What is \LaTeX? 
\LaTeX (usually pronounced “LAY teck,” sometimes “LAH teck,” and never “LAY tex”) is a format, or collection of macro commands, for \TeX, the standard for most professional mathematics and scientific writing. \TeX is a powerful typesetting engine created by Donald Knuth of Stanford University (his first version appeared in 1978). Leslie Lamport was responsible for creating \LaTeX, a popular set of user commands for \TeX. A team of \LaTeX programmers created the current version, \LaTeX 2e.

Mathematics

Math vs. text vs. functions
In properly typeset mathematics, the variables appear in italics (for example, \( f(x) = x^2 + 2x - 3 \)). The exception to this rule is predefined functions (for example, \( \sin(x) \)). Thus it is important to always treat text, variables, and functions correctly. See the difference between \( x \) and \( x \), and \( \sin(x) \) and \( \sin(x) \).

There are two ways to present a mathematical expression – inline or as a display.

Inline mathematical expressions
Inline math expressions occur as part of the normal flow of text. To produce an inline expression, use the math expression between dollar signs ($...$). For example, typing \$\frac{90}{\pi}\$ produces \( \frac{90}{\pi} \).

Displayed mathematical expressions
Displays are mathematical expressions that are given their own line and are centered on the page. These are usually used for important equations that deserve to be showcased on their own line or for large equations that cannot fit inline. To produce displayed mathematics, place the mathematical expression between the symbols \( \begin{align*} \end{align*} \).

Use \texttt{\textbackslash noindent} to prevent a paragraph from indenting.

Comments
Use % to create a comment. Nothing on the line after the % will be typeset. \$f(x) = \sin(x)\$ \( \text{this is the sine function} \)

\( f(x) = \sin(x) \).\n
Delimiters

To automatically make delimiters large enough to fit the content, use them together with \texttt{\textbackslash left} and \texttt{\textbackslash right}. For example, \texttt{\left\{ \sin \left( \frac{1}{x} \right) \right\} \text{this produces} \\left( \frac{1}{x} \right) \}\n
\begin{enumerate}
\item Thing 1
\item Thing 2
\end{enumerate}

Lists

You can produce ordered and unordered lists.

<table>
<thead>
<tr>
<th>description</th>
<th>command</th>
<th>output</th>
</tr>
</thead>
<tbody>
<tr>
<td>unordered list</td>
<td>\begin{itemize} \item Thing 1 \item Thing 2 \end{itemize}</td>
<td>1. Thing 1 2. Thing 2</td>
</tr>
</tbody>
</table>

Symbols (in math mode)

The basics

<table>
<thead>
<tr>
<th>description</th>
<th>command</th>
<th>output</th>
</tr>
</thead>
<tbody>
<tr>
<td>addition</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>subtraction</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>plus or minus</td>
<td>\pm</td>
<td>±</td>
</tr>
<tr>
<td>multiplication (times)</td>
<td>\times</td>
<td>×</td>
</tr>
<tr>
<td>multiplication (dot)</td>
<td>.</td>
<td>\cdot</td>
</tr>
<tr>
<td>division symbol</td>
<td>\div</td>
<td>÷</td>
</tr>
<tr>
<td>division (slash)</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>circle plus</td>
<td>\oplus</td>
<td>⊕</td>
</tr>
<tr>
<td>circle times</td>
<td>\otimes</td>
<td>⊗</td>
</tr>
<tr>
<td>equal</td>
<td>=</td>
<td>=</td>
</tr>
<tr>
<td>not equal</td>
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<td>≠</td>
</tr>
<tr>
<td>less than</td>
<td>\lt</td>
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<tr>
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<tr>
<td>dots</td>
<td>\ldots</td>
<td>\ldots</td>
</tr>
<tr>
<td>dots</td>
<td>1+2+3+\ldots</td>
<td>1 + 2 + 3 + ...</td>
</tr>
<tr>
<td>fraction</td>
<td>\frac{a}{b}</td>
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<tr>
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</tr>
<tr>
<td>nth root</td>
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<tr>
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<tr>
<td>natural log</td>
<td>\ln(x)</td>
<td>ln(x)</td>
</tr>
<tr>
<td>logarithms</td>
<td>\log_a(b)</td>
<td>\log_a b</td>
</tr>
<tr>
<td>exponential function</td>
<td>e^{x}</td>
<td>\exp(x)</td>
</tr>
<tr>
<td>degree</td>
<td>\deg(f)</td>
<td>\deg(f)</td>
</tr>
</tbody>
</table>

Images

You can put images (pdf, png, jpg, or gif) in your document. They need to be in the same location as your .tex file when you compile the document. Omit \texttt{[width=.5in]} if you want the image to be full-sized.

\begin{figure}[htb]
\includegraphics[width=.5in]{imagename.jpg}
\caption{The (optional) caption goes here.}
\end{figure}
<table>
<thead>
<tr>
<th>Functions</th>
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<th>output</th>
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<td>→</td>
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<tr>
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<td>\begin{cases} x \mid x \ge 0 \ -x \mid x &lt; 0 \end{cases}</td>
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<table>
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<table>
<thead>
<tr>
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<th>description</th>
<th>command</th>
<th>output</th>
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<td>norm</td>
<td>| | v |</td>
<td>| v |</td>
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<tr>
<td>matrix</td>
<td>\begin{bmatrix} 1 &amp; 2 &amp; 3 \ 4 &amp; 5 &amp; 6 \end{bmatrix}</td>
<td>\begin{bmatrix} 1 &amp; 2 &amp; 3 \ 4 &amp; 5 &amp; 6 \end{bmatrix}</td>
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<td>\det(\begin{bmatrix} 1 &amp; 2 &amp; 3 \ 4 &amp; 5 &amp; 6 \end{bmatrix})</td>
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<table>
<thead>
<tr>
<th>Geometry and trigonometry</th>
<th>description</th>
<th>command</th>
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<tbody>
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<td>inverse tangent</td>
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</table>

<table>
<thead>
<tr>
<th>Symbols (in text mode)</th>
<th>description</th>
<th>command</th>
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<tbody>
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<td>X-ray</td>
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</tr>
<tr>
<td>en-dash</td>
<td>Yes—or no?</td>
<td>Yes—or no?</td>
<td></td>
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Getting started with Overleaf and \LaTeX
\LaTeX collaborative authoring online: https://overleaf.com
Overleaf \LaTeX documentation: https://overleaf.com/learn
Learn \LaTeX in 30 minutes: https://overleaf.com/learn/latex/Learn_LaTeX_in_30_minutes
Comprehensive \TeX Archive Network: http://www.ctan.org/
\TeX Users Group: http://www.tug.org/

Want to work offline? Local install options for Linux or Windows:
\TeX Live; MacOS: Mac\TeX; Windows: MiMac\TeX