

Some examples of T_EX

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1. Math symbols are enclosed by dollar signs, in two ways. If you type

```
$$  
\lim_{x\to\infty} f(x)=\pi.  
$$
```

it comes out displayed as

$$\lim_{x \rightarrow \infty} f(x) = \pi.$$

2. If you type

```
 $\lim_{x\to\infty} f(x)=\epsilon.$
```

it comes out undisplayed as $\lim_{x \rightarrow \infty} f(x) = \epsilon$.

3. If you type

```
 $$  
\int_0^{3/2} x^2 \ dx=\frac{9}{8}  
 $$
```

it comes out as

$$\int_0^{3/2} x^2 dx = \frac{9}{8}.$$

Here the \backslash before the dx puts a little space before the dx , which looks better. Generally, the \backslash sign indicates a command, like

```
 $\int$
```

is the command for \int . Likewise, \int (with a space after the \int) is a command for a bit of space. If you want more space, use \int :

```
$$
\int_0^{3/2} x^2 \int dx = \frac{9}{8}
$$
```

gives

$$\int_0^{3/2} x^2 dx = \frac{9}{8},$$

which doesn't look too good.

4. If you type

```
$$
\cup, \bigcup, \cap, \bigcap, \subset, \subseteq, \supset, \supseteq
$$
```

You get

$$\cup, \bigcup, \cap, \bigcap, \subset, \subseteq, \supset, \supseteq.$$

You can put limits on these:

```
$$ S = \bigcap_{n=1}^{\infty}
\left(1 - \frac{1}{n}, 1 + \frac{1}{n}\right)
= [0, 1]
$$
```

gives

$$S = \bigcap_{n=1}^{\infty} \left(1 - \frac{1}{n}, 1 + \frac{1}{n}\right) = [0, 1].$$

The commands

```
\left( \right)
```

tell \TeX to adjust the size of parentheses to the fractions, as it sees fit.

5. If you type

```

$$ S=
\{\cos(\frac{n\pi}{3}) : n\in\mathbb{N}\}
=\left\{\pm 1, \pm\frac{1}{2}, \pm\frac{\sqrt{3}}{2}\right\}
$$

```

you get

$$S = \left\{ \cos\left(\frac{n\pi}{3}\right) : n \in \mathbb{N} \right\} = \left\{ \pm 1, \pm \frac{1}{2}, \pm \frac{\sqrt{3}}{2} \right\}.$$

Note the unadjusted parentheses in the cos (because we used plain old ()), and the adjusted brackets in the right side (because we used `\left\{` and `\right\}`). Also the command `\mathbb{N}` is a “macro” for the symbol \mathbb{N} . This a made-up abbreviation for the real command

```
\mathbb{N}
```

which was given at the top of the source file (see 7. below). “mathbb” is a font called “blackboard bold” which you can use for any English letter. Other fonts:

```

$$\mathcal{N}, \mathsf{N}, \mathfrak{N}, \mathbf{N}$$

```

give

$\mathcal{N}, \mathbf{N}, \mathfrak{N}, \mathbf{N}$.

These can only be used in math mode (inside the dollar signs). If you want bold outside math mode, in regular text, use `\bf` inside `{...}`. For example:

6. To get this **6.** in bold, with space above it, not indented, and with a bit of space after it, you can type

```

\vskip10pt\noindent
{\bf 6.\ }

```

This is useful for numbering homework problems. The `\bf` command is confined within the brackets `{}`. Without the brackets, the rest of the file after the `\bf` would be in bold. Generally, `{}`, without any backslashes, is used to confine commands, and does not appear in the output. If you want curly brackets in the output,

```

$\{\cdots\}$

```

will give `{...}`, as in example 5 above.

7. You can invent new macros, as I did in the homework template. Here are two of them:

```
\newcommand\proof{\par\noindent{\bf Proof:\ } }  
\newcommand\qed{$\blacksquare$}
```

Now, if you type `\proof`, you get

Proof: (bold, new line, not indented) and if you type `\qed`, you get ■, to indicate the end of a proof.