# WORD SEARCH

P O C H Y G U X E M K C H D S G O A G S
A H B T A T D U D P X K L F S G C W V C
B E X P E R I M E N T K G V L J F Y P S
B K D I F F E R E N T I A L H R L X M P
L S U R F A C E V X V M M I B H U X A L
L U G L C X R A R E V A E A M R C U S A
G D G D O D P M O D E L A O D M T M U S
D R N U M N Y H P B U U S W U H U B X H
N X K F B P Y N U Y A U U D Q I A K J W
Y C Z R I P A Z A L F C R N Y C T G M I
U P H A N F O R V M N E E I F X I E H G
K F S C A K K L A G I J R Y G T O O O O
P R B T T G T F Y M M C U H Z F N M N S
D B Z A O N V A Y N E C S V V B Z E B F
K P I L R C I O X H O T Q B N G L T T Q
F C E Y I O T Y V S S M R J A D D R G P
H I Q P C U W S F X H B I I T L G Y F Z
D Q Y F S R T U T E Z B Y A Z C S F Y T
I D W D D A P M C O R Z J B L A D G N H
M Q I I O N C A B V C M D B K C T H Y Q
E C X D A T C U Y J M H A X Q X L I C Y
N D E R I V A T I V E Q A T D K X J O C
S A E P C E T C X I Q J J S E D A A D N
I L D H V Y Q R C I M A T H T N T F I W
O L L Q C M F V Q M M A Z L E I Z O S A
N P N Q R V A X K F Z K O A P G C X O A
V M W A V E S Z T Y A S C X Q V X J R U
W P I L V R A T I O N A L U O B V D D C
K Y C H H F I A G J V Z H B J J L L E I
F Z B I A J Y C N S D P T A L G E B R A

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math
model
csplash

## Thank you for coming!

Interested in cSplash 2026? Help us make next year's event even better by sharing your thoughts about this year's experience!

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**Questions? Reach us at nyumathsoc@gmail.com**

NEW YORK UNIVERSITY

# 2025 SPLASH

## Saturday, April 5
## 11 AM - 4 PM

## Warren Weaver Hall
**251 Mercer Street**
**New York, NY 10012**

**Hosted by NYU Mathematics Society**

NYU COURANT INSTITUTE OF MATHEMATICAL SCIENCES

## Opening and Introductions

**11:00 AM - 11:10 AM**

Hear from NYU Math Society's E-Board!

## Waves Across the Pacific by Ryan Shìjié Dù

**11:10 AM - 11:30 AM**

Atmospheric storms push and pull the surface of the ocean, creating waves. These waves eventually become swells and propagate far from the storm over a long time. In fact, one pioneer observational campaign led by Walter Munk in 1963 tracks swells generated south of New Zealand all the way to the coast of Alaska. In this talk, we will explore the mathematics describing ocean surface waves. How does organized swell form from the choppy water beneath a storm? Why do long waves move faster than short waves? Why does a group of waves move at a different speed compared to a single wave crest? We have to start with some differential equations to describe the physics of surface waves. However, things will simplify quickly and require only simple algebra and derivatives.

## Laboratory Icebergs Melt Down and Flip Out by Bobae Johnson

**11:35 AM - 12:00 PM**

Icebergs that melt and capsize are complicated, dynamic systems. Studying these phenomena in nature can be challenging, as data is typically limited to isolated events and evaluation of environmental parameters is difficult. Small-scale laboratory experiments reduce the system to its fundamental components, allowing us to better understand the physical mechanisms at play and investigate the fascinating dynamics that lie beneath the water's surface. In our lab, we study the dynamics of a free-floating cylinder of ice submerged in room-temperature freshwater. First, the ice locks into place and melts faster below the waterline due to the differential melt rates of ice in air and water. This causes the ice to become increasingly gravitationally unstable until it abruptly rotates and locks into a new stable configuration. These "capsize" events persist for the duration of our experiments, as the water's surface carves the ice faces into pentagonal form. We model this simplified system of laboratory-scale ``icebergs" to provide insight into the fundamental coupled dynamics of melting, shape change, and capsizing.

## Geometry and Polynomial Equations by Zhijia Zhang

**12:05 PM - 12:30 PM**

Imagine trying to find all solutions to the equations $x^2 + y^2 = 1$ where $x$ and $y$ are rational numbers. You can think of this equation as a circle and try to find a "rational parametrization" of all points on it. The area of mathematical research that studies such geometric properties of the solutions to polynomial equations is called algebraic geometry. In this talk, I will explore some of the key discoveries in the interplay between algebra and geometry, as well as a few seemingly simple problems such as finding rational solutions to higher-degree polynomial equations, which remain unsolved nowadays despite decades of effort made by mathematicians.

## Complete Disorder is Impossible Teresa Pollard

**12:35 PM - 12:55 PM**

Ramsey Theory is a branch of combinatorics motivated by the idea that, no matter how disordered a structure may seem, there must be some orderly part of it - in other words, the idea is that "complete disorder is impossible."* In this talk I will introduce some basic results in Ramsey Theory which begin to flesh out this idea, and then discuss how this theory arose in the context of Fermat's Last Theorem.

## Lunch

**12:55 PM - 2:05 PM**

Head up to the 13th Floor Lounge!
+ Math chats with Teresa and Finn.

## Math Modeling of Gene Expression by Mingtao Xia

**2:10 PM - 2:30 PM**

In the talk, I shall introduce our recent work on developing machine-learning-based methods for quantifying intrinsic noise in noisy cellular dynamics (intrinsic fluctuation in the stochastic process characterizing cellular dynamics). I will then discuss how to apply my methods to reconstruct stochastic processes in cellular dynamics such as the Langevin dynamics and fluctuations in protein count from data.

## [Keynote Speaker] What is Dimension? by Aria Halavati

**2:35 PM - 3:35 PM**

We all know what it means for something to have a whole-number dimension—a line is 1D, a plane is 2D, and a cube is 3D. But what if a shape is more complicated, like a fractal? In this talk, I'll explain what it means for something to have a fractional dimension and how we can measure it. At the end, I'll share an exciting new discovery—one of the biggest breakthroughs in math this century—that was made just a few weeks ago by our own Hong Wang and Josh Zahl!