

UNIVERSITY OF TORONTO  
Faculty of Arts and Science



Midterm 1  
CSC165H1S

Duration: 50 minutes  
Instructor(s): David Liu, Toniann Pitassi

midterm139.1

No Aids Allowed

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Name:

scratched out only label/

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.

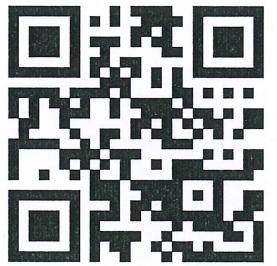
A number does not define you.

Good luck!



1. [2 marks] Here is question 1.

S



2. [2 marks] Here is question 2.

(

3. [3 marks] Here is question 3.

V

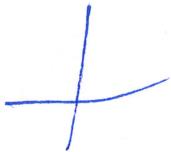


4. [4 marks] Here is a multi-page question.

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Question 4 continued...





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.*

C



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.*

b



Name:

L

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