

In this assignment, we will practice typesetting some basic math in L^AT_EX.

1 Setting it all up

Go to www.overleaf.com and set up an account.

2 Assignment

2.1 Introduction

To display

$$a \in A,$$

one would write the text

`\[a \in A\]`.

The command `\[` tells L^AT_EX that you are beginning an equation and you want it to be centered on its own line. The command `\]` tells L^AT_EX 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 L^AT_EX 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

TeX Code	Output	
<code>\$a\in A\$</code>	$a \in A$	
<code>\$A\times B\$</code>	$A \times B$	
<code>\$A\cdot B\$</code>	$A \cdot B$	
<code>\$\emptyset=\{\}\\$</code>	$\emptyset = \{\}$	
<code>\$P\implies (Q\lor R)\$</code>	$P \implies (Q \vee R)$	Note that <code>\lor</code> stands for "logical or"
<code>\$P\implies (Q\land R)\$</code>	$P \implies (Q \wedge R)$	Note that <code>\land</code> stands for "logical and"
<code>\$2\neq 3\$</code>	$2 \neq 3$	
<code>\$x\notin\{a,b,c\}\$</code>	$x \notin \{a, b, c\}$	
<code>\$A\subseteq B\$</code>	$A \subseteq B$	
<code>\$X\subsetneq Y\$</code>	$X \subsetneq Y$	

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.

2.2 What to do

Turn in a replica of the following two paragraphs (don't worry about font size, or getting the line breaks to match up—just produce readable text that says the same thing, with the same appearance):

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 ,

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

2.3 Hints

L^AT_EX has several features that make fixing little problems in the typesetting easier.

1. To center an equation on its own line, type the following: `\[mathy stuff here \]`.
2. To include an equation within a line, type the following: `$ mathy stuff here $`.
3. Sometimes, when you hit the L^AT_EX button, you get an error that reads:

! Missing \$ inserted.

<inserted 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.

4. Note that 'A' is different than 'A'. The first is written as \mathbf{A} and the second as **A**. The difference in font is the difference between a math symbol and an indefinite article.
5. To get the word 'and' to show up in the equation as 'and' and not as '*and*', write `\text{ and }`.
6. The command for ' \notin ' is '`\notin`', and the command for ' \neq ' is '`\neq`'.