emmy Noether as "the most significant creative Mathematical genius thus far produced since the higher education of women began." Noether had overcome many hurdles before she could collaborate with the famed physicist. She was brought up in Germany and her Mathematics education suffered a great deal because of rules against women matriculating at universities. 'After she finally received her Ph.D., for a dissertation on a branch of abstract algebra, she was unable to obtain a university position for many years, eventually receiving the title of "unofficial associate professor" at the University of Göttingen, only to lose that in 1933 because she was Jewish.' And so she moved to America and became a lecturer and researcher at Bryn Mawr College and the Institute for Advanced Study in Princeton, New Jersey. There she developed many of the Mathematical foundations for Einstein's general theory of relativity and made significant advances in the field of algebra.



**DESPITE BEING BOUND BY THE BACKWARD, ORTHODOX SOCIETAL NORMS, THESE WOMEN SHOWED REMARKABLE PROGRESS IN THE FIELD OF MATHEMATICS AND SCIENCE. IT IS NOTEWORTHY HOW THEY ACHIEVED EXCELLENCE IN THEIR RESPECTIVE FIELDS DESPITE LACK OF RESOURCES AND A PREVALENT CHAUVINISTIC SOCIETY. IT IS UNDOUBTEDLY TRUE THAT WE WOULD HAVE NEVER ACHIEVED THE MILESTONES OF SUCCESS IN THE FIELD OF MATHEMATICAL SCIENCE IF IT HADN'T BEEN FOR THESE AND HUNDREDS OF OTHER STRONG-HEADED WOMEN WHO DECIDED TO DEFY THE SOCIETY FOR GOOD AND PUSH THE WORLD OF SCIENCE INTO A MORE PROGRESSIVE STAGE.**





Architectural Marvel:

# UNRAVELING THE MATHEMATICAL WONDERS OF THE SYDNEY OPERA HOUSE

The Sydney Opera House is a multi-venue center in Sydney, New South Wales, Australia. Located on the foreshore of Sydney Harbour, it is widely regarded as one of the world's most famous and distinctive buildings and a masterpiece of 20th-century architecture. Designed by Danish architect Jørn Utzon, but completed by an Australian architectural team headed by Peter Hall, the building was formally opened by Queen Elizabeth II on 20 October 1973.

The Sydney Opera House is a testament to the intricate interplay between mathematics, architecture, and engineering. Through the application of geometric principles, calculus techniques, trigonometric calculations, structural analysis, and optimization algorithms, architects and engineers were able to realize one of the most iconic and visually stunning architectural landmarks in the world.

## Recognitions and Accolades:

- Australian Institute of Architects Gold Medal (1966)
- Pritzker Architecture Prize (2003)
- AIA 25 Year Award (2003)
- National Trust of Australia Heritage Award (2006)
- UNESCO World Heritage Site (2007)



# THE MATHEMATICAL CONCEPTS BEHIND THE SYDNEY OPERA HOUSE

## Geometry

The Sydney Opera House's iconic design is characterized by its distinctive shell-like structure, which consists of a series of curved surfaces resembling billowing sails. These shells are geometrically complex and are not simple geometric shapes like cubes or cylinders.

- **Spherical Sections:** The shells of the Opera House are composed of intersecting spherical sections, which create a visually stunning and dynamic appearance. Calculating the precise dimensions, angles, and intersections of these spherical sections required advanced geometric calculations.
- **Curves and Surfaces:** The shells feature smooth, flowing curves that transition seamlessly from one section to another. Analyzing and modeling these curves using geometric principles allowed architects and engineers to create aesthetically pleasing and structurally sound designs.

## Structural Analysis

Structural analysis is the process of analyzing the behavior of a structure under various loads and conditions. Mathematical modeling techniques were employed to simulate the performance of the Sydney Opera House's shells.

- **Finite Element Analysis (FEA):** FEA is a mathematical method used to approximate solutions to complex structural problems. Engineers divided the Opera House's shells into smaller elements and analyzed their behavior under different loading scenarios using FEA software. This allowed them to identify potential weaknesses and optimize the design for strength and stability.
- **Load-Bearing Capacity:** By conducting structural analyses, engineers could determine the Opera House's load-bearing capacity and ensure that it met safety standards and regulatory requirements.

## Calculus

Calculus, a branch of mathematics concerned with rates of change and accumulation, played a crucial role in analyzing the curves and surfaces of the Sydney Opera House's shells.

- **Rate of Change:** Calculus was used to determine the rates of change in curvature along different sections of the shells. By calculating derivatives and gradients, engineers could understand how the shape of the shells evolved and adjust the design accordingly.

## Optimization Algorithms

Optimization algorithms were used to minimize material usage and construction costs while maximizing structural efficiency and performance.

- **Iterative Process:** Optimization is often an iterative process, requiring engineers to refine and adjust the design based on mathematical analyses and simulations. By iteratively optimizing the design, engineers were able to achieve a balance between form and function in the Sydney Opera House.

## Trigonometry

Trigonometry, the study of the relationships between angles and sides in triangles, was essential for calculating the lengths, angles, and distances of structural elements within the Sydney Opera House.

- **Angles and Distances:** Trigonometric functions, such as sine, cosine, and tangent, were used to calculate the angles and distances between different components of the Opera House's structure. These calculations helped ensure the precise alignment and positioning of structural elements.
- **Load Distribution:** Trigonometry was also used to analyze the distribution of loads, such as wind and gravity, on the Opera House's shells. Engineers studied the angles of incidence and deflection to design the structure to withstand external forces effectively.

# ABEL PRIZE

## CELEBRATING YVES MEYER - ABEL PRIZE LAUREATE 2017



### A Portrait of Genius: The Life and Journey of Yves Meyer

Yves Meyer was born on July 19, 1939, in Paris, France, into a family with a deep appreciation for academia and intellectual pursuits. From an early age, Meyer displayed an exceptional aptitude for mathematics, fueled by a relentless curiosity and an insatiable thirst for knowledge. After completing his undergraduate studies at the prestigious École Normale Supérieure, Meyer embarked on a journey of discovery that would shape the course of modern mathematics.

Throughout his illustrious career, Meyer held academic positions at renowned institutions such as the University of Paris-Sud, the École Polytechnique, and the Centre National de la Recherche Scientifique.

His pioneering work in harmonic analysis, wavelet theory, and signal processing earned him widespread recognition as one of the preeminent mathematicians of his generation.

### Unraveling the Mysteries of Wavelet Theory

At the heart of Yves Meyer's enduring legacy lies his groundbreaking contributions to wavelet theory—a revolutionary framework that has transformed the landscape of signal processing, data analysis, and mathematical research. Meyer's innovative approach to wavelet analysis provided researchers and practitioners with powerful

tools for decomposing signals into their constituent parts, enabling a deeper understanding of complex data sets and phenomena.

Central to Meyer's work is the concept of wavelets—mathematical functions that are used to analyze and manipulate signals at different scales and resolutions. By developing a rigorous mathematical framework for wavelet analysis, Meyer laid the foundation for a wide range of applications in fields such as image processing, medical imaging, and seismic analysis.

### Shaping the Future of Mathematics: The Enduring Influence of Yves Meyer

Yves Meyer's legacy extends beyond mathematics, inspiring generations to explore new frontiers and confront societal challenges. From pioneering image compression algorithms to applying wavelet analysis in diverse fields, Meyer's work demonstrates mathematics' capacity to transcend disciplines and address complex issues. As we commemorate his achievements, including the 2017 Abel Prize, we recognize his enduring commitment to truth and knowledge, leaving an indelible mark on mathematics and inspiring countless minds to pursue enlightenment and innovation.



# Decoding Fuzziness in Our Daily Lives

In the intricate tapestry of modern technology, an unsung hero is at work, making split-second decisions in devices we often take for granted. This silent force is none other than fuzzy logic, a mathematical concept that allows our everyday gadgets to navigate the uncertainties of the real world. Join us on a journey to uncover how fuzzy logic weaves its magic in our daily lives.

## The Fuzzy Revolution

Fuzzy logic, introduced by Lotfi Zadeh in the 1960s, was a groundbreaking departure from traditional binary logic. Unlike the crisp "yes" or "no" decisions of classical logic, fuzzy logic embraces shades of gray, introducing degrees of truth or membership. This nuance proves invaluable in handling imprecise data, making fuzzy logic a linchpin in many of our cherished devices.

## Washing Machines with a Gentle Touch

Imagine a washing machine that understands the delicacy of your fabrics. Fuzzy logic, employed in the control systems of modern washing machines, ensures a nuanced approach to cycles. Instead of rigidly adhering to set parameters, these devices adapt water levels, wash times, and spin speeds based on the load's characteristics, making them more efficient and gentle on your clothes.

## Climate Control, Thanks to Fuzzy Logic

Ever wondered how your air conditioner maintains the perfect temperature without constant adjustments? Fuzzy logic is the key. By considering factors like room temperature, humidity, and user preferences, air conditioners equipped with fuzzy logic create an environment that feels just right, even when the external conditions are unpredictable.

## Beyond Binary: Fuzzy Logic in Microwaves

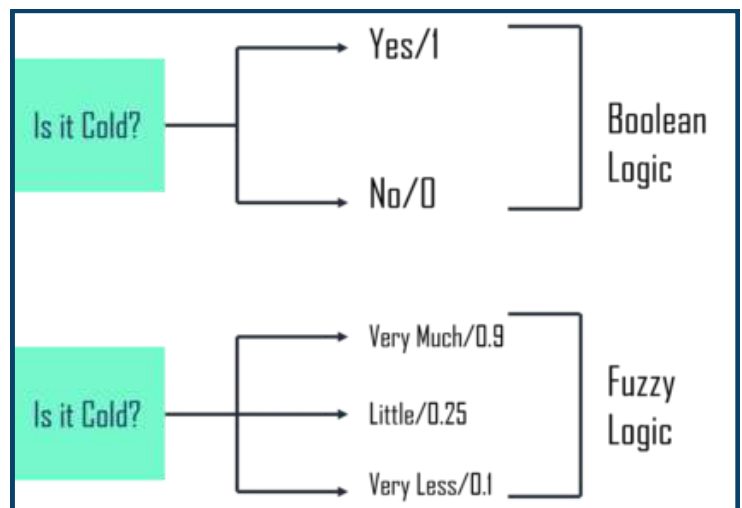
Microwaves with fuzzy logic don't just blindly follow cooking times; they adapt to the food's characteristics. Whether it's reheating leftovers or defrosting meat, these devices use fuzzy logic to adjust power levels and cooking times based on the item's size and initial temperature. The result? Perfectly cooked meals without the guesswork.

## Fuzzy Logic in Your Pocket: Smartphones and Battery Management

In the palm of your hand lies a device that seamlessly manages power consumption, thanks to fuzzy logic. Smartphones utilize this concept to optimize battery usage based on your usage patterns. Fuzzy algorithms learn when you're likely to use your phone most and adjust background processes accordingly, extending battery life without compromising performance.

## The Future of Fuzzy Logic

As we revel in the convenience afforded by fuzzy logic in our everyday devices, the journey is far from over. Researchers and engineers continue to explore new frontiers, envisioning a future where fuzzy logic plays an even more integral role in shaping intelligent, adaptable technologies. The fuzzy revolution is ongoing, promising a world where our devices not only understand us but also anticipate our needs with unprecedented precision.



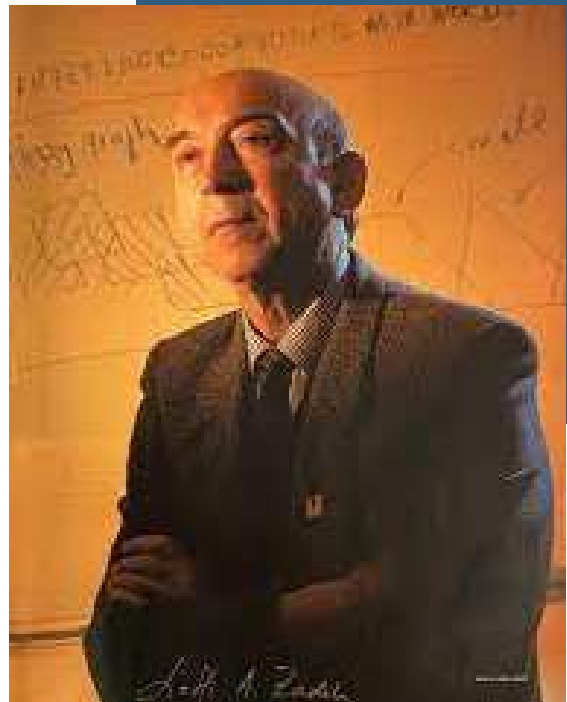
## Call to Action: Embrace the Fuzz

So, the next time you load your washing machine or adjust the thermostat, remember the unsung hero working behind the scenes – fuzzy logic. Embrace the fuzz, and marvel at the technological symphony that adds a touch of sophistication to our daily routines. Stay tuned for more insights into the fascinating world where mathematics meets the everyday.

In this special edition, we explore Lotfi A. Zadeh's legacy as the Father of Fuzzy Set Theory, unraveling the mysteries of fuzzy logic and celebrating his profound impact on mathematics and beyond. Join us as we delve into Zadeh's visionary work and its far-reaching implications.

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## ***Celebrating the Legacy of Lotfi A. Zadeh - Father of Fuzzy Set Theory***



### **A Portrait of Genius: The Life and Journey of Lotfi A. Zadeh**

Lotfi Aliasker Zadeh was born on February 4, 1921, in Baku, Azerbaijan, to an Azerbaijani father and an Iranian mother. Growing up in a multicultural environment, Zadeh developed a deep appreciation for diversity and a keen interest in exploring the complexities of the world around him. After completing his undergraduate studies at the University of Tehran, Zadeh pursued graduate studies at the Massachusetts Institute of Technology (MIT) and Columbia University, where he earned his doctoral degree in electrical engineering in 1949.

Throughout his illustrious career, Zadeh held academic positions at prestigious institutions such as Columbia University, the University of California, Berkeley, and Stanford University, where he made significant contributions to the fields of artificial intelligence, control theory, and fuzzy logic. His pioneering work in fuzzy set theory, in particular, revolutionized the way we think about uncertainty, imprecision, and decision-making in mathematical modeling and beyond.



# REVOLUTIONIZING MATHEMATICS: THE LEGACY OF FUZZY SET THEORY



## Shaping the Future of Mathematics: The Enduring Influence of Lotfi A. Zadeh

In the early 1960s, Lotfi A. Zadeh introduced the world to the concept of fuzzy set theory—a groundbreaking framework that challenged traditional notions of set membership and paved the way for a new era of mathematical modeling and reasoning. Unlike classical set theory, which relies on crisp, binary distinctions between elements, fuzzy set theory allows for the representation of partial membership, enabling a more flexible and nuanced approach to capturing uncertainty and ambiguity in complex systems.

At the heart of fuzzy set theory is the notion of "fuzziness," which captures the inherent imprecision and vagueness present in real-world phenomena. By introducing the concept of fuzzy sets, Zadeh provided mathematicians, engineers, and scientists with a powerful tool for modeling and analyzing complex systems, ranging from industrial automation and robotics to natural language processing and pattern recognition.

As we reflect on the profound legacy of Lotfi A. Zadeh, it becomes clear that his influence extends far beyond the realm of mathematics. Through his pioneering work in fuzzy set theory and his commitment to interdisciplinary collaboration, Zadeh has inspired generations of researchers to explore new frontiers of knowledge and tackle some of the most pressing challenges facing humanity.

From the development of fuzzy logic controllers in industrial automation to the application of fuzzy set theory in medical diagnosis and decision support systems, Zadeh's ideas continue to resonate with profound relevance and significance in diverse fields of science, engineering, and beyond. His enduring influence serves as a testament to the power of mathematics to transcend disciplinary boundaries, foster innovation, and address some of the most complex and pressing problems of our time.

As we celebrate the remarkable achievements of Lotfi A. Zadeh, Father of Fuzzy Set Theory, we honor his unparalleled contributions to the field of mathematics and his enduring legacy of innovation, creativity, and visionary insight. Through his brilliance and dedication, Zadeh has left an indelible mark on the landscape of mathematics and inspired countless minds to explore, discover, and innovate in the timeless quest for understanding and enlightenment.

**"As complexity rises, precise statements lose meaning and meaningful statements lose precision"**

**-L.A.Zadeh**

# Departmental Symposium: Sharing Knowledge, Inspiring Growth

## **NATIONAL CONFERENCE ON MATHEMATICAL AND COMPUTATIONAL SCIENCES (NCMCS-18)**

Two day National Conference on “Mathematical and Computational Sciences (NCMCS-18) was organized by Department of Mathematics, Alagappa University, Karaikudi on 23rd and 24th October 2018 at Science Campus Conference Hall. Prof. N. Anbazhagan, Head of the Department of Mathematics welcomed the gathering. Prof. N. Rajendran, The Honorable Vice-chancellor of Alagappa University presided the conference. The probable speakers Dr. Pankaj Srivastava, MNNIT, Allahbad (UP), Dr. G Suresh Singh, University of Kerala, Kerala, Dr. R. Balasubramanian, IIT Roorkee, Roorkee, Dr. M. Lellise Thivagar, Madurai Kamaraj University, Madurai, Dr. R. Roopkumar, Central University of Tamilnadu, Thiruvarur and Dr. V. Lakshmana Gomathi Nayagam, NIT Tiruchirappalli, Trichy gave special lectures on various topics. Conference was coordinated by Dr. R. Jeyabalan.



### U P C O M I N G   E V E N T S   O F   O U R   D E P A R T M E N T

- The Two-day International Conference on “Discrete and Computational Mathematics (ICDCM-2018) jointly organized by the Ramanujan Center for Higher Mathematics and Department of Mathematics will be held on 20.12.2018 at the seminar hall of the convocation auditorium.
- National Mathematics Day has been celebrated on 24th December 2018 at University convocation seminar hall, organized by the School of Mathematics, Alagappa University.
- The School of Mathematics conducted a “State-level Quiz Contest” for PG Students in Mathematics on 26.02.2019

Drip painting method by Jackson Pollock represents a profound fusion of art and mathematics, showcasing the intricate interplay between chaos, rhythm, and geometry. Here's how the drip painting method embodies the art of mathematics:

### Chaotic Dynamics

Jackson Pollock's drip paintings are characterized by chaotic dynamics, echoing the principles of chaos theory. Through his spontaneous and uncontrolled application of paint, Pollock creates intricate patterns and textures that exhibit the unpredictable nature of chaotic systems. Each drip, splatter, and gesture contributes to the overall composition in a manner that defies conventional order, reflecting the inherent complexity of chaotic dynamics

### Fluid Dynamics

The application of paint in Pollock's drip paintings can be likened to the dynamics of fluid flow. The viscosity of the paint, the speed and direction of the drips, and the interactions between different colors create a dynamic interplay of fluid motion on the canvas. Through gestural movements and intuitive gestures, Pollock manipulates the flow of paint to imbue his compositions with a sense of energy and movement reminiscent of fluid dynamics.

### Expressive Abstraction

Pollock's drip painting method is a form of expressive abstraction, which emphasizes spontaneous, gestural mark-making and emotional intensity. While the gestural aspect of Pollock's technique may appear intuitive and instinctual, it also reflects a deeper understanding of mathematical principles such as symmetry, rhythm, and balance. The rhythmic repetition of drips and splatters, the balance of positive and negative space, and the symmetry of compositional elements all contribute to the mathematical harmony of Pollock's drip paintings.



# MATHEMATICS BEHIND DRIP PAINTING

### Fractal Geometry

Pollock's drip paintings often display fractal-like qualities, with patterns and motifs that repeat and evolve across various levels of detail. The interplay of lines, drips, and splatters creates fractal-like structures that mesmerize the viewer with their infinite complexity. Like fractals found in nature, Pollock's compositions captivate the imagination and evoke a sense of boundless exploration.

### Stochastic Processes

Stochastic processes, which involve random variations over time or space, are inherent in Pollock's drip painting method. The seemingly spontaneous and unplanned application of paint reflects the stochastic nature of the creative process. Each drip and splatter adds an element of randomness and unpredictability to the composition, contributing to the overall richness and depth of the artwork.



# Harmonic Equations: Exploring the Mathematical Symphony of Music

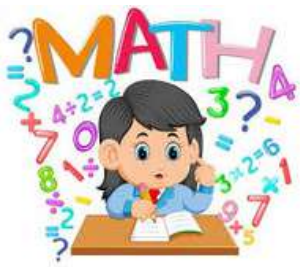
Mathematics plays a significant role in understanding and playing the guitar, influencing various aspects of music theory, technique, and composition. Here's how mathematics intersects with music and the guitar:

- **Fretboard Geometry:** The layout of the guitar fretboard is based on mathematical principles of geometry and proportion. The frets are spaced according to the mathematical relationships between musical intervals, such as semitones and whole tones. Understanding the geometric patterns of the fretboard helps guitarists navigate the instrument more efficiently and visualize scales, chords, and arpeggios.
- **Chord and Scale Theory:** Music theory concepts such as chord construction, scale formulas, and intervals are inherently mathematical. Guitarists use mathematical relationships between notes to construct chords and scales across the fretboard. For example, understanding the intervals that comprise a chord or scale allows guitarists to transpose music to different keys and create harmonic progressions with mathematical precision.
- **Signal Processing and Effects:** The use of guitar effects pedals and signal processing techniques involves mathematical algorithms and digital signal processing (DSP). Guitarists use effects such as delay, reverb,



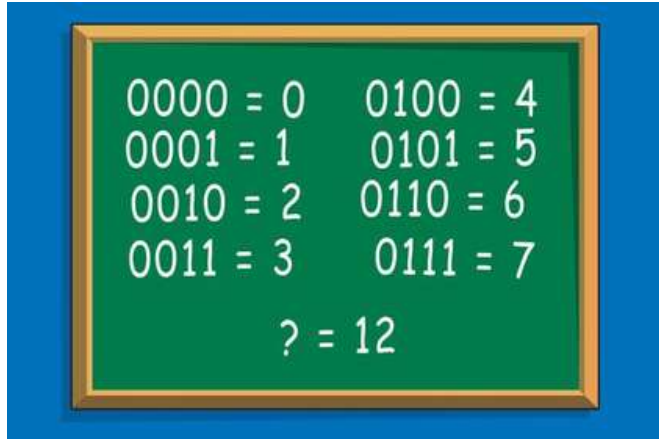
and distortion to manipulate the timbre and texture of their sound. Understanding the mathematical principles behind signal processing helps guitarists create unique tones and sonic landscapes

- **Rhythmic Patterns and Time Signatures:** Rhythm in music involves mathematical concepts such as beats, subdivisions, and time signatures. Guitarists use rhythmic patterns and time signatures to create a groove and feel in their playing. Understanding the mathematical relationships between different note durations (whole notes, half notes, quarter notes, etc.) helps guitarists execute complex rhythms and syncopated patterns accurately.
- **Fingerstyle and Picking Techniques:** Fingerstyle and picking techniques on the guitar involve precise coordination and timing between the fingers or pick and the strings. These techniques rely on mathematical principles of motion, velocity, and trajectory. Guitarists use mathematical concepts to optimize their picking patterns, improve speed and accuracy, and develop efficient muscle memory.



# STUDENT DILEMMA HUB

## Problem 1:

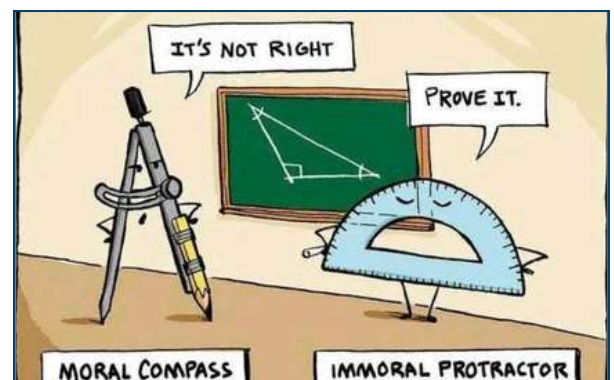
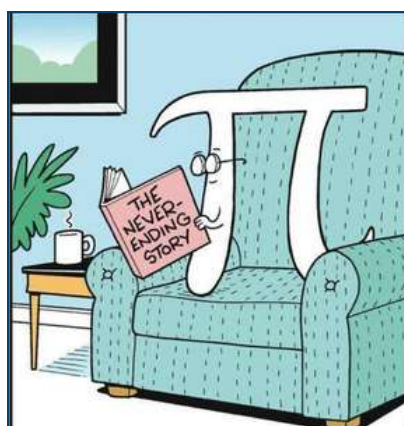
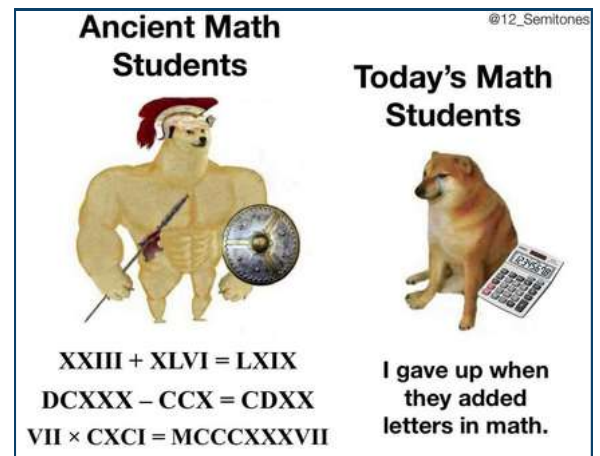
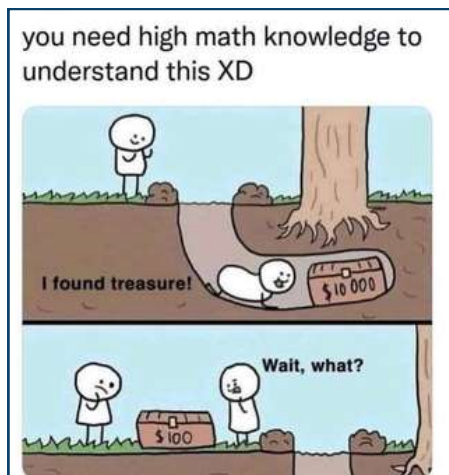


## Problem 2:

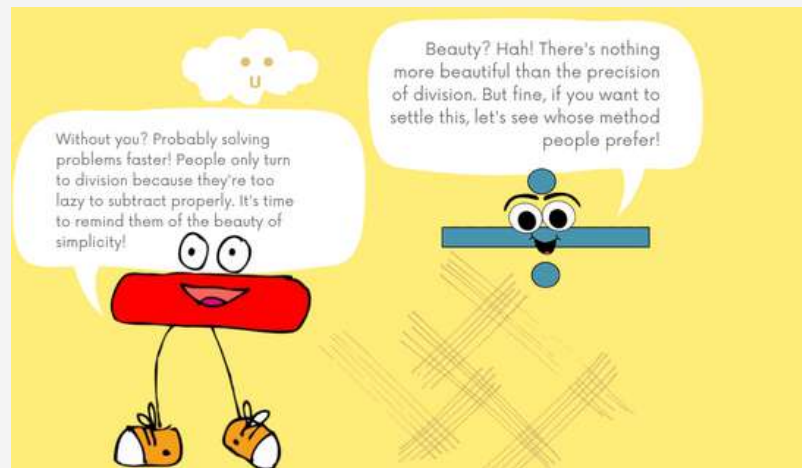
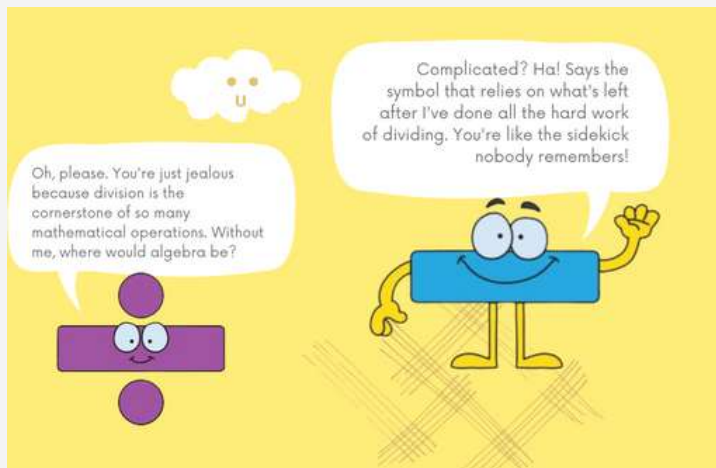
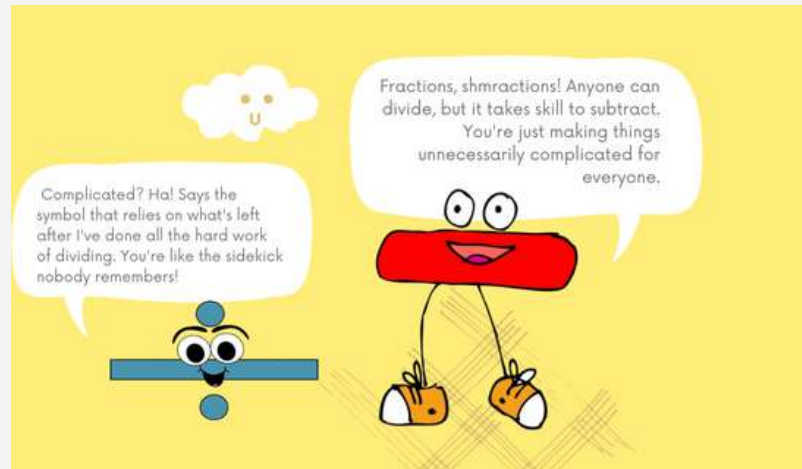
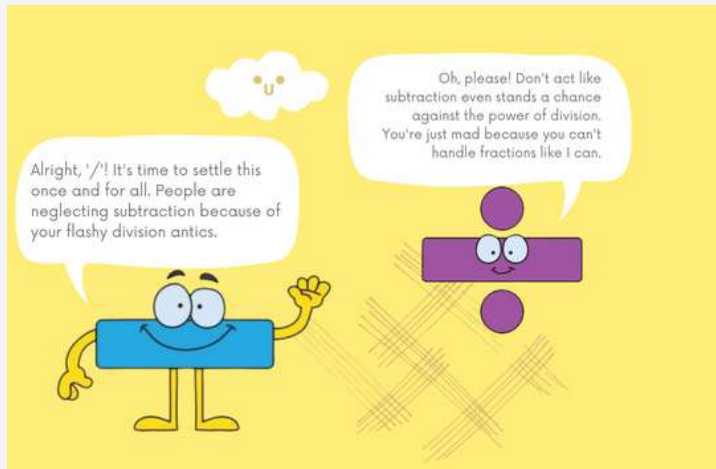


Answers: 1. 1100 2.2

# MATH MEMES



# ICONIC CHAT LOUNGE



## SuDoKu:

		3		7		6	
		7	8			2	
							3
				5			1
		5	4		8	3	7
	3		2	7	9	6	4
5							3
	7	6	3	9	4		
		4			5		8

## Let us know

- There is no Roman numeral for zero.
- Take any shape with the same perimeter, and a circle still possesses the largest area.
- You can use three geometric cuts to a cake and get 8 pieces.
- Every odd number has an 'e'.

