

STLF Report to CWSEI and Mathematics Department

STLF: Kseniya Garaschuk

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Throughout this term and the next one, I am mainly concentrating on two projects. One consists of developing and running of a diagnostic test for calculus students; the other one involves working on several aspects of Math 110.

Diagnostic test.

I have now created a stable version of the diagnostic test that will be used in Math 180 and 184 in January 2015 (approximately 200 students). The test is an hour long, consists of 20 questions and is currently fully functional on WebWork. At the end of the test, each student receives a 6-digit score that represents their strength in each of the 6 sections identified in the review materials. Students can then access review materials and practice sections they would like/need help with. Below is a more detailed description of the test, the review materials and how we plan to follow up this process.

The majority of the diagnostic test is based on the Basic Skills Test (BST) designed and currently given by Math Department to assess the calculus readiness of students whose pre-calculus 12 grade is low or is not recognized by the UBC. To help me gauge the level, length and difficulty of the diagnostic test, I have collected data from Eric Cytrynbaum, an instructor in charge of Math 102 this term (approximately 700 students), who has ran a BST-based review assignment at the beginning of the term. Based on the students' responses, I have adjusted the difficulty level of some questions and introduced several new ones. I have also included 2 trigonometry questions that did not appear on the BST. Finally, I have compared the test with a similar test used by University of Victoria (that I helped develop) for final adjustments. The test has been looked over and approved by Mark Mac Lean.

The next steps include testing it on WebWork with several participants to ensure randomization of questions and correctness of answers, meeting with course instructors to run the test past them and provide help with setting the test up for them, if needed, as well as registering all Math 180/184 students in the review course. We also plan to run a Mathematics Attitudes and Perceptions Survey in these courses.

Future work is two-fold. First of all, we will analyze the results of the diagnostic test,

compare them to students' performances throughout the course and consider some questions of the diagnostic test or the whole test itself as performance predictors. Based on the student data, we will potentially revise the test. Secondly, we will ask students to provide us with feedback on the review package. We will monitor students' engagement with review materials and will organize focus groups to collect students' opinions on the suitability and practicality of the review package. We will then modify the materials accordingly.

Math 110.

I continue to work with Costanza Piccolo on Math 110. I am developing interactive engagements materials (including worksheets and clicker questions) and, as I am attending all Math 110 lectures, I am noting how these activities work in the classroom; I then revisit them and adjust, if needed. I have created a Math 110 section on UBCMath Wiki and am now populating it with these materials. This term, we have also run a demographics survey to determine the students' interests in order to include them in the applications we use in the course. I have been conducting informal student interviews in the classroom to get a sense of how students find the pace of the course. Information gathered through both of these mediums further guides the creation of the course materials.

As an immediate future work, we are planning on holding a two-stage review at the end of the term, inspired by "An Improved Design for In-Class Review" by Maxwell, McDonnell and Wieman. As a follow-up, we are planning to implement a similar two-stage review in the first class of the next term on the material students have learned this term. We will also analyze the differences in students' performances pre- and post- Christmas break.

Slightly more long-term, we are in the planning stages of a study on the effectiveness of worked examples coupled with self-explanations. We are currently designing an appropriate intervention and measurements to be used in one of the sections of Math 110 next term.