

2024 TORUS Undergraduate Research Presentations

Southern Nazarene University

Bethany, OK

Time	Title	Presenter(s)
10:20 am	Using Mathematical Theory and Supercomputing to Compute Arbitrarily Large Collatz Streaks	Madison Gordon, John Eskue

Abstracts

Using Mathematical Theory and Supercomputing to Compute Arbitrarily Large Collatz Streaks

Presenters: Madison Gordon, John Eskue

Affiliation: Southeastern Oklahoma State University

A Collatz streak is defined to be the cardinality of a maximal set of consecutive integers which have the same height. We present an approach to computing Collatz streaks by using high performance computing resources to process arbitrary sized numbers with absolute precision. We have calculated Collatz streaks of length longer than 68 billion, and a survey of results for streaks of starting numbers of the form $2^k + 1$ for $1 \leq k < 10000$ will be presented. Exponents with Collatz streak lengths up to $2^{32} - 1(4, 294, 967, 295)$ have been verified from this set of starting numbers, and we present some results which describe some behaviors seen in these streak lengths. In this presentation we will discuss our coding process, highlight interesting discoveries, and hopefully inspire future mathematicians to investigate long standing conjectures.