CSC165 fall 2017
Mathematical expression

Danny Heap
csc16517f@cs.toronto.edu
BA4270 (behind elevators)
Web page:
http://www.teach.cs.toronto.edu/~heap/165/F17/
416-978-5899

Using Course notes: Prologue, Mathematical Expression
Outline

Introduction

sets

functions

sums and products

propositional logic

notes

annotated slides
what’s CSC165?
a course about expression (communication):

- with and through programs
- with developers
- knowing what you mean
- understanding what others mean
- analyzing arguments, programs
CS needs math:

- graphics
- verification
- cryptography
- artificial intelligence
- complexity
- numerical analysis
- networking
- databases
doing well in CSC165

Doing well has two aspects: one being recognized as doing well by being awarded credit (grades), another being able to retain concepts and tools for use later on. Here’s how to do both:

- Read the course web page, and emails, regularly. Understand the course information sheet.

- Spend enough time. We assume an average of 8 hours/week — 4 in lecture/problem sessions, 4 reviewing preparing assignments

- Ask questions. Make your own annotations.
computers are precise — in identical environments they execute identical instructions identically

humans are as precise as necessary, and different human audiences require different levels of precision

The really difficult job is finding the right level of precision. Too much precision introduces unbearable tedium; too little introduces unfathomable ambiguity.

Proofs are primarily works of literature: they communicate with humans, and the best proofs have suspense, pathos, humour and surprise. As a side-effect, proofs present a convincing argument for some fact.
building sets... in math

English prose

list elements

set comprehension
some standard sets
boolean operations on sets
operations that produce new sets
sets of sets...
size of sets
specify functions

- ordered pairs
- pictures
- rule
from/to, domain/range, arrow notation
one-to-one, onto, etc.
sums, products
manipulating sums and products
propositional logic

- statements, variables
- operators
not \neg, and \land
or \( \lor \), implies \( \Rightarrow \)
annotated week 0