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CS-101 Assignment #1

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Problem 1: Introduction to the template

Hello! This is a simple homework template written in LaTeX. The goal of the of this template is to provide some very light-weight boilerplate to help you get started quickly, without getting in your way with overly complex styling.

If you are new to Latex, great! It may be a pain at first, but I promise after awhile you'll grow to love it. LaTeX has been around forever so while that means it has it warts, its mostly good news for us since its usually pretty easy to install on most systems (if it isn't already installed by default) and there is a great community online, there to help you in your time of need! As with most things in life, most of the time if you don't know how to do something in LaTeX, a quick Google search will bring you to several other people asking the exact same question.

To get started, ShareLaTeX has some great tutorials available on their website I'd recommend taking a look at: https://www.sharelatex.com/learn/

Some very basic features that this template provides:

- A number of useful packages imported by default
- A question environment
- An answer environment (more on this below)
- An easy to use makefile (you'll need to edit this if you want to rename the template file)
  - Run `make` or `make build` to build the *homework_template.tex* file (will produce a *homework_template.pdf* file)
  - Run `make example` to build the *example.tex* file (this file)
  - Run `make clean` to clean up all of the extraneous files produced the Latex build proccess

Problem 2: Question and Answer Environments

Every new question/problem you work on should be wrapped in its own "question" environment. The question environment is a custom environment that this template defines and is what is generating all of these "**Problem #: Title**" headers that you are seeing.

The LaTex code for the question environment, looks like this:

```
\begin{question}{Question Number}{Question Title}
    Your text goes here!!
\end{question}
```

The template also include an "answer" environment you can optionally use. This is useful when you are including the question text alongside your own work to help show what is and what is not your work.

The answer environment looks like this and can be nested inside you question environment. All it really does is change the font and color of everything inside it, while adding padding on both sides. So, don't worry, you can still you all of the math you want and use LaTeX as you normally would inside of it.

$$\int_a^b f'(x)dx = f(b) - f(a) \tag{1}$$

and it looks a little something like this:

```
\begin{question}{Question Number}{Question Title}
    You can type the question here...
    \begin{answer}
        And put your answer here!
    \end{answer}
\end{question}
```

Problem 3: Miscellaneous stuff from here on out..

TODO: Shortcuts

LaTeX makes it wasy for you to define you own commands, which can be super helpful if you find yourself repeating things quite often. For example, that "todo" above is a custom command, helpful to leave in a question if you feel like it needs more work and you want to remind youself to come back to it later.

(a) The "letenum" environment is a helpful shortcut for a list with leters insteand of numbers.

(b) Check the top of either of the template `tex` file for some more examples.

(c) I haven't included many and they are more meant as examples to follow when adding your own, but if you think you have some good ones, please let me know so I can add them!

Problem 4: Psuedo Code

If you ever find yourself having to write some psuedocode, you can use the algorithmicx package and it's `algorithmic` environment:

if $i \geq maxval$ **then**
    $i \leftarrow 0$
else
    if $i + k \leq maxval$ **then**
        $i \leftarrow i + k$

end if
end if

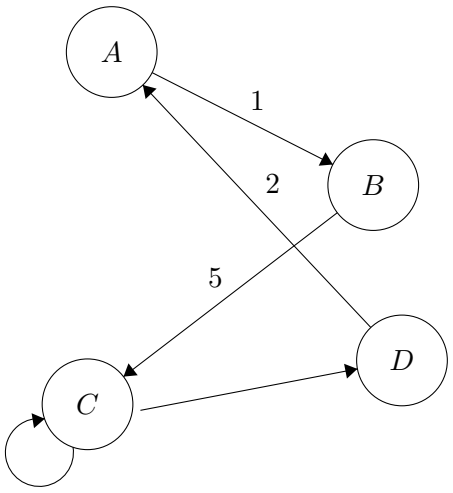
If you find yourself having to write some not-so psuedocode, you can use the listings package for some simple syntax highlighting for a multitude of languages.

```
#include <stdio.h>
#define N 10
/* Block
 * comment */

int main()
{
    int i;

    // Line comment.
    puts("Hello world!");

    for (i = 0; i < N; i++)
    {
        puts("LaTeX is also great for programmers!");
    }

    return 0;
}
```

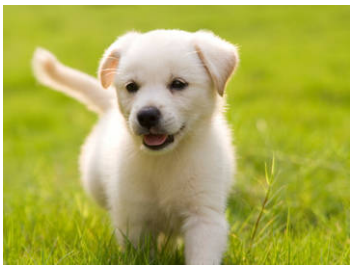
You can alternatively use the minted package for better syntax highlighting, but it is a little harder to set up and has an addition Python package dependency and so has been omitted from this template.

Problem 5: Graphs, Graphics, and Tables

If you need to draw any sort of graph, DFA, etc., I highly recommend Even Wallace's DFA creator. You can create something graphically and then export it to LaTeX.



If you want to include a picture inside your LaTeX homework you can put your image in the "images" folder and use the `includegraphics` command.



You can use the `tabular` environment for tables. The ampersand (&) is used to specify one cell from another and is the common operator for most alignment operations in LaTeX.

	A	B	C	D	E	F
One	0	0	0	0	0	0
Two	0	0	0	0	0	0
Three	0	0	0	0	0	0
Four	0	0	0	0	0	0

Problem 6: Fitch

Fitch is a package for formating logical proofs.

1	$q \to (p \to r)$	Premise 1
2	$\neg r$	Premise 2
3	q	Premise 3
4	$p \to r$	MP| $\to_e$ on (1,3)
5	$\quad p$	Assume
6	$\quad r$	MP| $\to_e$ (4,5)
7	$\quad r \wedge \neg r$	$\wedge_i$ (6,2)
8	$\quad \bot$	$\neg e$
9	$\neg p$	$\neg_i$ (4-8)

Problem 7: Acknowledgements

As with most LaTeX documents, this template ~~was inspired by~~ shamelessly stolen from a multitude of other LaTeX templates and forum comments. I never kept any sort of running list, so I can only thank the fantastic online LaTeX community.