Assignment

1.1 Introduction

To display

\[ a \in A, \]

one would write the text

\( [a \in A]. \)

The first set of \([\] tell \LaTeX that you are beginning an equation and you want it to be centered on its own line. The last set of \([\) tell \LaTeX that your equation is over. The \( a \) and \( A \) are hopefully self explanatory. The \( \in \) is very important. Most keyboards don’t have a key with an \( \in \), or most other non alphanumeric symbols for that matter, on it. Every symbol command in \LaTeX begins with an \( \) followed by a word. Most of the words make sense. For example, the command \( \in \) makes sense, since the sentence “\( a \in A \)” can be read as “The element \( a \) is in the set \( A \).”

In order to type an equation or mathematical symbol in the line of text that you are typing, you need to go into math mode. Surround the mathematics with single $$. So if you wanted to type an equation like

\[ ax^2 + bx + c = 0, \]

you would type $ax^2+bx+c=0$.

At this point you know very few symbols. Some of the important ones are illustrated below.

<table>
<thead>
<tr>
<th>TeX Code</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>$a \in A$</td>
<td>( a \in A )</td>
</tr>
<tr>
<td>$A \times B$</td>
<td>( A \times B )</td>
</tr>
<tr>
<td>$A \cdot B$</td>
<td>( A \cdot B )</td>
</tr>
<tr>
<td>$\emptyset = {}</td>
<td>\emptyset = {} = {}</td>
</tr>
<tr>
<td>$P \implies (Q \lor R)$</td>
<td>( P \implies (Q \lor R) ) Note that ( \lor ) stands for “logical or”</td>
</tr>
<tr>
<td>$P \implies (Q \land R)$</td>
<td>( P \implies (Q \land R) ) Note that ( \land ) stands for “logical and”</td>
</tr>
<tr>
<td>$2 \neq 3$</td>
<td>( 2 \neq 3 )</td>
</tr>
<tr>
<td>$x \notin {a, b, c}$</td>
<td>( x \notin {a, b, c} )</td>
</tr>
<tr>
<td>$A \subseteq B$</td>
<td>( A \subseteq B )</td>
</tr>
<tr>
<td>$X \subsetneq Y$</td>
<td>( X \subsetneq Y )</td>
</tr>
</tbody>
</table>

A vertical line can be obtained by a shifted backslash (above the enter key on your keyboard). It can also be obtained by \( \vert \), so you can type \[ a \] by either $|a|$ or $\vert a \vert$. Note also that set brackets need to have a backslash in front of them—they have a different meaning to \TeX if the backslash is omitted.
1.2 What to do

Turn in a replica of the following two paragraphs taken from section 1.7 of the text:

The Cartesian product (or simply the product) $A \times B$ of two sets $A$ and $B$ is the set consisting of all ordered pairs whose first coordinate belongs to $A$ and whose second coordinate belongs to $B$. In other words,

$$A \times B = \{(a, b) : a \in A \text{ and } b \in B\}.$$ 

For example, if $A = \{x, y\}$ and $B = \{1, 2, 3\}$, then

$$A \times B = \{(x, 1), (x, 2), (x, 3), (y, 1), (y, 2), (y, 3)\};$$

while

$$B \times A = \{(1, x), (1, y), (2, x), (2, y), (3, x), (3, y)\}.$$ 

Since, for example, $(x, 1) \in A \times B$ and $(x, 1) \notin B \times A$, these two sets do not contain the same elements; so $A \times B \neq B \times A$. If $A = \emptyset$ or $B = \emptyset$, then $A \times B = \emptyset$.

For the sets $A$ and $B$ just mentioned, $|A| = 2$ and $|B| = 3$; while $|A \times B| = |B \times A| = 6$. Indeed, for all finite sets $A$ and $B$,

$$|A \times B| = |A| \cdot |B|.$$ 

1.3 Hints

TeXmaker and \LaTeX have several features that make fixing little problems in the typesetting easier.

1. For hints and advice, refer to example2.tex often.

2. To center an equation on its own line, type the following: \[ mathy \ stuff \ here \].

3. To include an equation within a line, type the following: \$ mathy \ stuff \ here \$. 

4. If parenthesis, braces, $-signs, [\]-signs, and other such items line up correctly, one will be highlighted green and the other yellow. If they don’t, the mismatched symbol will be highlighted in red.

5. TeXmaker recognizes when you are entering a math equation. Inside a math equation, text will be green.

6. TeXmaker recognizes when you are entering straight text. In this case, text will be black and commands will be blue or red.

7. If, when you hit the \LaTeX button or the quick build button, you get an error that reads:

$\text{ ! Missing$ inserted.}$

$\text{ <inserted text>}$

$\text{ \$}}$

1.117

This means that on line 117, a $ was found that matched with no other $. In other words, you started an equation, but didn’t finish it. To fix this, insert a $ in the appropriate place.

8. Note that ‘$A$’ is different than ‘A’. The first is written as $A$ and the second as A. The difference in font is the difference between a math symbol and an indefinite article.

9. To get the word ‘and’ to show up in the equation as ‘and’ and not as ‘and’, write ‘\text{ and }’. 

10. The command for ‘$\notin$’ is ‘\notin’, and the command for ‘$\neq$’ is ‘\neq’.