A beginner's guide to StarTEX

Dag Langmyhr

10th October 1996

This document is a guide to the StarTEX typesetting program, which was designed to help students typeset their reports, essays, and similar small documents. StarTEX is based on the famous TEX program, and its name indicates that it is a "starter's TEX."

Since StarTEX is based on TEX, it is a batch-oriented system in which the user writes a "source code" consisting of text interspersed with markup commands, and then "compiles" it to create the final paper.

To make it easy to understand the effect of the various mark-up commands, this guide shows the source code on the left-hand pages with the resulting printed page to the right.

```
<body>
<style>[a4-article]

<title>A beginner’s guide to <startex></title>

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</author>

 <info><today></info>

 <abstract>
 <starTeX> is a program for typesetting simple student reports. It is based on
   the famous <TeX> typesetting program, but aims to be more robust and provide
   an interface better suited for students with little previous knowledge of
   document processing tools.
 </abstract>

 <h1>Background</h1>
 Many students are required to write short reports as part of their university
 course. This document describes a tool named <starTeX> designed just for
 writing such reports. Its aim is to provide the student with a document
 processing program which is neither too simple nor too complex.

 <h1>Writing text in <startex></h1>
 A document consists mostly of ordinary text. Using <startex>, you can enter
 this text just as it is, and <startex> will handle the formatting. Thus, it
 does not matter if you add some extra     spaces    in your text, or if you

 include blanks lines. Everything related to text formatting is taken
 care of by <startex>.

 <p>By comparing the <starTeX> source text on the left-hand page with
 the resulting output on the right, you can see the effect of the formatting.

 <h2>Character set</h2>
 You can use any character in the so-called ISO<~>8859-1 character set in your
 source text, like $ or # or Å or ç. The only character that is special to
 <starTeX>, is <code><</code> which should always be written as the four
 characters <code><lt></code>. (The reason for this will be explain later.)

 <h2>Hyphenation</h2>
 When formatting your text, <starTeX> will sometimes have to hyphenate a word to
 make it fit. <StarTeX> usually does this quite well, but if you are not
 satisfied, you can help <starTeX> by inserting so-called <‘‘>soft hyphens<’’>
 using the notation <code><-></code>, as in <code>rec<->ord</code>. Words
 containing such soft hyphens will only be hyphenated at the indicated position,
 or, if there is no need to hyphenate the word, the soft hyphens will not show.

 <p>You can also prevent <starTeX> from breaking the line at a particular
 inter-word space by writing <code><~></code> instead of the space, as in
 <code>3<~>Kb</code>, which will produce 3<~>Kb but will never be broken.

 <h1>Commands</h1>
 Writing just plain text is not always enough. A document has a certain
 structure (headings, sections, figures, etc) which must be indicated, and you
 may want symbols that are not part of the standard character set. To give
 <starTeX> this extra information, you will have to add some <i>commands</i>
 (often called <‘‘>markup<’’>) to your text.
```

A beginner's guide to StarTeX

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10th October 1996

Abstract

StarTeX is a program for typesetting simple student reports. It is based on the famous TeX typesetting program, but aims to be more robust and provide an interface better suited for students with little previous knowledge of document processing tools.

1 Background

Many students are required to write short reports as part of their university course. This document describes a tool named StarTeX designed just for writing such reports. Its aim is to provide the student with a document processing program which is neither too simple nor too complex.

2 Writing text in StarTeX

A document consists mostly of ordinary text. Using StarTeX, you can enter this text just as it is, and StarTeX will handle the formatting. Thus, it does not matter if you add some extra spaces in your text, or if you include blanks lines. Everything related to text formatting is taken care of by StarTeX.

By comparing the StarTeX source text on the left-hand page with the resulting output on the right, you can see the effect of the formatting.

2.1 Character set

You can use any character in the so-called ISO 8859-1 character set in your source text, like $ or # or Å or ç. The only character that is special to StarTeX, is < which should always be written as the four characters <lt>. (The reason for this will be explain later.)

2.2 Hyphenation

When formatting your text, StarTeX will sometimes have to hyphenate a word to make it fit. StarTeX usually does this quite well, but if you are not satisfied, you can help StarTeX by inserting so-called "soft hyphens" using the notation <->, as in rec<->ord. Words containing such soft hyphens will only be hyphenated at the indicated position, or, if there is no need to hyphenate the word, the soft hyphens will not show.

You can also prevent StarTeX from breaking the line at a particular inter-word space by writing <~> instead of the space, as in 3<~>Kb, which will produce 3 Kb but will never be broken.

3 Commands

Writing just plain text is not always enough. A document has a certain structure (headings, sections, figures, etc) which must be indicated, and you may want symbols that are not part of the standard character set. To give StarTeX this extra information, you will have to add some *commands* (often called "markup") to your text.

```
<p>The commands always start with a <code><</code> and end with a
<code>></code>. One example is <code><p></code> which is used to start another
paragraphs, like this one.

<p>Other commands produce some kind of text or symbol, like the present time
<now> (<code><now></code>), the current date <today> (<code><today></code>), or
the <``>official<''> way of writing <starTeX> (<code><starTeX></code>). These
symbols are shown in table<~><ref>[symbols].

<table>Basic symbol commands<label>[symbols]
<row> <b>Symbol</b> <col> <b>Code</b> <col> <b>Result</b>
<row> Current time <col> <code><now></code> <col> <now>
<row> <starTeX> name <col> <code><startex></code> <col> <starTeX>
<row> Current date <col> <code><today></code> <col> <today>
<row> Quotation mark <col> <code><``></code> <col> <``>
<row>    <col> <code><''></code> <col> <''>
<row> Ellipses <col> <code><...></code> <col> <...>
<row> Non-breaking space <col> <code><~></code> <col> <~>
<row> <``>Soft hyphen<''> <col> <code><-></code> <col> - or nothing
<row> Range dash <col> <tt>1<lt>-<>->5</tt> <col> 1<-->5
<row> Dash <col> <tt><lt>-<>-<>-></tt> <col> <--->
<row> Nothing <col> <code><></code> <col> <>
</table>

<p>The commands are not sensitive to casing. This means that it does not matter
whether you use uppercase or lowercase letters when writing them; both
<code><startex></code> and <code><STARTEX></code><--->and even
<code><starTeX></code><--->will produce <startex>.

<h2>Environments</h2>
Some commands come in pairs, defining an <i>environment</i> affected by the
commands. Such commands have the same name, except that the command terminating
the environment starts with a <code>/</code>.

<p>The two commands <code><tt></code> and <code></tt></code> form a typical
environment, the effect of which is to set the text in a <tt>typewriter</tt>
font.

<h2>Comments</h2>
You can include comments in your document using the
<code><comment></code><...><code></comment></code> environment. All comments
are ignored by <starTeX>. <comment>This comment is ignored!</comment>

<p>When reading this guide, you should look out for comments in the source
code. Some minor issues will be explained there and not in the text.

<h2>Unformatted code</h2>
Sometimes you may want to include some kind of code other than <starTeX>, for
instance a computer program. In that case, the normal formatting of <starTeX>
must be disabled, and <code><</code> should no longer be a special character.

<p>This is handled by the <code><code></code><...><tt><lt>/code></tt>
environment. Any text placed between <code><code></code> and
<tt><lt>/code></tt> will be printed just as it is, and a typewriter font will
be used. This environment has already been used several times when describing
the <starTeX> commands.

<p>If the code to be inserted resides on a file, the contents of the file can
be inserted into the document using the <tt><lt>codefile>[<i>code
file</i>]</tt> command. For example, the short file <code>hello.c</code> can be
inserted using the command <code><codefile>[hello.c]</code>:
<codefile>[hello.c]

<comment>It is customary in StarTeX to use square brackets ([...])
  around parameters which are not typeset, like file names. </comment>
```

Table 1: Basic symbol commands

Symbol	Code	Result
Current time	<now>	14:52
StarTeX name	<startex>	StarTeX
Current date	<today>	10th October 1996
Quotation mark	<“>	“
	<”>	”
Ellipses	<...>	...
Non-breaking space	<~>	
“Soft hyphen”	<->	- or nothing
Range dash	1<-->5	1–5
Dash	<--->	—
Nothing	<>	

The commands always start with a < and end with a >. One example is <p> which is used to start another paragraphs, like this one.

Other commands produce some kind of text or symbol, like the present time 14:52 (<now>), the current date 10th October 1996 (<today>), or the “official” way of writing StarTeX (<starTeX>). These symbols are shown in table 1.

The commands are not sensitive to casing. This means that it does not matter whether you use uppercase or lowercase letters when writing them; both <startex> and <STARTEX>—and even <starTeX>—will produce StarTeX.

3.1 Environments

Some commands come in pairs, defining an *environment* affected by the commands. Such commands have the same name, except that the command terminating the environment starts with a /.

The two commands <tt> and </tt> form a typical environment, the effect of which is to set the text in a typewriter font.

3.2 Comments

You can include comments in your document using the <comment>...</comment> environment. All comments are ignored by StarTeX.

When reading this guide, you should look out for comments in the source code. Some minor issues will be explained there and not in the text.

3.3 Unformatted code

Sometimes you may want to include some kind of code other than StarTeX, for instance a computer program. In that case, the normal formatting of StarTeX must be disabled, and < should no longer be a special character.

This is handled by the <code>...</code> environment. Any text placed between <code> and </code> will be printed just as it is, and a typewriter font will be used. This environment has already been used several times when describing the StarTeX commands.

If the code to be inserted resides on a file, the contents of the file can be inserted into the document using the <codefile>[*code file*] command. For example, the short file hello.c can be inserted using the command <codefile>[hello.c]:

```
#include <stdio.h>

void main(void)
{
  printf("Hello, world!\n");
}
```

```
<h2>User-defined commands</h2>
You may define your own commands using <code><define></code>. For instance, if
you often mention <‘‘>operating systems<’’>, you can define a short command for
the term:
<p><code>
<define><opsys>operating system
</code>

<define><opsys>operating system

Following the <code><define></code> command is the name of the new command. Its
definition is the text on the rest of the line. Now it’s enough to write
<code><opsys></code> when you mean an <opsys>.

<p>The definition may contain other commands (except <code><code></code>,
<tt><lt>/code></tt>, <code><comment></code> and <code></comment></code>). For
example, in this document I often describe various <starTeX> commands. To
simplify this, I define two useful commands:
<p><code>
<define><x><tt><lt>
<define></x><gt></tt>
</code>
<define><x><tt><lt>
<define></x><gt></tt>
Using these, I can write <code><x>code</x></code> when I mention the
<x>code</x> command.

<h1>Document structure</h1>
All documents have a structure; they have chapters, sections, subsections,
subsubsections, etc, and they may contain lists and footnotes. A good document
processing tool will make this structure easily detectable for the reader by
using various visual clues like spacing, varying text sizes, <b>bold text</b>,
numbering, and others.

<p><starTeX> is a structure-oriented document tool (like SGML, HTML and
La<TeX>). This means that the writer employs commands indicating the
<i>structure</i> of the document rather than its <i>appearance</i>. <starTeX>
will then format the document according to the indicated structure.

<h2>Document environment</h2>
All <starTeX> documents must be placed in a <x>body></x><...><x>/body</x>
environment.

<h2>Headings at different levels</h2>
The most important structural information in a document is the indication of
level. The highest level is called H1 in <starTeX>, and a heading at that level
is placed in an <x>h1</x><...><x>/h1</x> environment, like <‘‘>Document
structure<’’> above.

<p><starTeX> supports levels from H1 to H4.

<h2>The document head</h2>
The start of a document contains information like its title and author. This
kind of information is indicated by suitable environments.

<h3>The document title</h3>
The title should be placed in a <x>title</x><...><x>/title</x> environment.

<h3>The name of the author</h3>
The name of the author is given in an <x>author</x><...><x>/author</x>
environment. If several lines are required, the paragraph command <x>p</x> may
be used to start a new line.

<h3>Additional information</h3>
Additional information like the date may be given in the
<x>info</x><...><x>/info</x> environment.

<h3>Abstract</h3>
If the document has an abstract, the <x>abstract</x><...><x>/abstract</x>
environment should be used.

<h2>Document styles</h2>
Most institutions have some standard concerning the appearance of documents,
specifying paper size, text font, margins, etc. This guide is formatted
according to a standard article style that could be used anywhere.
```

3.4 User-defined commands

You may define your own commands using `<define>`. For instance, if you often mention "operating systems", you can define a short command for the term:

```
<define><opsys>operating system
```

Following the `<define>` command is the name of the new command. Its definition is the text on the rest of the line. Now it's enough to write `<opsys>` when you mean an operating system.

The definition may contain other commands (except `<code>`, `</code>`, `<comment>` and `</comment>`). For example, in this document I often describe various StarTEX commands. To simplify this, I define two useful commands:

```
<define><x><tt><lt>
<define></x><gt></tt>
```

Using these, I can write `<x>code</x>` when I mention the `<code>` command.

4 Document structure

All documents have a structure; they have chapters, sections, subsections, subsubsections, etc, and they may contain lists and footnotes. A good document processing tool will make this structure easily detectable for the reader by using various visual clues like spacing, varying text sizes, **bold text**, numbering, and others.

StarTEX is a structure-oriented document tool (like SGML, HTML and LaTEX). This means that the writer employs commands indicating the *structure* of the document rather than its *appearance*. StarTEX will then format the document according to the indicated structure.

4.1 Document environment

All StarTEX documents must be placed in a `<body>>`...`</body>` environment.

4.2 Headings at different levels

The most important structural information in a document is the indication of level. The highest level is called H1 in StarTEX, and a heading at that level is placed in an `<h1>`...`</h1>` environment, like "Document structure" above.

StarTEX supports levels from H1 to H4.

4.3 The document head

The start of a document contains information like its title and author. This kind of information is indicated by suitable environments.

4.3.1 The document title

The title should be placed in a `<title>`...`</title>` environment.

4.3.2 The name of the author

The name of the author is given in an `<author>`...`</author>` environment. If several lines are required, the paragraph command `<p>` may be used to start a new line.

4.3.3 Additional information

Additional information like the date may be given in the `<info>`...`</info>` environment.

4.3.4 Abstract

If the document has an abstract, the `<abstract>`...`</abstract>` environment should be used.

4.4 Document styles

Most institutions have some standard concerning the appearance of documents, specifying paper size, text font, margins, etc. This guide is formatted according to a standard article style that could be used anywhere.

```
<p>You can specify a style using the <tt><lt>style>[<i>style name</i>]</tt>
command, as this document does at the very beginning of the source file. All
<starTeX> implementations should provide the two styles <tt>article</tt> and
<tt>a4-article</tt>; contact the computer staff at your installation for
information on which additional styles are available.

<h2>Example</h2>
A simple <starTeX> source file could look like this: <codefile>[small.tex]

<h1>Other constructs</h1>
A few additional constructs are used in reports and similar documents.

<h2>Using various fonts</h2>
Sometimes you will want to emphasize a piece of text by writing it in
<i>italics</i>, or put something in <b>bold text</b>. This is done using the
font change commands shown in table<~><ref>[tab-fonts].

<table> The various font environments<label>[tab-fonts]
<row> <tt>Ordinary text</tt>                <col> Ordinary text
<row> <tt><lt>i>Italic text<lt>/i></tt>      <col> <i>Italic text</i>
<row> <tt><lt>b>Bold text<lt>/b></tt>        <col> <b>Bold text</b>
<row> <tt><lt>tt>Typewriter text<lt>/tt></tt> <col> <tt>Typewriter text</tt>
</table>

<p>The font environments may be nested. Using both <code><i></code> and
<code><tt></code> will produce <i><tt>italic typewriter</tt></i> text.

<h2>Displays</h2>
An important piece of text is often placed in a <i>display</i> using the
<x>display</x><...><x>/display</x> environment:

<display>
  <b>Warning:</b> Type design can be hazardous to your other interests. Once
  you get hooked, you will develop intense feelings about letterforms; the
  medium will intrude on the messages that you read.

  <p>  Donald Knuth in <i>The MetaFont book</i>
</display>

<h2>Lists</h2>
Some information is best presented as a list of items. This
is done using a <x>list</x><...><x>/list</x> environment.
<list>
<item>This is the first item in a list. Each item is marked with a
  <i>bullet</i> in the left-hand margin.
<item>The <code><item></code> command starts a new item.
</list>
```

Table 2: The various font environments

`Ordinary text`	Ordinary text
`<i>Italic text</i>`	*Italic text*
`<b>Bold text</b>`	**Bold text**
`<tt>Typewriter text</tt>`	`Typewriter text`

You can specify a style using the `<style>[`*`style name`*`]` command, as this document does at the very beginning of the source file. All StarTEX implementations should provide the two styles `article` and `a4-article`; contact the computer staff at your installation for information on which additional styles are available.

4.5 Example

A simple StarTEX source file could look like this:

```
<body>
<style>[a4-article]

<title> <startex><-->A <tex> for beginners </title>
<author> Dag Langmyhr<p> Department of Informatics<p>
  University of Oslo<p> <tt>dag@ifi.uio.no</tt>
</author>
<info> <today> </info>

<h1>The notation used by <Startex></h1>
The notation used in <startex> resembles HTML and some of the commands
are the same, but the philosophy of the two is different. HTML was
designed to display hypertext information on a computer screen, while
<startex> is used to produce a student report on paper.
</body>
```

5 Other constructs

A few additional constructs are used in reports and similar documents.

5.1 Using various fonts

Sometimes you will want to emphasize a piece of text by writing it in *italics*, or put something in **bold text**. This is done using the font change commands shown in table 2.

The font environments may be nested. Using both `<i>` and `<tt>` will produce *`italic typewriter`* text.

5.2 Displays

An important piece of text is often placed in a *display* using the `<display>`...`</display>` environment:

> **Warning:** Type design can be hazardous to your other interests. Once you get hooked, you will develop intense feelings about letterforms; the medium will intrude on the messages that you read.
>
> Donald Knuth in *The MetaFont book*

5.3 Lists

Some information is best presented as a list of items. This is done using a `<list>`...`</list>` environment.

- This is the first item in a list. Each item is marked with a *bullet* in the left-hand margin.
- The `<item>` command starts a new item.

```
<h3>Numbered lists</h3>
Sometimes it is better to have the items numbered sequentially.
<list>
<numitem>This is the first item in a numbered list. It uses the
  <x>list</x><...><x>/list</x> environment like other lists.
<numitem>The command <x>numitem</x> starts another numbered
  item.
<numitem>The various kinds of lists can be nested.
  <list>
  <item>This is an ordinary list which is a sublist of a numbered list.
  <item>The lists may be nested to any depth.
  </list>
</list>

<comment>You can also mix various kinds of items in the same list, but
  that will most probably confuse the reader.
</comment>

<h3>Dictionary lists</h3>
A third kind of list is the one found in dictionaries and
encyclopedias, in which a particular word or phrase is explained.
<list>
<textitem>Dictionary list</textitem> is the term often used to describe such
  lists. It starts with a word or a phrase in bold text sticking into the left
  margin, making it easy to spot.
<textitem>A <x>textitem</x><...><x>/textitem</x> environment</textitem> is used
  to start the next item. Note that this is an environment (with a
  terminating <x>/textitem</x>) and not just a command.
</list>

<h2>Footnotes</h2>
Footnotes are useful for supplying additional information. They are written in
a <x>footnote</x><...><x>/footnote</x> environment.<footnote>This is an
example of a footnote. It is automatically placed at the bottom of the
page.</footnote>
The footnote on this page was made using the code
<p><code>
...environment.<footnote>This is an example...</footnote>
</code>

<h2>Cross-references</h2><label>[x-ref]
A document contains many references to other parts; for instance, this document
refers to table<~><ref>[tab-fonts] and to figure<~><ref>[fig:sinus]. To ensure
that these references always are correct, even when new tables and figures are
inserted at the beginning of the document, it is necessary to define a <i>named
reference</i> and use that when referencing. <StarTeX> will then make sure that
these references always are correct.

<p>A named reference is defined using the command <x>label</x><tt>[<i>my
label</i>]</tt> where you give a label of your choice. For example,
figure<~><ref>[symbols] contains the command <code><label>[symbols]</code>.

<p>You refer to a label using the <code><ref></code> command; for instance, the
command <code><ref>[symbols]</code> will produce the text
<``><ref>[symbols]<''>. A typical reference will then be
<code>table<~><ref>[symbols]</code> producing
<``>table<~><ref>[symbols]<''>.<footnote>Notice the use of a <code><~></code>
  before the <code><ref></code>. It is used to avoid a line break just before
  the reference number; such breaks don't look good.</footnote>

<p>You can refer to tables, figures, section titles, and footnotes.

<display>
  <b>Note!</b> Sometimes, <starTeX> will discover that the references
  are not correct. In that case, it will give the message
<p><code>
  ** StarTeX warning:
     Cross-references are not correct;
     please run StarTeX again.
</code>
  The next run will produce correct references.
</display>

<h2>PostScript illustrations</h2>
You can include PostScript illustrations like figure <ref>[fig:sinus] using the
<x>psfig</x><tt>[<i>file name</i>]</tt><...><x>/psfig</x> environment. Since
that figure resides in file <tt>sinus.eps</tt>, the following code was used to
include it:
```

5.3.1 Numbered lists

Sometimes it is better to have the items numbered sequentially.

1. This is the first item in a numbered list. It uses the `<list>...</list>` environment like other lists.
2. The command `<numitem>` starts another numbered item.
3. The various kinds of lists can be nested.
    - This is an ordinary list which is a sublist of a numbered list.
    - The lists may be nested to any depth.

5.3.2 Dictionary lists

A third kind of list is the one found in dictionaries and encyclopedias, in which a particular word or phrase is explained.

Dictionary list is the term often used to describe such lists. It starts with a word or a phrase in bold text sticking into the left margin, making it easy to spot.

A `<textitem>...</textitem>` environment is used to start the next item. Note that this is an environment (with a terminating `</textitem>`) and not just a command.

5.4 Footnotes

Footnotes are useful for supplying additional information. They are written in a `<footnote>...` `</footnote>` environment.[1] The footnote on this page was made using the code

```
...environment.<footnote>This is an example...</footnote>
```

5.5 Cross-references

A document contains many references to other parts; for instance, this document refers to table 2 on page 4 and to figure 1 on page 6. To ensure that these references always are correct, even when new tables and figures are inserted at the beginning of the document, it is necessary to define a *named reference* and use that when referencing. StarTEX will then make sure that these references always are correct.

A named reference is defined using the command `<label>[`*`my label`*`]` where you give a label of your choice. For example, figure 1 on page 2 contains the command `<label>[symbols]`.

You refer to a label using the `<ref>` command; for instance, the command `<ref>[symbols]` will produce the text "1 on page 2". A typical reference will then be `table<~><ref>[symbols]` producing "table 1 on page 2".[2]

You can refer to tables, figures, section titles, and footnotes.

> **Note!** Sometimes, StarTEX will discover that the references are not correct. In that case, it will give the message
>
> ```
> ** StarTeX warning:
>    Cross-references are not correct;
>    please run StarTeX again.
> ```
>
> The next run will produce correct references.

5.6 PostScript illustrations

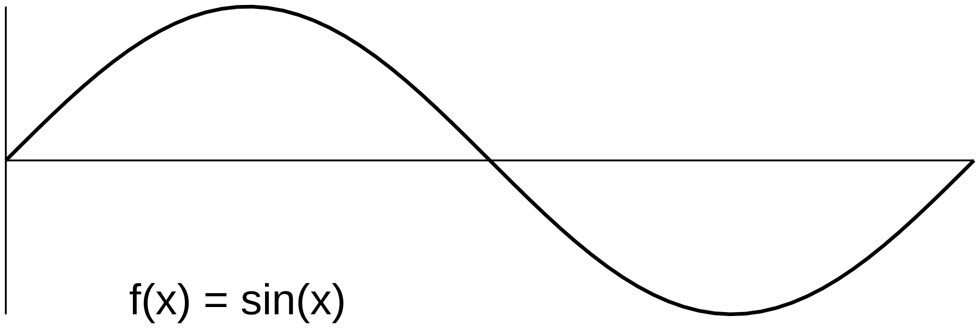
You can include PostScript illustrations like figure 1 on page 6 using the `<psfig>[`*`file name`*`]...` `</psfig>` environment. Since that figure resides in file `sinus.eps`, the following code was used to include it:

[1] This is an example of a footnote. It is automatically placed at the bottom of the page.

[2] Notice the use of a `<~>` before the `<ref>`. It is used to avoid a line break just before the reference number; such breaks don't look good.

```
<psfig>[sinus.eps]A sample PostScript figure <label>[fig:sinus]</psfig>
<p><code>
<psfig>[sinus.eps]A sample PostScript figure <label>[fig:sinus]</psfig>
</code>

<p>The text following the file name is used as a caption for the figure.

<p>The illustration will automatically be scaled to a size that <starTeX>
regards as suitable.

<p>Note that illustrations will not appear exactly where you put them in the
text, but <‘‘>float<’’> to the top of either the current or the next
page.<footnote>The reason while illustrations float, is that there will not
  always be enough space at the position where the user has written the
  inclusion command.</footnote>
You should refer to the illustration using a cross-reference label
(see section<~><ref>[x-ref]).

<h2>Tables</h2>
A <x>table</x><...><x>/table</x> environment is used to create a table. The
<x>row</x> command is used to start a new row, and the <x>col</x> command
starts another row. For example, the code producing table<~><ref>[tab-fonts] is

<p><code>
<table> The various font environments<label>[tab-fonts]
<row> <tt>Ordinary text</tt>                <col> Ordinary text
<row> <tt><lt>i>Italic text<lt>/i></tt>       <col> <i>Italic text</i>
<row> <tt><lt>b>Bold text<lt>/b></tt>         <col> <b>Bold text</b>
<row> <tt><lt>tt>Typewriter text<lt>/tt></tt> <col> <tt>Typewriter text</tt>
</table>
</code>

<p>The text preceding the first row is used as a table caption. It should
include a cross-reference label if you want to refer to the table.

<h1>Mathematical formulae</h1>
Writing a mathematical formula in <starTeX> is no more difficult than writing
ordinary text; it is just a question of specifying the elements of the formula
and then leave all typesetting details to <starTeX>.

<p>Mathematical formulae come in two shapes: <i>inline formulae,</i>
that occur on the same line as other text, like
<math>
  <sum><sub>k=1</sub><sup><infinity></sup> 2<sup>-k</sup>
</math>,
and <i>display formulae,</i> that occupy a line of their own, like
<displaymath>
  <sum><sub>k=1</sub><sup><infinity></sup> 2<sup>-k</sup>
</displaymath>
You can notice that the formulae looks slightly different in the two versions:
the display formula is larger, and the limits are placed differently in
relation to the <math><sum></math> sign.

<p>The commands for specifying the elements of a formula is the same for both
inline and display formulae, but <starTeX> will set it differently. Inline
formulae use a <x>math</x><...><x>/math</x> environment while display formulae
use <x>displaymath</x><...><x>/displaymath</x>.

<p>Mathematical typesetting is a bit different from setting ordinary
text, so a few special rules apply:
<list>
<item> Very few of the standard <starTeX> commands work when describing
  mathematical formulae. Instead, a special set of commands is available.
```

Figure 1: A sample PostScript figure




```
<psfig>[sinus.eps]A sample PostScript figure <label>[fig:sinus]</psfig>
```

The text following the file name is used as a caption for the figure.

The illustration will automatically be scaled to a size that StarTEX regards as suitable.

Note that illustrations will not appear exactly where you put them in the text, but "float" to the top of either the current or the next page.[3] You should refer to the illustration using a cross-reference label (see section 5.5 on page 5).

5.7 Tables

A <table>...</table> environment is used to create a table. The <row> command is used to start a new row, and the <col> command starts another row. For example, the code producing table 2 on page 4 is

```
<table> The various font environments<label>[tab-fonts]
<row> <tt>Ordinary text</tt>                    <col> Ordinary text
<row> <tt><lt>i>Italic text<lt>/i></tt>         <col> <i>Italic text</i>
<row> <tt><lt>b>Bold text<lt>/b></tt>           <col> <b>Bold text</b>
<row> <tt><lt>tt>Typewriter text<lt>/tt></tt>   <col> <tt>Typewriter text</tt>
</table>
```

The text preceding the first row is used as a table caption. It should include a cross-reference label if you want to refer to the table.

6 Mathematical formulae

Writing a mathematical formula in StarTEX is no more difficult than writing ordinary text; it is just a question of specifying the elements of the formula and then leave all typesetting details to StarTEX.

Mathematical formulae come in two shapes: *inline formulae,* that occur on the same line as other text, like $\sum_{k=1}^{\infty} 2^{-k}$, and *display formulae,* that occupy a line of their own, like

$$\sum_{k=1}^{\infty} 2^{-k}$$

You can notice that the formulae looks slightly different in the two versions: the display formula is larger, and the limits are placed differently in relation to the $\sum$ sign.

The commands for specifying the elements of a formula is the same for both inline and display formulae, but StarTEX will set it differently. Inline formulae use a $...$ environment while display formulae use <displaymath>...</displaymath>.

Mathematical typesetting is a bit different from setting ordinary text, so a few special rules apply:

- Very few of the standard StarTEX commands work when describing mathematical formulae. Instead, a special set of commands is available.

[3] The reason while illustrations float, is that there will not always be enough space at the position where the user has written the inclusion command.

```
<item> There is no limitation on how deep a formula may be nested. The
  numerator of a fraction may be a complete formula in itself, as may
  the subscript of a variable. The only real limit is readability.
<item> In a mathematical environment, spaces matter even less than
  usual. For example, <code><math> x + 1 </math></code> produces
  <math> x + 1 </math> which is no different from <math>x+1</math>
  produced by <code><math>x+1</math></code>.
</list>

<h2>Mathematical symbols</h2>
<starTeX> provides a very large set of mathematical symbols:
<list>
<item> All the ordinary letters can be used directly: <math>a, b, <...>, z, à,
  á, <...></math> and <math>A, B, <...>, Z, À, Á, <...></math>

<item> Numbers can also be written as they are: <math>127</math>.
  Note, however, that if the number contains a comma, as in
  <math>3<,>142</math>, you should use the command <x>,</x>. This can
  make a difference in the spacing, as in the list
  <math>(1<,>000,1<,>500,2<,>000,<...>)</math>.

<item> Greek letters are given by commands: <x>alpha</x> for <alpha>,
  <x>beta</x> for <beta>, etc. The commands for all the Greek letters are
  shown in table<~><ref>[tab:greek].  The commands for the uppercase letters
  all start with <tt>UC</tt>-, so writing <x>UCgamma</x> will produce a
  <UCgamma>. Some of the lowercase letters have a variant form whose command
  starts with <tt>VAR</tt>-; to obtain a <VARrho>, type <x>VARrho</x>.

<table>The Greek letters<label>[tab:greek]
<row> <b>Name</b> <col> <b>Lowercase</b>
  <col> <b>Variant</b> <col> <b>Uppercase</b>
<row> alpha   <col> <alpha>   <col>              <col> <UCalpha>
<row> beta    <col> <beta>    <col>              <col> <UCbeta>
<row> gamma   <col> <gamma>   <col>              <col> <UCgamma>
<row> delta   <col> <delta>   <col>              <col> <UCdelta>
<row> epsilon <col> <epsilon> <col> <VARepsilon> <col> <UCepsilon>
<row> zeta    <col> <zeta>    <col>              <col> <UCzeta>
<row> eta     <col> <eta>     <col>              <col> <UCeta>
<row> theta   <col> <theta>   <col> <VARtheta>   <col> <UCtheta>
<row> iota    <col> <iota>    <col>              <col> <UCiota>
<row> kappa   <col> <kappa>   <col>              <col> <UCkappa>
<row> lambda  <col> <lambda>  <col>              <col> <UClambda>
<row> mu      <col> <mu>      <col>              <col> <UCmu>
<row> nu      <col> <nu>      <col>              <col> <UCnu>
<row> xi      <col> <xi>      <col>              <col> <UCxi>
<row> omicron <col> <omicron> <col>              <col> <UComicron>
<row> pi      <col> <pi>      <col> <VARpi>      <col> <UCpi>
<row> rho     <col> <rho>     <col> <VARrho>     <col> <UCrho>
<row> sigma   <col> <sigma>   <col> <VARsigma>   <col> <UCsigma>
<row> tau     <col> <tau>     <col>              <col> <UCtau>
<row> upsilon <col> <upsilon> <col>              <col> <UCupsilon>
<row> phi     <col> <phi>     <col> <VARphi>     <col> <UCphi>
<row> chi     <col> <chi>     <col>              <col> <UCchi>
<row> psi     <col> <psi>     <col>              <col> <UCpsi>
<row> omega   <col> <omega>   <col>              <col> <UComega>
</table>

<item> There also exist 26 calligraphic letters <CalA>, <CalB>, <...>, <CalZ>.
  The commands for these letters are <x>CalA</x>, <x>CalB</x>, etc.

<item> You can use all the symbols you can find on your keyboard, like
  <math>+, -, /, =, (, [, {,</math> etc.

<item> Fractions like <math><frac>a<over>n+1</frac></math> are made with a
  special environment: <x>frac</x><...><x>over</x><...><x>/frac</x>.

<item> Square root like <math><sqrt>2</sqrt></math> or <math><sqrt>1+<frac>1
  <over><sqrt>n</sqrt></frac></sqrt></math> are
  made with the environment <x>sqrt</x><...><x>/sqrt</x>.
```

Table 3: The Greek letters

Name	Lowercase	Variant	Uppercase
alpha	α		A
beta	β		B
gamma	γ		Γ
delta	δ		Δ
epsilon	ϵ	ε	E
zeta	ζ		Z
eta	η		H
theta	θ	ϑ	Θ
iota	ι		I
kappa	κ		K
lambda	λ		Λ
mu	μ		M
nu	ν		N
xi	ξ		Ξ
omicron	o		O
pi	π	ϖ	Π
rho	ρ	ϱ	P
sigma	σ	ς	Σ
tau	τ		T
upsilon	υ		Υ
phi	ϕ	φ	Φ
chi	χ		X
psi	ψ		Ψ
omega	ω		Ω

- There is no limitation on how deep a formula may be nested. The numerator of a fraction may be a complete formula in itself, as may the subscript of a variable. The only real limit is readability.
- In a mathematical environment, spaces matter even less than usual. For example, `<math> x + 1 </math>` produces $x+1$ which is no different from $x+1$ produced by `<math>x+1</math>`.

6.1 Mathematical symbols

StarTEX provides a very large set of mathematical symbols:

- All the ordinary letters can be used directly: $a, b, \ldots, z, \grave{a}, \acute{a}, \ldots$ and $A, B, \ldots, Z, \grave{A}, \acute{A}, \ldots$
- Numbers can also be written as they are: 127. Note, however, that if the number contains a comma, as in 3,142, you should use the command `<,>`. This can make a difference in the spacing, as in the list $(1{,}000, 1{,}500, 2{,}000, \ldots)$.
- Greek letters are given by commands: `<alpha>` for α, `<beta>` for β, etc. The commands for all the Greek letters are shown in table 3. The commands for the uppercase letters all start with `UC-`, so writing `<UCgamma>` will produce a Γ. Some of the lowercase letters have a variant form whose command starts with `VAR-`; to obtain a ϱ, type `<VARrho>`.
- There also exist 26 calligraphic letters $\mathcal{A}$, $\mathcal{B}$, …, $\mathcal{Z}$. The commands for these letters are `<CalA>`, `<CalB>`, etc.
- You can use all the symbols you can find on your keyboard, like $+, -, /, =, (, [, \{$, etc.
- Fractions like $\frac{a}{n+1}$ are made with a special environment: `<frac>...<over>...</frac>`.
- Square root like $\sqrt{2}$ or $\sqrt{1+\frac{1}{\sqrt{n}}}$ are made with the environment `<sqrt>...</sqrt>`.

```
<item> Subscripts (like <math>a<sub>0</sub></math>) are given in a
  <x>sub</x><...><x>/sub</x> environment. Similarly, superscripts (like
  <math>x<sup>2</sup></math>) are specified using a
  <x>sup</x><...><x>/sup</x> environment.

  <p> Sub- and superscripts may be combined, as in
  <math>p<sub>1</sub><sup>2</sup></math>.

<item> All the other symbols you might need are accessed by commands.
  Table<~><ref>[ops] shows all the operators,
  table<~><ref>[relations] shows the relations,
  table<~><ref>[arrows] shows the arrows,
  table<~><ref>[delims] shows some additional delimiters,
  table<~><ref>[big-sym] shows the <``>big<''> symbols, and
  table<~><ref>[other-sym] shows the rest of the mathematical symbols
  <starTeX> can provide.

<item> Most symbols can be negated by placing a / across it, like
  <math><not><rightarrow></math> or <math><not><lt></math>. This is done
  by placing a <x>not</x> command in front of it.

  <p>Since the result of <x>not</x><x>in</x> doesn't look too good, a special
  symbol <x>notin</x> has been designed for that particular negation: <notin>.

<item> Some common functions like `<lim>' are regarded as symbols, and
  there exist commands for typesetting them correctly. These commands
  are shown in table<~><ref>[func-names].
</list>

<table> Various unary and binary operators<label>[ops]
<row> <x>mp</x>              <col> <mp>              <col>
      <x>star</x>            <col> <star>
<row> <x>circ</x>            <col> <circ>            <col>
      <x>bullet</x>          <col> <bullet>
<row> <x>cap</x>             <col> <cap>             <col>
      <x>cup</x>             <col> <cup>
<row> <x>sqcap</x>           <col> <sqcap>           <col>
      <x>sqcup</x>           <col> <sqcup>
<row> <x>vee</x>             <col> <vee>             <col>
      <x>wedge</x>           <col> <wedge>
<row> <x>wr</x>              <col> <wr>              <col>
      <x>diamond</x>         <col> <diamond>
<row> <x>triangleleft</x>    <col> <triangleleft>    <col>
      <x>triangleright</x>   <col> <triangleright>
<row> <x>bigtriangleup</x>   <col> <bigtriangleup>   <col>
      <x>bigtriangledown</x> <col> <bigtriangledown>
<row> <x>oplus</x>           <col> <oplus>           <col>
      <x>ominus</x>          <col> <ominus>
<row> <x>otimes</x>          <col> <otimes>          <col>
      <x>oslash</x>          <col> <oslash>
<row> <x>odot</x>            <col> <odot>            <col>
      <x>uplus</x>           <col> <uplus>
<row> <x>dagger</x>          <col> <dagger>          <col>
      <x>ddagger</x>         <col> <ddagger>
<row> <x>amalg</x>           <col> <amalg>           <col>
      <x>bigcirc</x>         <col> <bigcirc>
</table>

<h2>Example</h2>
To produce the equation
<displaymath>
  <int><sub>a</sub><sup>b</sup> f(x) <partial>x =
  <lim><sub><delta><rightarrow>0</sub>
    <sum><sub>k=1</sub><sup>n</sup> f(<xi><sub>k</sub>)
      (x<sub>k</sub> - x<sub>k-1</sub>),
</displaymath>
you must type

<p><code>
<displaymath>
  <int><sub>a</sub><sup>b</sup> f(x) <partial>x =
  <lim><sub><delta><rightarrow>0</sub>
    <sum><sub>k=1</sub><sup>n</sup> f(<xi><sub>k</sub>)
      (x<sub>k</sub> - x<sub>k-1</sub>),
</displaymath>
</code>

<table> Various relation symbols.<label>[relations]
<row> <x>lt</x> <col> <lt> <col>
```

Table 4: Various unary and binary operators

<mp>	$\mp$	<star>	$\star$
<circ>	$\circ$	<bullet>	$\bullet$
<cap>	$\cap$	<cup>	$\cup$
<sqcap>	$\sqcap$	<sqcup>	$\sqcup$
<vee>	$\vee$	<wedge>	$\wedge$
<wr>	$\wr$	<diamond>	$\diamond$
<triangleleft>	$\triangleleft$	<triangleright>	$\triangleright$
<bigtriangleup>	$\bigtriangleup$	<bigtriangledown>	$\bigtriangledown$
<oplus>	$\oplus$	<ominus>	$\ominus$
<otimes>	$\otimes$	<oslash>	$\oslash$
<odot>	$\odot$	<uplus>	$\uplus$
<dagger>	$\dagger$	<ddagger>	$\ddagger$
<amalg>	$\amalg$	<bigcirc>	$\bigcirc$

- Subscripts (like a_0) are given in a `<sub>...</sub>` environment. Similarly, superscripts (like x^2) are specified using a `<sup>...</sup>` environment.

  Sub- and superscripts may be combined, as in p_1^2.

- All the other symbols you might need are accessed by commands. Table 4 shows all the operators, table 5 on page 9 shows the relations, table 6 on page 10 shows the arrows, table 7 on page 10 shows some additional delimiters, table 8 on page 10 shows the "big" symbols, and table 9 on page 10 shows the rest of the mathematical symbols StarTeX can provide.

- Most symbols can be negated by placing a / across it, like $\not\to$ or $\not<$. This is done by placing a `<not>` command in front of it.

  Since the result of `<not><in>` doesn't look too good, a special symbol `<notin>` has been designed for that particular negation: $\notin$.

- Some common functions like 'lim' are regarded as symbols, and there exist commands for typesetting them correctly. These commands are shown in table 10 on page 11.

6.2 Example

To produce the equation

$$\int_a^b f(x)\partial x = \lim_{\delta\to 0}\sum_{k=1}^{n} f(\xi_k)(x_k - x_{k-1}),$$

you must type

```
<displaymath>
  <int><sub>a</sub><sup>b</sup> f(x) <partial>x =
  <lim><sub><delta><rightarrow>0</sub>
    <sum><sub>k=1</sub><sup>n</sup> f(<xi><sub>k</sub>)
      (x<sub>k</sub> - x<sub>k-1</sub>),
</displaymath>
```

7 Running StarTeX

How to run StarTeX depends on your computer system, but on most you just give the command

```
startex myfile.tex
```

The second word is the name of the file containing your StarTeX source code.

```
      <x>leq</x> <col> <leq> <col>
      <x>ll</x> <col> <ll>
<row> <tt><gt></tt> or <x>gt</x> <col> <gt> <col>
      <x>geq</x> <col> <geq> <col>
      <x>gg</x> <col> <gg>
<row> <x>sim</x> <col> <sim> <col>
      <x>simeq</x> <col> <simeq> <col>
      <x>equiv</x> <col> <equiv>
<row> <x>approx</x> <col> <approx> <col>
      <x>cong</x> <col> <cong> <col>
      <x>neq</x> <col> <neq>
<row> <x>prec</x> <col> <prec> <col>
      <x>preceq</x> <col> <preceq> <col>
      <x>doteq</x> <col> <doteq>
<row> <x>succ</x> <col> <succ> <col>
      <x>succeq</x> <col> <succeq> <col>
      <x>models</x> <col> <models>
<row> <x>subset</x> <col> <subset> <col>
      <x>subseteq</x> <col> <subseteq> <col>
      <x>mid</x> <col> <mid>
<row> <x>supset</x> <col> <supset> <col>
      <x>supseteq</x> <col> <supseteq> <col>
      <x>parallel</x> <col> <parallel>
<row> <x>sqsubseteq</x> <col> <sqsubseteq> <col>
      <x>sqsupseteq</x> <col> <sqsupseteq> <col>
      <x>bowtie</x> <col> <bowtie>
<row> <x>in</x> <col> <in> <col>
      <x>ni</x> <col> <ni> <col>
      <x>notin</x> <col> <notin>
<row> <x>vdash</x> <col> <vdash> <col>
      <x>dashv</x> <col> <dashv> <col>
      <x>perp</x> <col> <perp>
<row> <x>smile</x> <col> <smile> <col>
      <x>frown</x> <col> <frown> <col>
      <x>asymp</x> <col> <asymp>
</table>

<h1>Running <starTeX></h1>
How to run <starTeX> depends on your computer system, but on most you
just give the command

<p><code>
startex myfile.tex
</code>
The second word is the name of the file containing your <starTeX> source code.

<p>If you have made no errors, everything should run run smoothly and you
should see some output like

<p><code>
This is TeX, Version 3.14159 (C version 6.1)
(myfile.tex (article.stx) (myfile.aux) [1] [2] [3] [4]
[5] [6] (myfile.aux) )
Output written on myfile.dvi (6 pages, 28872 bytes).
Transcript written on myfile.log.
</code>

<p><starTeX> will now have produced a graphic file named <tt>myfile.dvi</tt>.
You can either
<list>
<item> display the document on your computer screen using a program
  like <tt>xdvi</tt>, or
<item> print the document on a laser printer using <tt>dvips</tt> or a
  similar program.
</list>
Contact your local system staff for further details on which programs
are available at your site.

<h2>Error handling</h2>
Everybody makes mistakes, and if you do, you may encounter messages like
<p><code>
** StarTeX error detected on line 95:
   No <over> in the <frac>...<over>...</frac> environment.
</code>
The line number and the error description should be enough to enable
you to locate the error and fix it.

<p>Some errors will produce many error messages, so it you get a lot of
messages, do not try to understand them all. It is often best to just
fix the first one and run the source code through <starTeX> again.
```

Table 5: Various relation symbols.

<lt>	$<$	<leq>	$\leq$	<ll>	$\ll$
> or <gt>	$>$	<geq>	$\geq$	<gg>	$\gg$
<sim>	$\sim$	<simeq>	$\simeq$	<equiv>	$\equiv$
<approx>	$\approx$	<cong>	$\cong$	<neq>	$\neq$
<prec>	$\prec$	<preceq>	$\preceq$	<doteq>	$\doteq$
<succ>	$\succ$	<succeq>	$\succeq$	<models>	$\models$
<subset>	$\subset$	<subseteq>	$\subseteq$	<mid>	$\mid$
<supset>	$\supset$	<supseteq>	$\supseteq$	<parallel>	$\parallel$
<sqsubseteq>	$\sqsubseteq$	<sqsupseteq>	$\sqsupseteq$	<bowtie>	$\bowtie$
<in>	$\in$	<ni>	$\ni$	<notin>	$\notin$
<vdash>	$\vdash$	<dashv>	$\dashv$	<perp>	$\perp$
<smile>	$\smile$	<frown>	$\frown$	<asymp>	$\asymp$

If you have made no errors, everything should run run smoothly and you should see some output like

```
This is TeX, Version 3.14159 (C version 6.1)
(myfile.tex (article.stx) (myfile.aux) [1] [2] [3] [4]
[5] [6] (myfile.aux) )
Output written on myfile.dvi (6 pages, 28872 bytes).
Transcript written on myfile.log.
```

StarTeX will now have produced a graphic file named `myfile.dvi`. You can either

- display the document on your computer screen using a program like `xdvi`, or
- print the document on a laser printer using `dvips` or a similar program.

Contact your local system staff for further details on which programs are available at your site.

7.1 Error handling

Everybody makes mistakes, and if you do, you may encounter messages like

```
** StarTeX error detected on line 95:
   No <over> in the <frac>...<over>...</frac> environment.
```

The line number and the error description should be enough to enable you to locate the error and fix it.

Some errors will produce many error messages, so it you get a lot of messages, do not try to understand them all. It is often best to just fix the first one and run the source code through StarTeX again.

Sometimes your error is so severe that you get messages like this:

```
Runaway argument?
p
! Paragraph ended before < was complete.
<to be read again>
                   \par
l.562
```

These messages are from TeX, the system on top of which StarTeX is implemented. The message itself will quite probably mean nothing to you, but the line number (562 in this example) will hopefully make it possible for you to locate the error.[4]

[4] In this case, the error was a missing `>`; the user had written just `<p`.

```
<p>Sometimes your error is so severe that you get messages like this:
<p><code>
Runaway argument?
p
! Paragraph ended before < was complete.
<to be read again>
                   \par
l.562
</code>

These messages are from <TeX>, the system on top of which <starTeX> is
implemented. The message itself will quite probably mean nothing to you, but
the line number (562 in this example) will hopefully make it possible for you
to locate the error.<footnote>In this case, the error was a missing
  <code>></code>; the user had written just <code><p</code>.</footnote>


<table> Various arrows. (Note that not every arrow is listed. For every
  -<tt>left</tt>- arrow there is also a corresponding -<tt>right</tt>-
  arrow.)<label>[arrows]
<row> <x>leftarrow</x>          <col> <leftarrow>           <col>
      <x>longleftarrow</x>      <col> <longleftarrow>
<row> <x>leftrightarrow</x>     <col> <leftrightarrow>      <col>
      <x>longleftrightarrow</x>  <col> <longleftrightarrow>
<row> <x>doubleleftarrow</x>    <col> <doubleleftarrow>     <col>
      <x>doublelongleftarrow</x> <col> <doublelongleftarrow>
<row> <x>doubleleftrightarrow</x><col> <doubleleftrightarrow> <col>
      <x>doublelongleftrightarrow</x> <col> <doublelongleftrightarrow>
<row> <x>uparrow</x>            <col> <uparrow>             <col>
      <x>doubleuparrow</x>      <col> <doubleuparrow>
<row> <x>downarrow</x>          <col> <downarrow>           <col>
      <x>doubledownarrow</x>    <col> <doubledownarrow>
<row> <x>updownarrow</x>        <col> <updownarrow>         <col>
      <x>doubleupdownarrow</x>  <col> <doubleupdownarrow>
<row> <x>nearrow</x>            <col> <nearrow>             <col>
      <x>nwarrow</x>            <col> <nwarrow>
<row> <x>searrow</x>            <col> <searrow>             <col>
      <x>swarrow</x>            <col> <swarrow>
<row> <x>mapsto</x>             <col> <mapsto>              <col>
      <x>longmapsto</x>         <col> <longmapsto>
<row> <x>leftharpoonup</x>      <col> <leftharpoonup>       <col>
      <x>rightleftharpoons</x>  <col> <rightleftharpoons>
<row> <x>leftharpoondown</x>    <col> <leftharpoondown>     <col>
      <x>hookleftarrow</x>      <col> <hookleftarrow>
</table>

<table> Various delimiters<label>[delims]
<row> <x>langle</x> <col> <langle> <col> <x>rangle</x> <col> <rangle>
<row> <x>lceil</x>  <col> <lceil>  <col> <x>rceil</x>  <col> <rceil>
<row> <x>lfloor</x> <col> <lfloor> <col> <x>rfloor</x> <col> <rfloor>
</table>

<table>Big symbols<label>[big-sym]
<row> <x>sum</x> <col> <math><sum></math> <col>
      <x>prod</x> <col> <math><prod></math> <col>
      <x>coprod</x> <col> <math><coprod></math>
<row> <x>int</x> <col> <math><int></math> <col>
      <x>oint</x> <col> <math><oint></math> <col> <col>
<row> <x>bigcap</x> <col> <math><bigcap></math> <col>
      <x>bigcup</x> <col> <math><bigcup></math> <col>
      <x>biguplus</x> <col> <math><biguplus></math>
<row> <x>bigoplus</x> <col> <math><bigoplus></math> <col>
      <x>bigotimes</x> <col> <math><bigotimes></math> <col>
      <x>bigodot</x> <col> <math><bigodot></math>
<row> <x>bigvee</x> <col> <math><bigvee></math> <col>
      <x>bigwedge</x> <col> <math><bigwedge></math> <col>
      <x>bigsqcup</x> <col> <math><bigsqcup></math>
</table>
```

Table 6: Various arrows. (Note that not every arrow is listed. For every `-left-` arrow there is also a corresponding `-right-` arrow.)

`<leftarrow>`	$\leftarrow$	`<longleftarrow>`	$\longleftarrow$
`<leftrightarrow>`	$\leftrightarrow$	`<longleftrightarrow>`	$\longleftrightarrow$
`<doubleleftarrow>`	$\Leftarrow$	`<doublelongleftarrow>`	$\Longleftarrow$
`<doubleleftrightarrow>`	$\Leftrightarrow$	`<doublelongleftrightarrow>`	$\Longleftrightarrow$
`<uparrow>`	$\uparrow$	`<doubleuparrow>`	$\Uparrow$
`<downarrow>`	$\downarrow$	`<doubledownarrow>`	$\Downarrow$
`<updownarrow>`	$\updownarrow$	`<doubleupdownarrow>`	$\Updownarrow$
`<nearrow>`	$\nearrow$	`<nwarrow>`	$\nwarrow$
`<searrow>`	$\searrow$	`<swarrow>`	$\swarrow$
`<mapsto>`	$\mapsto$	`<longmapsto>`	$\longmapsto$
`<leftharpoonup>`	$\leftharpoonup$	`<rightleftharpoons>`	$\rightleftharpoons$
`<leftharpoondown>`	$\leftharpoondown$	`<hookleftarrow>`	$\hookleftarrow$

Table 7: Various delimiters

`<langle>`	$\langle$	`<rangle>`	$\rangle$
`<lceil>`	$\lceil$	`<rceil>`	$\rceil$
`<lfloor>`	$\lfloor$	`<rfloor>`	$\rfloor$

Table 8: Big symbols

`<sum>`	$\sum$	`<prod>`	$\prod$	`<coprod>`	$\coprod$
`<int>`	$\int$	`<oint>`	$\oint$		
`<bigcap>`	$\bigcap$	`<bigcup>`	$\bigcup$	`<biguplus>`	$\biguplus$
`<bigoplus>`	$\bigoplus$	`<bigotimes>`	$\bigotimes$	`<bigodot>`	$\bigodot$
`<bigvee>`	$\bigvee$	`<bigwedge>`	$\bigwedge$	`<bigsqcup>`	$\bigsqcup$

Table 9: Various other symbols

`<infinity>`	∞	`<angle>`	$\angle$
`<re>`	$\Re$	`<im>`	$\Im$
`<forall>`	$\forall$	`<exists>`	$\exists$
`<top>>`	$\top$	`<bot>`	$\bot$
`<wp>`	$\wp$	`<partial>`	∂
`<nabla>`	∇	`<surd>`	$\surd$
`<hbar>`	$\hbar$	`<emptyset>`	$\emptyset$
`<aleph>`	$\aleph$	`<ell>`	ℓ
`<neg>`	$\neg$		

```
<table> Various other symbols<label>[other-sym]
<row> <x>infinity</x> <col> <infinity> <col>
      <x>angle</x> <col> <angle>
<row> <x>re</x> <col> <re> <col>
      <x>im</x> <col> <im>
<row> <x>forall</x> <col> <forall> <col>
      <x>exists</x> <col> <exists>
<row> <x>top></x> <col> <top> <col>
      <x>bot</x> <col> <bot>
<row> <x>wp</x> <col> <wp> <col>
      <x>partial</x> <col> <partial>
<row> <x>nabla</x> <col> <nabla> <col>
      <x>surd</x> <col> <surd>
<row> <x>hbar</x> <col> <hbar> <col>
      <x>emptyset</x> <col> <emptyset>
<row> <x>aleph</x> <col> <aleph> <col>
      <x>ell</x> <col> <ell>
<row> <x>neg</x> <col> <neg> <col>
      <col>
</table>

<table> Function names<label>[func-names]
<row> <x>arccos</x> <col> <x>arcsin</x> <col>
      <x>arctan</x> <col> <x>arg</x>
<row> <x>cos</x> <col> <x>cosh</x> <col>
      <x>cot</x> <col> <x>coth</x>
<row> <x>csc</x> <col> <x>deg</x> <col>
      <x>det</x> <col> <x>dim</x>
<row> <x>exp</x> <col> <x>gcd</x> <col>
      <x>hom</x> <col> <x>inf</x>
<row> <x>ker</x> <col> <x>lg</x> <col>
      <x>lim</x> <col> <x>liminf</x>
<row> <x>limsup</x> <col> <x>ln</x> <col>
      <x>log</x> <col> <x>max</x>
<row> <x>min</x> <col> <x>pr</x> <col>
      <x>sec</x> <col> <x>sin</x>
<row> <x>sinh</x> <col> <x>sup</x> <col>
      <x>tan</x> <col> <x>tanh</x>
</table>

</body>
```

Table 10: Function names

<arccos>	<arcsin>	<arctan>	<arg>
<cos>	<cosh>	<cot>	<coth>
<csc>	<deg>	<det>	<dim>
<exp>	<gcd>	<hom>	<inf>
<ker>	<lg>	<lim>	<liminf>
<limsup>	<ln>	<log>	<max>
<min>	<pr>	<sec>	<sin>
<sinh>	<sup>	<tan>	<tanh>