

UNIVERSITY OF TORONTO  
Faculty of Arts and Science

Midterm 1  
CSC165H1S

Duration: 50 minutes  
Instructor(s): David Liu, Toniann Pitassi  
No Aids Allowed



Exam 1-1

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Name:

Student Number:

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Please read the following guidelines carefully!

- Please write your name on both the front and back of this exam.
  - This examination has 4 questions. There are a total of 8 pages, **DOUBLE-SIDED**.
  - Answer questions clearly and completely, with justifications unless explicitly asked not to.
  - Unless stated otherwise, your formulas can use *only* the propositional connectives and quantifiers we have seen in class, arithmetic operators (like +,  $\times$ , and exponentiation), comparison operators (like = and  $>$ ), and the divisibility and *Prime* predicates. You may not define your own sets or predicates unless asked to do so.
  - All formulas must have negations applied directly to propositional variables or predicates (e.g.,  $\neg \text{Prime}(n)$ ). You do *not* need to show your work for computing negations.
  - In your proofs, you may always use definitions of predicates. You may *not* use any external facts about rates of growth, divisibility, primes, or greatest common divisor unless you prove them, or they are given to you in the question.
  - You may **not** use induction for your proofs on this midterm.
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Take a deep breath.

This is your chance to show us

How much you've learned.

We **WANT** to give you the credit

That you've earned.

A number does not define you.

Good luck!



Exam 1-2

CSC165H1S , Winter 2017

Midterm 1

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1. [2 marks] Here is question 1.



2. [2 marks] Here is question 2.

3. [3 marks] Here is question 3.



Exam 1-4

CSC165H1S , Winter 2017

Midterm 1

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4. [4 marks] Here is a multi-page question.



Exam 1-5

Midterm 1

CSC165H1S , Winter 2017

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Question 4 continued...



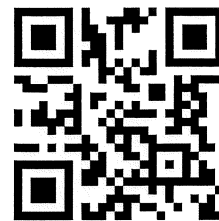
Exam 1-6

CSC165H1S , Winter 2017

Midterm 1

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Use this page for rough work. If you want work on this page to be marked, please indicate this clearly *at the location of the original question*.



Use this page for rough work. If you want work on this page to be marked, please indicate this clearly *at the location of the original question*.



Exam 1-8

CSC165H1S , Winter 2017

Midterm 1

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Name:

| Question     | Grade | Out of |
|--------------|-------|--------|
| Q1           |       | 2      |
| Q2           |       | 2      |
| Q3           |       | 3      |
| Q4           |       | 4      |
| <b>Total</b> |       | 11     |