

Virtual Poster Abstracts

The following posters will be presented virtually during the poster session.

Presenter(s): Karthik Mittal and Aditya Mittal, James Logan High School

Title: *Determining Smallest Path Size of Multiplication Transducers Without a Restricted Digit Set*

Abstract: Directed multiplication transducers are a tool for performing non-decimal base multiplication without conversion to base 10. This allows for faster computation and provides easier visualization depending on the problem at hand. By building these multiplication transducers computationally, new patterns can be identified as these transducers can be built with much larger bases and multipliers. Through a Python-based recursive approach, we created artificial multiplication transducers, allowing for the formation of several unique conjectures specifically focused on the smallest closed loop around a multiplication transducer starting and ending at zero. We show a general recursive pattern for this loop; through this recurrence relation, the length of the smallest closed loop for a particular transducer base b along with the range of multipliers having this particular length for multiplier m was also identified. This research will be explored further by testing reductions of the digit set and determining whether similar properties will hold.

Presenter(s): Citlalli Villegas, California State University Channel Islands

Title: *Understanding of Mathematical Induction*

Abstract: Many undergraduates have difficulty when they are first introduced to mathematical induction. This project seeks to understand the common struggles students have with mathematical induction and how it relates to their overall performance in the course. We gathered data from fifty students and analyze their response to an induction problem on a midterm. Our data explored correlations between their understanding of checking for small numbers, formulating $k + 1$ and correctly performing the induction step. This data will be used to explore how professors can better prepare students to combat their struggles with mathematical induction.

Advisor: Ivona Grzegorzcyk

Poster Area(s): Education/Pedagogy, Mathematical Proofs