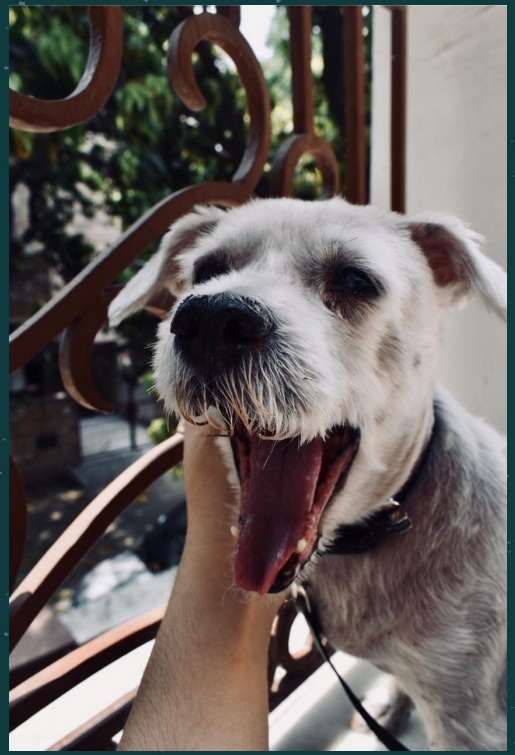
ANNOUNCEMENTS

- Our new course calendar is now available at: **https://tinyurl.com/gpiF20**
- For those of you watching asynchronously, we're making **async breakout sessions**! Check out **Piazza** for more details!
- **sportslab** is due at **11:59 pm** tonight!
- This week's extratation will be **Summer Opportunities**. Watch **Piazza** for an announcement soon!


LATEX
The only typesetting program you need.
By: Deepayan Patra & Sayan Chaudhry
A
B
C

PET TAX

Bugs



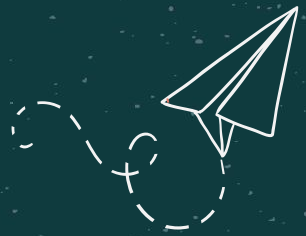
Delphi

01

INSTALLATION

02

WRITING MATH



03

WRITING CODE

04

MACRO MAGIC


INSTALLATION

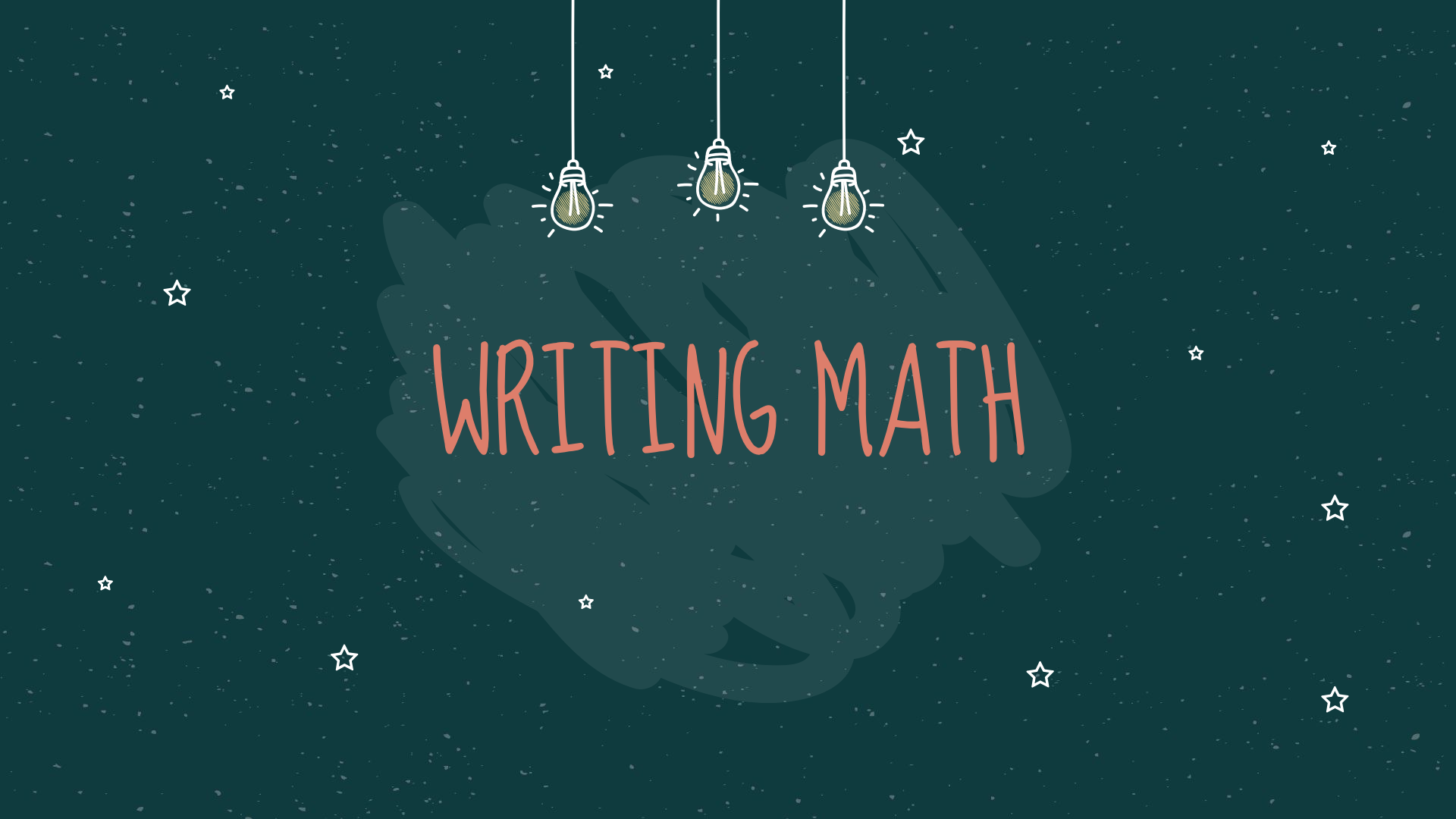
TWO SCHOOLS OF THOUGHT

OVERLEAF

- An online LaTeX editor
- Grab and go
- Chrome + Overleaf = 😈
- Need to be online
- Awesome for collaboration

LOCAL

- Edit using your favorite IDE
- Might be a pain to setup
- Much better performance
- Can do homework on a plane
- Need to use `git` or Live Share


WRITING MATH

I WANNA MAKE MATH PRETTY

LaTeX's main purpose is to make typesetting easy for technical and scientific documents, most often math (e.g. **15-151 bonus**).

Modes

Math has to be written within a "math-mode" to differentiate from regular text.

a. **Inline:** Write math-formatted text inline
   i. `$\frac{x + y}{12}$`
b. **Labeled Equation:** Centered equation on newline
   i. `\begin{equation} \label{ezmath} 1 + 1 = 2 \end{equation}`
   ii. Labels can later be linked to: `\hyperref{ezmath}`
c. **Unlabeled Equation:** Centered equation on newline
   i. `\[ 1 + 1 = 2 \]`

BUT I RAN OUT OF SPACE

Alignment

Math can be split over multiple lines and better styled with alignment;

- `&` is the alignment keyword and sets the points where equations are vertically aligned
- **Numbered Equation:** Centered equations aligned at `&`
  - `\begin{align} a &= b\\ &= c \end{align}`
  - **Protip:** You can suppress the line numbers with `\begin{align*}` instead
  - **Protip:** Use `\tag{...}` to cite your lines!
- **Multline Equation:** Centered equations with no alignment points
  - e.g. `\begin{multline} a + b + c + d\\ e + f + g + h\end{multline}`

🚨 **ALWAYS close any `\begin{...}` with an `\end{...}`** 🚨

USEFUL FEATURES

EQUATIONS

- `\begin{equation}`
  `...`
  `\end{equation}`
- More:
  - `\begin{multline*}`
  - `\begin{align*}`
  - `\begin{gather*}`
  - `\begin{cases}`

MATRICES

- ```
  \begin{matrix}
  1 & 2 & 3\\
  4 & 5 & 6
  \end{matrix}
  ```
- More:
  - `pmatrix`, `bmatrix`, `Bmatrix`, `vmatrix`, `Vmatrix`

PROOFS

- `\newtheorem{...}`
- `\begin{proof}...\end{proof}`
- More:
  - Induction (templated)
  - QED stylings (templated)

RELATION & BINARY OPERATORS

- General
  - `+`, `-`, `\div`, `\times`, `\pm`, `\ge`, `\geq`
- Trigonometric
  - `\sin`, `\cos`, `\tan`
- Set
  - `\in`, `\subset`, `\subseteq`
- Calculus (templated)

LETTERS & SYMBOLS

- Greek letters
  - `\SYMBOL_NAME` (e.g. `\mu`)
- Arrows
  - `\DIR_ARROW` (e.g. `\rightarrow`)
- `\infty`, `\nabla`, `\emptyset`, `\neg`

PROBABILITY

- `$P(A \binom B)$` → $P(A \binom B)$
- `\binom{n}{k}`
- `\bar`
- `\hat`
- `A \perp B`
- Probability, combinations, expectation, variance (templated)
  ```

DON'T FALL INTO A PIT

Quotations

- ✔️ Two backticks start, two single quotations end: ``` ``...'' ```
- 🚫 This will not work: `"..."`

Math Mode

- 🚫 `$$...$$` is no longer supported by LaTeX
- ✔️ Use `\[...\]` instead.

Parentheses

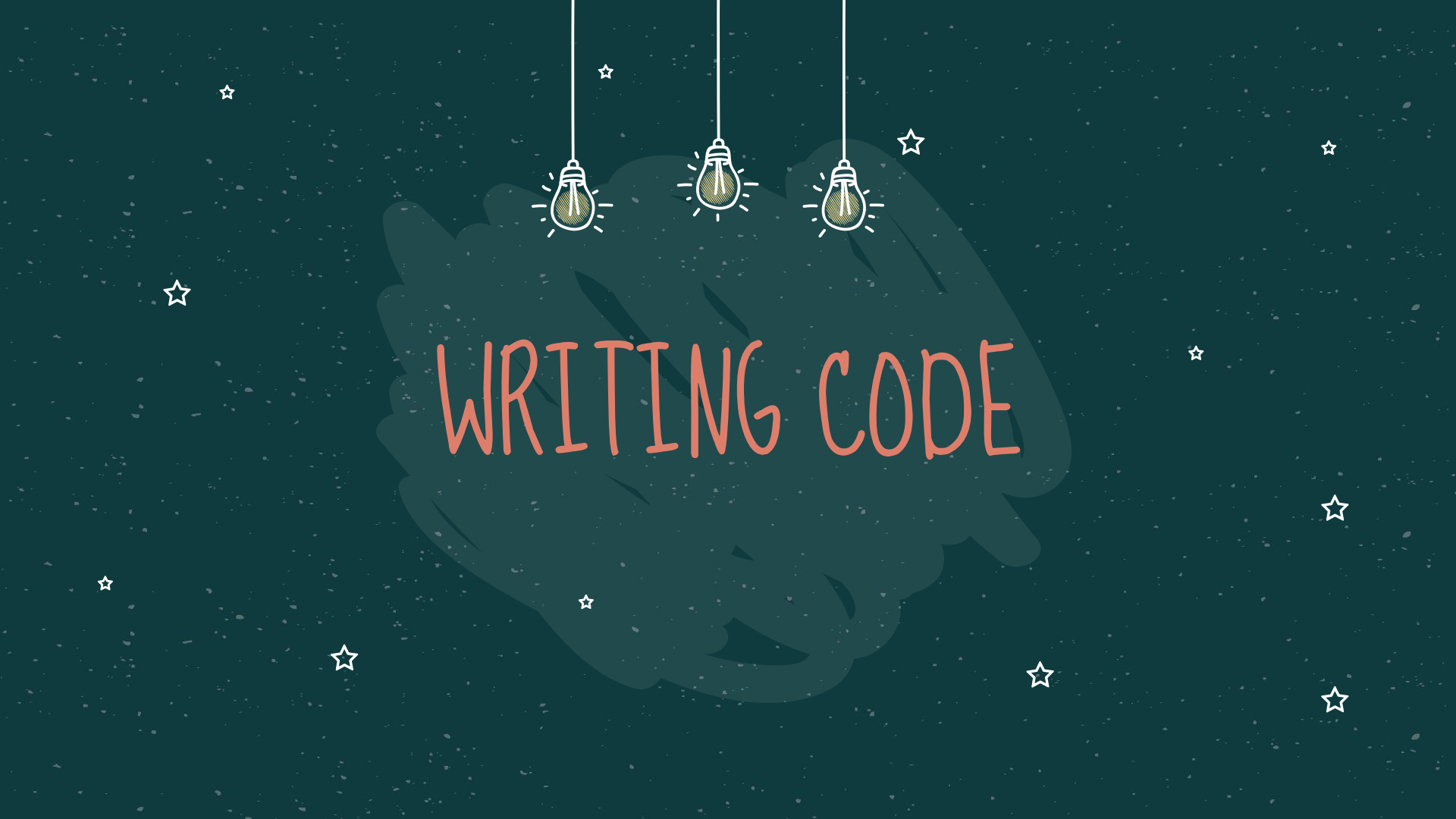
- 🚫 Do not use parenthesis like `(5 * f(x))`
- ✔️ Instead use `\left(` and `\right)` every time for correct sizing

Special Characters

- When using the letter L as a variable name, use `\ell` so it looks like ℓ instead of l
- A number of special characters exist in LaTeX. To show up in output, the character must be escaped:
  - `&`, `%`, `$`, `#`, `_`, `{`, `}` → `\&`, `\%`, `\$`, `\_`, `\#`, `\_`, `\{`, `\}`
  - `~`, `^`, `\` → `\textasciitilde`, `\textasciicircum`, `\textbackslash`

Newline

- `\\` should NOT be used for text newlines
  - This command has different meanings under different environments. Be explicit with using `\newline`, `\linebreak`, or `\par` instead.


WRITING CODE

BUT MACKEY, I JUST WANNA CODE

VERBATIM

It's the 1980s guys. People have **typewriters**.
With LaTeX, you have typewriters on your computer:

- `\begin{verbatim}...\end{verbatim}`
- Will type out exactly what you type in, as if you were writing on a typewriter
- By default will turn text into monospace text (i.e. code style)

Special commands:

- Emphasize whitespace
  - `\begin{verbatim*}`
    `...`
    `\end{verbatim*}`
- Verbatim environment
  - `\verb|...|`

LISTINGS

Aight LaTeX moved to the **21st century** now.
Way more bells and whistles to play around with:

- `\begin{lstlisting}[options=...]`
  `...`
  `\end{lstlisting}`
- Will also create monospace text, but way more configuration options:
  - **Language:** `[options]`
  - **Syntax highlighting:**
    - `[keywordstyle, stringstyle, commentstyle, morecomment]`

Special commands:

- Listings environment inline
  - `\lstinline{...}`
- Import code from file
  - `\begin{lstlisting}{path_to_file}`


MACRO MAGIC

FACTS OF LIFE

LaTeX is noice.

- It makes math look pretty.
- You can type complicated symbols.
- It makes code look pretty.

LaTeX is a good to know.

- You get bonus points in 15-151.
- Pretty is better than ugly.

LaTeX is a need to know.

- Some classes will require your homework to be typeset.
- Some classes will require your homework to be typeset. x2
- Conferences will require a .tex source of your paper.
- Collaboration on large papers for non-LaTeX mediums is almost impossible.

BUT AT WHAT COST?

- Everything has **tradeoffs**.
- Typesetting is **glorious** but **time-consuming**.
- But it doesn't have to be!
- You can create your **own commands** to template out commonly used things in your homework workflow for the rest of your college career.
- The sooner you start, the more time you'll save!

COMMAND CENTER

- `\newcommand{\NAME}[#]{...}`
  - `\newcommand{\R}{\mathbb{R}}`
  - `\newcommand{\dotseparated}[2]{#1 \cdot #2}`
- 🚨 Be cautious of whether your command will be used in math mode or not.
- You might need to use `\renewcommand` if a prexisting command has the same name.
- You can use these for titles, problems, common proof templates (induction), etc.
- In fact you can use our own LaTeX template for homeworks at CMU!!!

Closing Thoughts

- **Practice, Practice, Practice**
- Template
- LaTeX Cheat Sheet
- Ask **Questions**
  - StackOverflow
  - LaTeX Community
- **Make** Things!

LAB PRO TIPS

- Please go through the writeup on Autolab before starting this week!
- Each task has a header describing what you will do in the file!
- Remember to uncomment the task in main.tex to work on it!
- There may be hints at the bottom of each lab to help you along :)
- The syntax for zipping a set of files (file1, file2, file3, for example) is as follows:

zip archivename.zip filename1 filename2 filename3

- You can rename a project in Overleaf by selecting the project, going to “More”, and then applying rename!
- The Makefile will only work if you have a LaTeX installation!