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# Titles and Abstracts

SWiM@Wes 2025

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## Elliptic Curve Cryptography: Data Encryption through Math | WILLIAM ALLEN

Elliptic curves form the foundation of many modern cryptographic systems. In this talk, we will discuss one such cryptosystem, the Elliptic-Curve Diffie-Hellman algorithm. To understand the role of elliptic curves in this algorithm, we will first explore how the set of points on elliptic curves form a group, and then how that group structure lends itself to efficiently encrypting data.

## Continued Fractions: These Fractions Just Keep Going! | STEFAN HESSELING

Any real number  $x$  can be written as a simple continued fraction of the form

$$x = a_0 + \frac{1}{a_1 + \frac{1}{a_2 + \ddots}}$$

with  $a_0 \in \mathbb{Z}$  and  $a_i \in \mathbb{Z}^+$  for all  $i > 0$ . In this talk, we will discuss how to derive the continued fraction representation of a real number, and how to evaluate which number a given continued fraction represents. Further, we will explore how to compare continued fractions, with the goal of learning how to work with them as mathematical objects.