This is an extremely simple tutorial on the basics of how to do your problem sets in LaTeX (pronounced *lay-tek*). The broad outline is this:

1. You use a LaTeX editor to write your *.tex* file

2. Your *.tex* file is instructions for how you want your final *.pdf* to look

3. Once you have some LaTeX stuff written, you hit a "compile" button

4. This will generate a *.pdf* file in the same folder with the same name as your *.tex* file (which you can send to your math camp instructor)

5. Compiling is also going to create some intermediate files (e.g., *.log*) which you can just ignore

First, you need to download a LaTeX distribution (back end code to make it work).

• For Mac, download MacTeX

• For Windows, download MikTeX

Next, you need to open a LaTeX editor (program to use).

• MacTeX comes with TeXShop

• MikTeX comes with TeXworks

• Both of these are pretty basic, and there are lots of choices for fancier editors with more features. Personally, I prefer to use TeXstudio, shown below
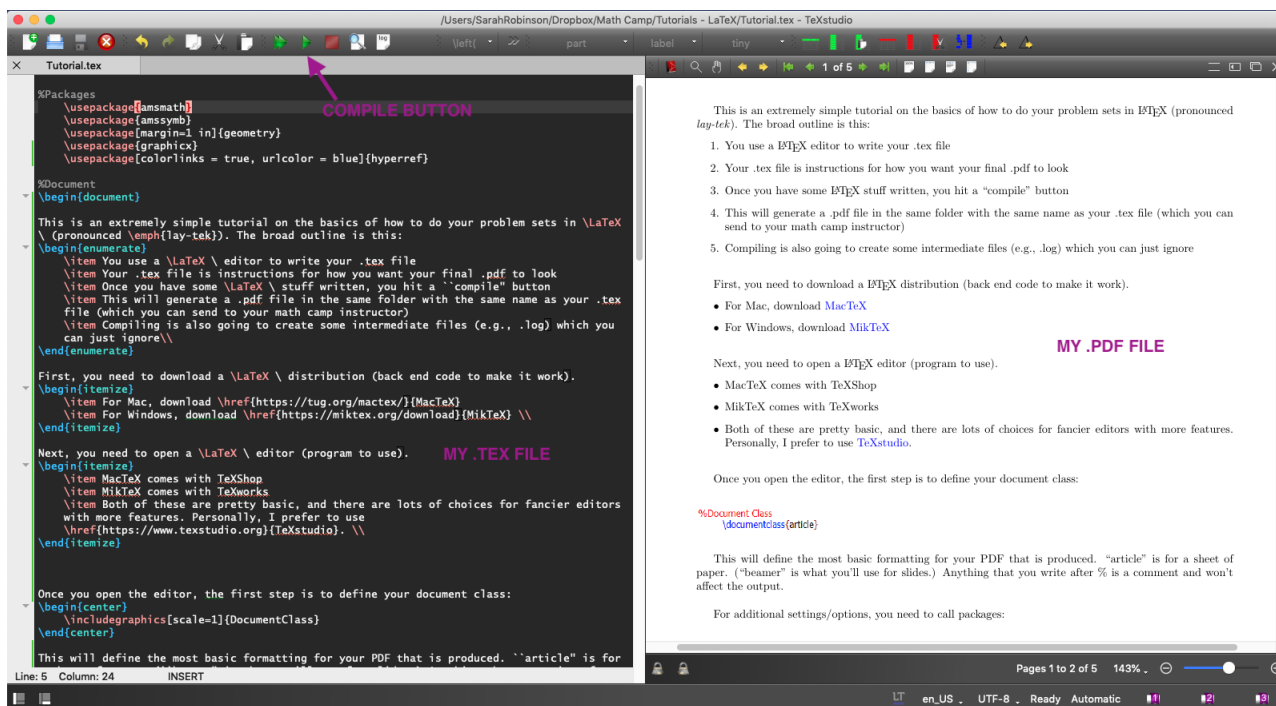
Once you open the editor, the first step is to define your document class:

```
%Document Class
     \documentclass{article}
```

This will define the most basic formatting for your PDF that is produced. "article" is for a sheet of paper. ("beamer" is what you'll use for slides.) Anything that you write after % is a comment and won't affect the output.

For additional settings/options, you need to call packages:

```
%Document Class
     \documentclass{article}

%Packages
     \usepackage{amsmath}
     \usepackage{amssymb}
     \usepackage[margin=0.5 in]{geometry}
```

Packages like "amsmath" and "amssymb" define commands that let you use math symbols and certain environments that are useful for typing up problem sets. "geometry" lets you change document settings; the option [margin = 0.5 in] sets the document margins to 1/2 inch. Note that the last package illustrates how much of the syntax works. \ defines something as a command, [ ] specifies options, and { } is for required fields.

Next, we want to think about environments. Environments in latex require a "begin" command and an "end" command. YOUR DOCUMENT WILL NOT COMPILE WITHOUT BOTH. For the document environment, we add a few more lines:

```
%Document Class
     \documentclass{article}

%Packages
     \usepackage{amsmath}
     \usepackage{amssymb}
     \usepackage[margin=0.5 in]{geometry}

%Other Document Settings
     \setlength\parindent{0pt}

%Document
\begin{document}




\end{document}
```

Anything typed between "begin" and "end" document will appear in the PDF once compiled. Note I've also added a document setting. These commands shut auto-indenting off. As an example of useful text, you can add a header to let your math camp instructor know who you are (picture on the next page):

```
%Document Class
      \documentclass{article}

%Packages
      \usepackage{amsmath}
      \usepackage{amssymb}
      \usepackage[margin=0.5 in]{geometry}

%Other Document Settings
      \setlength\parindent{0pt}

%Document
\begin{document}
James Banovetz\\
Math Camp 2016\\
8/29/2013 \\

\end{document}
```

The double-backslash \\ indicates that a new line should be started. New lines start automatically with new environments, and if you skip a line in plain text. For problem sets, you want to use the "enumerate" environment:

```
%Document Class
      \documentclass{article}

%Packages
      \usepackage{amsmath}
      \usepackage{amssymb}
      \usepackage[margin=0.5 in]{geometry}

%Other Document Settings
      \setlength\parindent{0pt}

%Document
\begin{document}
James Banovetz\\
Math Camp 2016\\
8/29/2013 \\

\begin{enumerate}
\item
\end{enumerate}

\end{document}
```

Enumerate is how you get numbered/lettered lists. It requires the command "item." Each item receives a number, corresponding to its position in the list. To add text for a question:

```
%Document
\begin{document}
James Banovetz\\
Math Camp 2016\\
8/29/2013 \\

\begin{enumerate}
\item \textbf{This is where the text goes for question one. What is 2+2+2?} \\[5pt]

\end{enumerate}

\end{document}
```

"textbf" bolds the text. adding [5pt] after the double-backslash adds an additional 5 points of space between this and whatever comes next. The document could now be compiled if you wanted. To do so, click

the green arrow in TeXWorks, or the Typeset button in TeXShop.

To answer math problems, you usually use something like the "align" environment:

```
%Document
\begin{document}
James Banovetz\\
Math Camp 2016\\
8/29/2013 \\

\begin{enumerate}
\item \textbf{This is where the text goes for question one. What is 2+2+2?} \\[5pt]
    I'm going to do some simple addition as an example.
    \begin{align*}
    2 + 2 + 2 & = (2 + 2) + 2 &\text{(by associativity)}
    \end{align*}

\end{enumerate}

\end{document}
```

The asterisk (*) tells the align environment not to number lines (otherwise, a "(1)" will appear when compiled). The ampersand & tells LATEX how to align things; if you put the equal sign after the first &, all of your equal signs will line up as you add more lines. The second & also aligns. I usually use "text" to add comments. We can add more lines to finish the problem:

```
%Document
\begin{document}
James Banovetz\\
Math Camp 2016\\
8/29/2013 \\

\begin{enumerate}
\item \textbf{This is where the text goes for question one. What is 2+2+2?} \\[5pt]
    I'm going to do some simple addition as an example.
    \begin{align*}
    2 + 2 + 2 & = (2 + 2) + 2 &\text{(by associativity)} \\
    & = 4 + 2 &\text{(adding inside the parentheses)} \\
    & = 6 &\text{(by simple addition)}
    \end{align*}
    This completes the first ``problem"

\end{enumerate}

\end{document}
```

Again, the \\ tells LATEXwhen to start a new line. We can then add additional questions by adding another "item." The "enumerate" environment will also automatically nest things, e.g., the first level of "enumerate" marks things 1, 2, 3... while an "enumerate" opened inside of the first "enumerate" marks items as a, b, c,... etc. (picture on next page):

```
%Document
\begin{document}
James Banovetz\\
Math Camp 2016\\
8/29/2013 \\

\begin{enumerate}
\item \textbf{This is where the text goes for question one. What is 2+2+2?} \\[5pt]
        I'm going to do some simple addition as an example.
        \begin{align*}
        2 + 2 + 2 & = (2 + 2) + 2 &\text{(by associativity)} \\
        & = 4 + 2 &\text{(adding inside the parentheses)} \\
        & = 6 &\text{(by simple addition)}
        \end{align*}
        This completes the first ``problem."

\item \textbf{This is where the text goes for question two.}
        \begin{enumerate}
        \item\textbf{Question two, subpart (a).}
        \item\textbf{Question two, subpart (b).}
        \end{enumerate}
\end{enumerate}

\end{document}
```

Compile the document, and off you go! Some more things to note:

- If your document doesn't compile, check that (a) you've spelled all of your commands correctly and (b) you've opened and closed all environments.

- Indenting (e.g., indenting the lines that are under each item) can be useful for keeping yourself organized, but doesn't affect the output.

- Empty lines between commands will either affect how your text is spaced or do nothing. However, you cannot have empty lines within an "align" environment! Otherwise the document won't compile.

- The default is text mode, but equations, symbols, etc. need to be done in math mode. You can enter math mode a few different ways, including $ math stuff $, \[math stuff \], or within an align environment.

The file *BasicFormat.tex* shows you a few more things, such as how to make a table, a proof, and a matrix. The file *BeamerTemplate.tex* shows you how to make slides. More resources:

- Google

- Detexify – you can draw a symbol and it will give you the LaTeX command (classify), or you can search them by name (symbols)

- These tables of common math symbols

- LaTeX for Beginners

- Ask around!