Queen's University
School of Computing

CISC 203: Discrete Mathematics for Computing II
Midterm Examination Review
Winter 2019

1 Topics Covered

The following list gives an overview of every topic covered in CISC 203 up to the midterm examination. You should ensure you have a good understanding of each topic. All midterm examination questions will test some topic on this list, but not all topics will be tested on the midterm examination.

- **Proof Techniques**
  - Direct proof
  - Proof by counterexample
  - Proof by contrapositive
  - Proof by contradiction
  - Proof by induction
    - Induction
    - Strong induction
    - Well-ordering principle
- **Combinatorics**
  - Basic combinatorial techniques
    - Product rule
    - Sum rule
    - Inclusion-exclusion principle
    - Pigeonhole principle
  - Permutations
    - Without repetition
    - With repetition
    - With indistinguishable elements
  - Combinations
    - Without repetition
    - With repetition
  - Binomial coefficients/binomial theorem
  - Combinatorial identities
- **Discrete Probability**
  - Probability theory fundamentals
    - Definitions
    - Unions, intersections
    - Disjointness, independence
    - Conditional probability
    - Bayes' theorem
  - Random variables
  - Expectation
- **Recurrence relations**
  - Definitions
  - Properties of recurrence relations
  - Solving recurrence relations
    - Substitution
    - Iteration
    - Characteristic roots
    - Undetermined coefficients

2 Format

The midterm examination is fifty minutes long. It consists of 5 questions worth a total of 50 marks.

The first question is divided into 5 multiple-choice style questions. The second and third questions are short-answer style questions that ask you to perform small calculations. The fourth and fifth questions ask you to write complete proofs for some given statements.

3 Tips and Tricks

- Double-check the date, time, and room of the midterm examination. You will not get extra time to write if you arrive late.
- Use your time wisely. Proof questions will likely take more time than multiple choice or short answer questions, so make sure you allocate the appropriate amount of time for each question.
- Use the resources you are given. The lecture notes contain everything you need to know. The assignment questions are similar in content and difficulty to the midterm examination questions. The course textbook and problem sets serve as great supplementary material.
- Don't leave your questions until the last minute. Seek help before the midterm examination if you have questions. Attend office hours or send an email.
- Don't try to memorize formulas. Instead, focus on understanding how formulas are derived and how they are applied.
- Don't panic!