1115-05-156 **Burcu Canakci**, **Hannah Christenson**, **Robert Fleischman**, **William Gasarch**, **Nicole McNabb*** (nmcnabb1@swarthmore.edu) and **Daniel Smolyak**. *Using SAT Solvers to find Ramsey-type Numbers.* Preliminary report.

We created and parallelized two SAT solvers to find new bounds on some Ramsey-type numbers.

For $c > 0$, let $L(c)$ be the least n such that for all c-colorings of the $n \times n$ lattice grid there will exist a monochromatic right isosceles triangle forming an L. It is known that $L(2) = 5$. Using a known proof that $L(c)$ exists we obtained $L(3) \leq 2593$. We formulate the $L(c)$ problem as finding a satisfying assignment of a boolean formula. Our parallelized probabilistic SAT solver run on an 8-core virtual machine cluster found a 3-coloring of 20×20 with no monochromatic L's, giving $L(3) \geq 21$.

We also searched for new computational bounds on two polynomial van der Waerden numbers, which we denote to be the "van der Square" number ($VDS(c)$) and the "van der Cube" number ($VDC(c)$). $VDS(c)$ is the smallest positive integer n such that for a given $c > 0$, for all c-colorings of $\{1, \ldots, n\}$ there exist two integers of the same color that are a square apart. $VDC(c)$ is defined analogously with cubes. For $c \leq 3$, $VDS(c)$ was previously known. Our parallelized deterministic SAT found the $VDS(4) = 58$. Our parallelized probabilistic SAT found $VDS(5) > 180$, $VDS(6) > 333$, and $VDC(3) > 521$. All of these results are new. (Received September 14, 2015)