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Logical Reasoning Improvement After One Semester of Calculus for First Year Undergraduate Students

Logical reasoning is a crucial aspect of mathematics, and yet it is often expected that students in mathematics courses, especially courses for non-majors, will learn these ideas "by osmosis". Indeed, research shows that precise logical reasoning is not inherent, and is difficult even for those trained in mathematics. A natural question to ask is whether there is a notable increase in logical reasoning skill after students take one semester of mathematics that does not explicitly teach logical reasoning.

We will discuss a study that compared Calculus II students' performance on a logical reasoning quiz in Winter 2022 with new Calculus I students' performance on the same quiz at the beginning of Fall 2022. Additionally, a number of students were interviewed and we will discuss these students' beliefs and experiences with mathematics and logical reasoning at the high school and university levels. These findings make a case for increased attention to logical reasoning in first year mathematics courses.