DS 320 Algorithms for Data Science **LaTeX Resource**

General Information

LaTeX is a document markup language that will help you produce beautiful mathematical solutions. It allows you to produce professional-looking pdf or dvi documents with relative ease. It's used by science researchers to typeset their documents in a consistent way, that is, you fill in the information and LaTeX worries about the visual presentation.

There are a lot of free LaTeX distributions that you can easily acquire for any platform. There is a **homework template** on the course website, and there are plenty other useful pages on the web, including a very good Wikibook and a stackexchange page just for LaTeX. Feel free to use the internet to look up how to do things in LaTeX. Below are the basics to get you started:

Getting LaTeX

The first step is to get LaTeX installed on your computer. It's just like any other programming language in this regard. For links to installation pages, look here:

`https://en.wikibooks.org/wiki/LaTeX/Installation#Distributions`

LaTeX Editors

Like any programming language, you can edit LaTeX source in any text editor, but it helps to have an editor which is syntax-aware. You can find a list of editors here:

`https://en.wikibooks.org/wiki/LaTeX/Installation#Editors`

There are many options. If you are new to LaTeX, I would recommend something simple like TeXworks. If you find yourself writing larger documents in LaTeX later in your career, you might want to upgrade to something with more bells and whistles, like TeXstudio.

Compiling a Document

Once you have a LaTeX editor that works, it's time to actually make a document. Here's some code which should compile if you type it in a new document and press the "Typeset" or "Compile" button in your editor:

```
\documentclass{article}
\begin{document}
Hello, world!
\end{document}
```

The first line indicates that you want the document formatted as an article (rather than a book or a thesis or as presentation slides etc.). Usually, article formatting will suffice for this class. The second and fourth lines define the body of the document, where you write the stuff you want to appear. In this case, you're making "Hello, world!" appear.

For purposes of your DS 320 homework, I'd recommend using the LaTeX template document posted on the course website. If all you did was find the places where there is text on the template and replaced that text with the stuff you wanted to submit as homework, you'd get pretty far. If you want to see what's going on in the template, you can look at this guide to the structure of LaTeX documents:

`https://en.wikibooks.org/wiki/LaTeX/Document_Structure`

At the bottom of the template are lots of environments and tricks you can do in LaTeX. Pattern matching will get you far here, as will google, if you want to learn more.

Math Stuff

LaTeX's main advantage is its ability to immaculately typeset mathematics. Whenever you want a piece of mathematics notation typeset, it must be enclosed by `$`'s or `\[` and `\]`. If you want it displayed on its own line, centered on the page, you can also enclose it in double `$`'s. Hopefully you can get the idea by looking at how it is done in the template. Below is a listing of some math symbols that will be useful to you.

Set symbols:

symb	latex	symb	latex	symb	latex	symb	latex
$\subset$	`\subset`	$\not\subset$	`\not\subset`	$\cap$	`\cap`	$=$	`=`
$\subseteq$	`\subseteq`	$\not\subseteq$	`\not\subseteq`	$\cup$	`\cup`	$\neq$	`\neq`
$\overline{S}$	`\overline{S}`	$S \setminus T$	`S \setminus T`	$\{$	`\{`		
$S \times T$	`S \times T`	$\bigcup_{i=0}^{n} S_i$	`\bigcup_{i=0}^n S_i`	$\}$	`\}`		
$\emptyset$	`\emptyset`	$v_1, v_2, \ldots, v_n$	`v_1, v_2,\ldots, v_n`	$\notin$	`\not\in`	$\in$	`\in`

Superscripts, Subscripts, etc.

v_0	`v_0`	v^0	`v^0`	$\bar{A}$	`\bar{A}`	G'	`G'`
$\tilde{A}$	`\tilde{a}`	$\hat{v}$	`\hat{v}`	$e_{ij}^{c^2}$	`e_{ij}^{c^2}`	c^*	`c^*`

Proof symbols:

$\forall$	`\forall`	$\leftarrow$	`\leftarrow`	$\stackrel{def}{=}$	`\stackrel{def}{=}`	$\Box$	`\Box`
$\exists$	`\exists`	$\rightarrow$	`\rightarrow`	$\nexists$	`\not\exists`	$\iff$	`\iff`
$\Rightarrow$	`\rightarrow`	$\Leftarrow$	`\Leftarrow`	$\not\forall$	`\not\forall`	∞	`\infty`

Other math symbols:

$\div$	`\div`	$\geq$	`\geq`	rah	`\textrm{rah}`	$\lfloor x \rfloor$	`\lfloor x \rfloor`
$\sqrt{x}$	`\sqrt{x}`	$>$	`>`	**bah**	`\textbf{bah}`	$\lceil y \rceil$	`\lceil y \rceil`
$\ngeq$	`\not\geq`	$\leq$	`\leq`	tah	`\texttt{tah}`	$\sum_{i=0}^{n} v_i$	`\sum_{i=0}^n v_i`
$\frac{x}{y}$	`\frac{x}{y}`	$<$	`<`	*pha*	`\emph{pha}`	$\prod_{i=0}^{n} v_i$	`\prod_{i=0}^n v_i`
α	`\alpha`	β	`\beta`	$\wedge$	`\land`	$\vee$	`\lor`