Diophantine Equations to the Power of n

MATC15 - Project - Draft 1

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Conjecture: Let x be an arbitrary integer.

$$x^n = \sum_{i=1}^{n} y_i^n \text{ has an integer solution such that } y_i \neq x, \forall i.$$

Andrew D'Amario, Feburary 18, 2021

1 Introduction

The objective of this project is to investigate the conjecture above: whether or not we can always find at least one integer solution to equations of the form $x^n = y_0^n + \cdots + y_n^n$ given any x, excluding trivial solutions involving y_i's$= 0$ or x.

Some of this investigation and research will involve:

- Computational analysis on random integers raised to the power of n and finding an integer solution to the sum.
- Noting differences between even and odd n.
- Identifying different families of solutions that take on a similar form.

Though this conjecture may be false, we hope to investigate as much as we can on the matter and provide some deeper research to the subject.