



**Faculty of Science  
Department of Mathematics**

**MATH 875: PhD Preliminary Examination**

**Exam Description and Procedures**

**Learning Objectives**

1. Demonstrate mastery of foundational topics in mathematics;
2. Identify topics for which they are lacking a familiarity, and subsequently fill in gaps on material from those topics;
3. Demonstrate the ability to coherently and clearly answer basic mathematical questions from a broad range of senior undergraduate material.

**Student Preparation** The material covered in the exam is defined by a reading list, consisting of books, with relevant chapters identified. For preparation, the student will be provided with this reading list, and a sample exam to illustrate the type of question they are to expect. Past exams will be made available to students.

Students can request solutions to this exam to understand the required depth and clarity of a proper solution. It is the department's responsibility to ensure that the textbooks are available in the library or via the graduate administrator.

**Content** Exam will consist of one question each from the 10 following topics. The level of the material is a third year undergraduate mathematics courses at SFU. Any question that could reasonably appear on a final exam from the corresponding course is considered fair.

**Format** The exam is 3 hours. The student is not permitted any study aids or notes.

**Grading** Students will be required to identify 6 solutions for submission. Solutions will be graded for completeness and accuracy. Each question will be graded out of 10. A pass requires a minimum of 80% of the total points.

**Expectations** Correct answers will be complete, accurate and well presented.

## Topics

The questions in the exam will be based on the material indicated. Students are encouraged to read the relevant texts and work through problems from the indicated sections. If students are completely unfamiliar with a certain topic, they are encouraged to audit the relevant SFU course to gain additional exposure.

Continuous Optimization (MATH 309)    Numerical Optimization (Springer Series in Operations Research and Financial Engineering) (Hardcover) by Jorge Nocedal and Stephen J. Wright, published by Springer; 2nd ed. edition (July 27, 2006). Chapters 12 & 16.

Differential Equations (MATH 310)