Mathematics Mode

In order to obtain a mathematical formula using LaTeX, one must enter *mathematics mode* before the formula and leave it afterwards. Mathematical formulae can occur either embedded in text or else displayed between lines of text. When a formula occurs within the text of a paragraph one should place a `$` sign before and after the formula, in order to enter and leave mathematics mode. Thus to obtain a sentence like

> Let f be the function defined by $f(x) = 3x + 7$, and let a be a positive real number.

one should type

```
Let $f$ be the function defined by $f(x) = 3x + 7$, and
let $a$ be a positive real number.
```

In particular, note that even mathematical expressions consisting of a single character, like *f* and *a* in the example above, are placed within `$` signs. This is to ensure that they are set in italic type, as is customary in mathematical typesetting.

LaTeX also allows you to use `\(` and `\)` to mark the beginning and the end respectively of a mathematical formula embedded in text. Thus

> Let f be the function defined by $f(x) = 3x + 7$.

may be produced by typing

```
Let \( f \) be the function defined by \( f(x) = 3x + 7 \).
```

However this use of `\(` ... `\)` is only permitted in LaTeX: other dialects of TeX such as Plain TeX and AmSTeX use `$` ... `$`.

In order to obtain an mathematical formula or equation which is displayed on a line by itself, one places `\[` before and `\]` after the formula. Thus to obtain

> If $f(x) = 3x + 7$ and $g(x) = x + 4$ then
>
> $$f(x) + g(x) = 4x + 11$$
>
> and
>
> $$f(x)g(x) = 3x^2 + 19x + 28.$$

one would type

```
If $f(x) = 3x + 7$ and $g(x) = x + 4$ then
\[ f(x) + g(x) = 4x + 11 \]
and
\[ f(x)g(x) = 3x^2 + 19x +28. \]
```

(Here the character `^` is used to obtain a superscript.)

LaTeX provides facilities for the automatic numbering of displayed equations. If you want an numbered equation then you use `\begin{equation}` and `\end{equation}` instead of using `\[` and `\]` . Thus

```
If $f(x) = 3x + 7$ and $g(x) = x + 4$ then
\begin{equation}
f(x) + g(x) = 4x + 11
\end{equation}
and
\begin{equation}
f(x)g(x) = 3x^2 + 19x +28.
\end{equation}
```

produces

If $f(x) = 3x + 7$ and $g(x) = x + 4$ then

$$f(x) + g(x) = 4x + 11 \qquad (1)$$

and

$$f(x)g(x) = 3x^2 + 19x + 28. \qquad (2)$$