CSC165 fall 2019

Mathematical expression

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Using Course notes: Prologue, Mathematical Expression

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Introduction

sets

functions

sums and products

propositional logic

notes



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

understanding cool domains (number theory, graphs, 1..)

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CS needs math:

- graphics
- verification
- cryptography
- artificial intelligence
- complexity
- numerical analysis
- networking
- databases

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objectives

by the end of this course you will able to

- express mathematical ideas precisely
- read and understand other people's proofs
- read and identify flaws in incorrect proofs
- express your own proofs
- analyze (some) program complexityy
- engage with number theory, graph theory

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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:

- build a network of good peers
- 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

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ask questions; make your own annotations.

typical week workflow

reading and prep

lectures

work sheet(s)

problem sets — start early!

tests — study groups!

NB: This exam for this course is based on... this course! The best preparation is re-working all the materials listed above **not** old exams...

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balance

- 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.

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building sets...in math

English prose

list elements

set comprehension



some standard sets



boolean operations on sets



operations that produce new sets

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sets of sets...

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size of sets



specify functions

ordered pairs







from/to, domain/co-domain, arrow notation



one-to-one, onto, etc.



sums, products



manipulating sums and products

propositional logic







not \neg , and \land



or $\lor,$ implies \Rightarrow



Notes

