Assessable Learning Goals for the Mathematics Minor

Like other academic disciplines, mathematics encompasses a mode of inquiry, a body of knowledge, and a functional role within the wider world. The mathematical mode of inquiry focuses on identifying axioms and analyzing their consequences using rigorous logic. Math's knowledge base includes arithmetic, geometry, algebra, analysis, and other tools developed across the world over the past several millennia and, at an accelerated pace, over the past century. This knowledge has contributed to many scientific, technological, philosophical, and artistic advances.

Although not all goals of the Carleton mathematics program are easily quantifiable, the Department of Mathematics and Statistics has catalogued three learning goals that can be measured. We offer examples --- not comprehensive, binding lists --- of possible methods for assessing them.

1. *Mathematics minors will be able to explain canonical concepts and solve representative problems in calculus and linear algebra*. We could assess this goal by studying student work on final exams in our Calculus and Linear Algebra courses, or by studying written work from later courses which rely heavily on this material, such as Ordinary Differential Equations or Advanced Linear Algebra.
2. *Mathematics minors will meet at least one of the following two learning goals of the mathematics major.*
    a. *Mathematics minors will be able to read and devise proofs*. We could assess this goal by examining written student work in Math 236, or by examining final projects in proof-heavy courses beyond Math 236.
    b. *Mathematics minors will be able to describe a substantive application of mathematics to a real-world problem*. We could assess this goal using a questionnaire or interview, in which each student describes an application.
3. *Mathematics minors will meet at least one of the following two learning goals of the mathematics major.*
    a. *Mathematics minors will be able to communicate mathematics orally and in writing*. We could assess writing competence by examining written student work in Math 236 or final presentations in certain upper level courses.
    b. *Mathematics minors will be able to use technology appropriately to explore and/or solve mathematical problems*. We could assess this goal by studying student projects and lab reports from courses, independent studies, and research experiences.

Assessment Plan

In the fall of each year we will choose one part of one of the three goals for assessment. Generally this choice will be consistent with the goal of the mathematics majors that we have chosen to assess. Within any ten-year period, we will assess each goal at least once. We will collect appropriate data during the academic year, and at either the last department meeting of

the academic year or the department retreat the following fall we will discuss the data and formulate an appropriate response.