1102-11-222 **Joshua A. Day*** (dayja10@uww.edu) and **Ki-Bong Nam**. *Observing Integer Solutions of Various Algebraic Equations with Modular Congruences.*

Mathematicians thrive when it comes to solving new and different kinds of puzzles. The key is to approach any given question from as many ways possible; this often results in unique and creative solutions. Diophantine equations are a classic kind of problem that challenge a mathematician to answer a few basic questions: Are there any nontrivial solutions? And if so, can we find out what they are? Can all the solutions to the equation even be found?

Classic examples of these types of equations are Pythagoras' Theorem and Fermat's Last Theorem. We will be using Diophantine equations of this form $ax^2 + by^2 = cz^2$, as well as different Pell equations as examples in order to make conclusions about the solutions to the generalized form $ax^\ell + by^m = cz^n$. Our theory that we will be using is that if there is a nontrivial solution to this equation in the set of integers modulo $r$ ($\boldsymbol{Z}_r$), then there is a solution in the set of all integers ($\boldsymbol{Z}$).

With our proposed method, we hope to be able answer the above questions in a quick and simple way, while drawing conclusions about the integer solutions of various types of equations. (Received July 29, 2014)