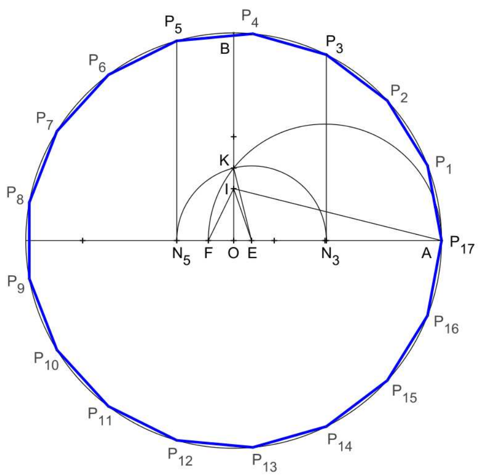
Hidden Symmetry in the Roots of Polynomials

Undergraduate Math Club
CORNELL UNIVERSITY



SPEAKER

Professor Daniel Rubin

ABSTRACT

People have known since antiquity how to find the roots of quadratic polynomials $x^2 + ax + b = 0$ by completing the square, but how do you calculate the roots of cubic, quartic, and higher degree polynomials? A related question: The n complex roots of the cyclotomic equation $x^n - 1 = 0$ are $e^{2\pi ik/n}$, $k = 0, \ldots, n-1$, but note that we can express the cubic roots of unity as $1, \frac{-1\pm\sqrt{-3}}{2}$; can we find similar algebraic expressions for any n-th root of unity? I will describe some progress that was made towards answering these questions in a naive and elementary fashion, following the steps of the key contributors before Galois. My goal is to address how the key underlying structure of symmetries in these problems was actually uncovered, or to put it another way, to answer: how did people come up with the idea of a group?

FEB 27 at 4:45pm

Malott 532 ⋆ Refreshments