CS3000: Algorithms & Data — Summer '25 — Laney Strange

LaTeXGuide

LaTeXis a typesetting tool that's used extensively among mathematicians and computer scientists. It's similar to programming, in that you type in your source, and then compile it to produce a PDF or other document. It's especially good at typesetting mathematical symbols, which makes it quite handy for an algorithms course.

In CS3000, we'll ask you to typeset your homework solutions. You are not required to use LaTeXbut it's a good idea to get some practice with it, and in many cases it's easier than formatting mathematical symbols in Google Docs or MS Word.

You'll typically need at least one style file (`.*sty`) and one LaTeXsource file (`.tex`). You can also include packages that have specific tasks like creating mathematical symbols and incorporating images. For the CS3000 homeworks, you can simply grab the `.tex` file we provide, which will have just the problems written in. You can add your solutions within the file, and then compiled it in LaTeX.

LaTeXResources

- Overleaf tutorial
- Learn LaTeX
- LaTeX Guide
- Mathematical Symbols in LaTeX

Overview

Steps to get started

- Download the style file we'll use for pseudocode, https://course.ccs.neu.edu/cs3000/resources/clrspseudo.sty.
- Go to https://www.overleaf.com and create a new, blank project. (We use Overleaf to create CS3000 homeworks and recitations, but it's not the only way to use LaTeX. Feel free to look into other options if you prefer them!)
- Upload the `.sty` file and the `.tex` file with the homework problems.
- Type your solution into the `.tex` file and hit "recompile" to produce your PDF. (As with programming, we recommend compiling frequently so you catch any bugs before they get out of hand!)

Typesetting Math for CS3000

- Use `$ ... $` to begin and end math-mode inline. Use `\[ ...\]` to begin and end math-mode on a new line.

- In math mode, all of these symbols can simply be typed in from the keyboard as you normally would: `+ - = ! / ( ) [ ] < > ' : *`‘. Put an escape character to make curly braces appear `\{...\}`.
- Use `\cdot` to make the multiply-dot, `\ldots` to make an ellipsis, and `\pm` for plus-minus.
- Use `O`, `\Omega`, `\Theta` in math mode for the asymptotic bounds.
- Use `x^{}` for exponent, where whatever goes in the {} will be superscripted.
- Use `x_{}` for subscripting, where whatever goes in the {} will be subscripted.
- The commands `\log` and `\sqrt{}` do what you'd expect.
- Use `sum_{i=1}{10}` for a summation going from $i = 1$ to 10.
- Use `\frac{numerator}{denominator}` to make a fraction.
- Use `\\` to break a line.

Example 1

Suppose you want to typeset the following:

The quadratic formula is $ax^2 + bx + c = 0$. Let's solve for a: $ax^2 = -bx - c$ and $a = \frac{-bx-c}{x^2}$.

You would type the following into LaTeX:

```
The quadratic formula is $ax^2 + bx + c = 0$. Let's solve for $a$: $ax^2 = -bx - c$
and $a = \frac{-bx - c}{x^2}$.
```

Example 2

Suppose you want to typeset the following:

Below we find the quadratic formula and solve for x.

$$ax^2 + bx + c = 0$$
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

You would type the following into LaTeX:

```
\[ax^2 + bx + c = 0 \]
\[x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}\]
```

Example 3

Suppose you want to typeset the following completely made-up example:

We compute the factorial of n to get $n! = n \cdot (n-1) \cdot (n-2) \cdot \ldots 2 \cdot 1$. Finally, the run-time of this algorithm as $O(n! \log n)$

You would type the following into LaTeX:

```
We compute the factorial of $n$ to get $n! = n \cdot (n-1) \cdot (n-2) \cdot \ldots 2
\cdot 1$. Finally, the run-time of this algorithm as $O(n! \log n)$
```