Homework 1

CS250 Discrete Structures I, Winter 2020

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Due: April 5, 2020

Your solutions must be typed (preferably typeset in LaTeX) and submitted as a PDF on D2L.
Solutions generally require clear explanations in complete sentences and must be in your own writing.

Your first assignment

- Familiarize yourself with the course layout in D2L.

- Look over the syllabus and schedule.

- Read the preface and 'how to use this book' as well as chapter 0.1 and 0.2 (page 1-23) of the textbook: http://discrete.openmathbooks.org/dmoi3.html.

- If you plan to use LaTeX and you have no prior experience, create a free account at https://www.overleaf.com/.

- Complete the following exercises.

Typesetting mathematical and logical languages   "In order to *do* mathematics, we must be able to *talk* and *write* about mathematics." For those of us studying CS, we should also be able to typeset mathematics for display on computers.

I strongly recommend using LaTeX to typeset your work for this class, work for other classes, academic research, and your resume. If you have no experience with LaTeX, now is a good time to learn the basics. For this class, you won't need much more than the basics and some Google searching to typeset your homework solutions. Producing polished mathematical documents with LaTeX is significantly easier than with MS Word or Google Docs.

LaTeX (pronounced LAH-tek) is a tool used to prepare documents. It's widely used for scientific papers, engineering documents, academic journals, books, resumes, and much more. Our textbook is typeset in LaTeX. Rather than WYSIWYG (what you see is what you get) document editors such as Microsoft Word or Google Docs, where edit the format directly, LaTeX is a language, much like C++, where you describe how you want your document to be formatted. Like C++, LaTeX is a compiled language. So, you write your content (source code) into an editor and a LaTeX compiler outputs a PDF file.

There are a number of good LaTeX IDEs (an integrated development environment, which combines an editor with a compiler and other tools). I like TeXstudio (`https://www.texstudio.org/`) for both Windows and MacOS. However, for beginners, I recommend Overleaf (`https://www.overleaf.com/`). Overleaf is an online browser based LaTeX IDE. It has tutorials, examples, and extensive documentation to help you get started.

Exercises The two problems for the first week's homework assignment involve getting comfortable with typing up mathematical symbols and getting familiar with the textbook and it's layout

Problem 1 Figure out how to typeset the following mathematical statements. (Hint, you can take a look at the HW1.tex file to find out how I did it.)

1. $f(x) = \mathcal{O}(n \log n)$ (Big 'O' notation)

2. $\neg(A \wedge B) \leftrightarrow (\neg A \vee \neg B)$ (De Morgan's law in propositional logic notation)

3. $\overline{A \cup B} = \overline{A} \cap \overline{B}$ (De Morgan's law in set theory notation)

4. $f(x) = \log_2 x^2$ (Subscripts and superscripts)

5. $A = \frac{\pi d^2}{4}$ (Fraction and special symbols)

6. $S = \{a, b, c, d\}$ (A set definition)

7. (Truth tables)

p	q	$p \wedge q$
T	T	T
T	F	F
F	T	F
F	F	F

8. (A summation statement)

$$\sum_{k=1}^{n} n$$

Problem 2 Read chapter 0.1 and 0.2 of the textbook and write up solutions to the following exercises (page 17–23 in the pdf version)

Exercises: 1, 3, 10, 12, 16, and 17.

(Hint: All of these have solutions or a check your answers field in the online version of the textbook: http://discrete.openmathbooks.org/dmoi3/sec_intro-statements.html)