# A proof of the strict monotone 5-step conjecture

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**Abstract**

The strict monotone $d$-step conjecture for linear programming says that, given a $d$-dimensional polytope $P$ with $2d$ facets and a linear function $f$, there is a path in the graph of $P$ from the vertex with minimum $f$ value to the vertex with maximum $f$ value that is increasing in $f$ and contains at most $d$ edges. Santos (2012) showed that this conjecture is false for $d$ sufficiently large, but the largest $d$ for which it is true is not known. For $d = 5$ we created a logical statement that is unsatisfiable if there is no counterexample. The satisfiablility solver that we used showed that there is no counterexample.

**Keywords:** linear programming, polytope, unsatisfiable logical statment.