QUADRATIC EQUATIONS WITH ABSOLUTE VALUES: AN EXAMPLE OF DEVELOPING PROOF IN MATHEMATICS STUDENTS

Serena Dipierro[a], R. Nazim Khan[a], and Enrico Valdinoci[a]

Presenting Authors: R. Nazim Khan (Nazim.khan@uwa.edu.au), Enrico Valdinoci (enrico.valdinoci@uwa.edu.au)
[a]Department of Mathematics and Statistics, University of Westerns Australia, Crawley WA 6009, Australia

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ABSTRACT

Proof is perhaps the most important and fundamental aspect of mathematics. However, it is generally agreed by mathematics teachers at upper high school and first year university that students lack the ideas of proof. How to develop this in students is a common, difficult and perennial problem.

In this presentation, we develop some ideas of proof based on the number of solutions of an equation involving a quadratic polynomial and absolute values of linear functions. We begin with the simple idea of making more precise a question that is posed, investigating the problem through exploration, and arriving at some conjectures. We proceed to determine ways to prove the conjectures and thus convert them into theorems.

The question discussed in this paper arose in a session for high school students held at the Department of Mathematics and Statistics of the University of Western Australia. The result is an excellent and interesting illustration of problem posing and solving in Mathematics that underpins mathematical thinking.

The paper is accessible to final year high school and first year university mathematics students. It is expected that it will serve as a resource for, and inspire further ideas and examples for, mathematics teachers for teaching proof to students.

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