LaTeX Reference Sheet for CSE 20

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1 Introduction

This reference sheet includes many of the most important LaTeX commands used in CSE 20: Discrete Mathematics, as well as miscellaneous commands useful for formatting your document. Where a line item includes multiple commands separated by commas, all of the listed commands have the same effect. The commands listed here are only a small subset of what LaTeX has to offer. For further exploration, we recommend the following resources:

- Overleaf Tutorials: https://www.overleaf.com/learn/latex/Tutorials. Overleaf is a great place to start learning the basics of LaTeX. If you can't find what you're looking for in the side bar, there's a convenient search function as well.
- Google. When in doubt, Google (or use your preferred search engine) what you want to do—usually, something turns up in the top 2-3 results. Commonly helpful sites include Overleaf and StackOverflow.

2 Packages

Most of the packages below are already in the CSE20packages.tex file, so you can simply upload that file into your project and add `\input{CSE20packages.tex}` to your document preamble. In the homework tex files, this command is usually already included as `\input{../CSE20packages.tex}`. If you get a compile error, try deleting the ../ and recompiling :)

Package	Functionality	Notes
amsthm	collection of proof and theorem environments	
amsmath	enhancements for writing math formulas	
amssymb	extended collection of math symbols	
amsfonts	special fonts for math symbols	includes blackboard bold (`\mathbb{}`)
hyperref	url and hyperlink support in pdfs	
tabularx	enhanced features for tables	
graphicx	enhanced support for graphics	includes `\includegraphics[]{}`
xcolor	greater control and flexibility over colors	
tikz	generates plots, graphs, diagrams	not needed in CSE 20 but super useful!
physics	includes automatic bracing with `\qty()`, etc.	can use `\qq{}` to insert text in math mode

3 Environments

These should be used with \begin{environment} and \end{environment}.

Environment	Functionality	Notes
align align*	math mode with multiple lines (numbered lines) math mode with multiple lines (unnumbered lines)	use \\ to end each line and & to align equations, e.g. &=
center	centers anything in between, e.g. images, tables	
tabular	format tables with rows and columns	c|cc for columns and vertical lines \hline for horizontal lines & to separate row elements \\ to end rows
itemize enumerate	unordered (bulleted) list ordered (numbered) list	\item or \item[(a)] (to manually set the counter)
verbatim	mode to write raw text without any formatting	text doesn't wrap; you have to start new lines manually

4 Page Formatting

Command	Description
% comment	add comments in .tex files
\\, \newline	newline
\vspace{1.5 cm}	vertical padding (replace 1.5 cm with desired height)
\newpage	new page
\pagebreak[4]	optional parameter from 0-4 (for encourage vs. insist on page break)
\smallskip, \medskip, \bigskip	spacing between paragraphs, list items, etc.

5 Text Formatting

Example Format	Command	Description
default	\text{}	normal text
mod	\textbf{}	bold
emph	\textit{}	italics
`code`	\texttt{}	monospace/code
$\boxed{box}$	\boxed{}	boxed text
color	\textcolor{color}{text}	colored text
a space	~	space (useful for padding in math mode)
more space	\quad and \qquad	larger space
“quote”	``quote”	opening and closing quotations

6 General Math

From this section onward, the listed commands should be used in math mode, such as with `$...$` (inline math), `$$...$$` or `\[...\]` (display mode), or `align` (math environment).

Symbol	Command	Description
$x \cdot y$	\cdot	multiplication
$\sqrt{x}$	\sqrt{}	square root
$\frac{1}{2}$	\frac{top}{bottom}	fraction
$\sum_{i=0}^{n}$	\sum_{start}^{end}	summation
$\lceil log_b n \rceil$	\lceil \rceil	ceiling
$\lfloor log_b n \rfloor$	\lfloor \rfloor	floor
a^{xy}	base^{superscript}	superscript
b_{ij}	base_{subscript}	subscript
$\leq$	\le, \leq	less than or equal to
$\geq$	\ge, \geq	greater than or equal to
$\neq$	\ne, \neq, \not=	not equal
$\approx$	\approx	approximation

7 Sets

Symbol	Command	Description
$\{\}$	\{ \}	curly braces
$\in$	\in	element in set
$\notin$	\notin	element not in set
$A \times B$	\cross	Cartesian product
$A \circ B$	\circ	set concatenation
$\mathbb{Z}$	\mathbb{Z}	all integers
$\mathbb{N}$	\mathbb{N}	all natural numbers
$\mathbb{R}$	\mathbb{R}	all real numbers
$\cup$	\cup	union
$\cap$	\cap	intersection
$\overline{A}$	\overline{}	complement
$\emptyset$	\emptyset	empty set
$\subseteq$	\subseteq	subset
$\subsetneq$	\subsetneq	proper subset
$\not\subseteq$	\not\subseteq	not a subset
$\mathcal{P}$	\mathcal{P}	power set

8 Logical Connectives

Symbol	Command	Description
$\land$	\land	logical AND
$\lor$	\lor	logical OR
$\oplus$	\oplus	XOR
$\neg$	\lnot	logical NOT (inverter)
$\rightarrow$	\rightarrow	conditional
$\leftrightarrow$	\leftrightarrow	biconditional
$\equiv$	\equiv	logical equivalence
$\not\equiv$	\not\equiv	not logically equivalent

9 Quantifiers

Symbol	Command	Description
$\exists$	\exists	existential quantifier
$\forall$	\forall	universal quantifier

10 Miscellaneous

Symbol	Command	Description
λ	\lambda	lambda (empty string)
$\therefore$	\therefore	therefore
$\because$	\because	because/since
$\square$	\square	end of proof (Q.E.D.)
$\ldots$	\ldots	ellipses
()	\left(\right)	automatically-sized parentheses
$\leqslant$ and $\geqslant$	\leqslant and \geqslant	how to be extra
$\clubsuit, \heartsuit, \diamondsuit, \spadesuit$	\clubsuit, \heartsuit, etc.	just for fun