

The SDSU Calculus I Gateway Exam: What and Why?

Many good students come to SDSU and other universities intent on pursuing one of the many excellent career paths that require knowledge of calculus, but dramatically under-perform their potential in calculus because of their lack of fundamental algebra and trigonometry skills. To address this problem, SDSU will start administering the SDSU Calculus I Gateway Exam to all Calculus I students during the Fall 2007 semester.

To construct this Gateway Exam, the faculty of the SDSU Department of Mathematics and Statistics compiled a short, very well-defined list of specific algebra and trigonometry concepts that students should master if they want to succeed in university calculus. It is this concept list upon which the Gateway Exam is based. It is our hope that this concept list and the associated Gateway Exam will benefit two sets of people:

- Students who will take an SDSU calculus course, by giving them a very well-defined set of concepts which, if mastered, will significantly enhance their chances of succeeding in calculus and thus in the career of their choice, and;
- South Dakota's K-12 mathematics instructors, for whom we hope this concept list and the associated Gateway Exam will serve as a tool they can use to motivate their students to master the concepts involved.

For K-12 mathematics instructors who want to use this Gateway Exam as a motivational tool for their students, it's worth pointing out a couple of key facts:

- The topics on the concept list were not chosen arbitrarily. These are EXACTLY the concepts that SDSU calculus instructors have identified as being the biggest barriers to their students' success in calculus in recent years. Students starting calculus with mastery of these concepts will have a much easier and more successful calculus experience than those without such mastery.
- The SDSU mathematics curriculum is constructed in consultation with representatives of the professions that offer many of the best career paths available to students today, including financial services, biotechnology, statistics, engineering, and the sciences. Experts in these fields have told us what they need students who take our mathematics and statistics classes to know, and it is this that in large part helps form our curriculum. Thus, if a concept appears on our Gateway Exam concept list it is because students who want to pursue careers in these fields need to have mastery of the concept.
- The specification that the concepts be mastered without the use of a calculator is very intentional and very important. These concepts are so basic that they must be completely internalized by students in order that they may form part of a student's thought process when solving a problem in calculus.

More information on the SDSU Calculus I Gateway Exam and its associated concept list is available at <http://teach.sdstate.edu/users/vestals/Gateway.htm>. Here you will find:

- The Gateway Exam concept list.
- A sample Gateway Exam
- Answers to the sample exam
- Complete solutions to the sample exam
- Links to online resources for reviewing algebra and trigonometry

Finally, please note that the exam and website are intended to be a work in progress. We want it to be a useful tool for South Dakota's K-12 mathematics students and instructors, and welcome your feedback regarding ways to improve its usefulness. Please send your feedback to Kurt Cogswell at kurt.cogswell@sdstate.edu.