

W. H. K. Bester

Scientific Computing 372

L^AT_EX §3: Standard environments

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Schedule

- 1 Introduction and setting text
- 2 Setting mathematics
- 3 **Standard environments**
- 4 Tables and figures
- 5 Boxes and new environments
- 6 AMS-LATEX
- 7 Beamer and PGF

Including other files

Example (Including files in a document)

- Use `\include{<file>}` and `\includeonly{<file list>}`.

```
\documentclass[a4paper]{book}
\includeonly{intro,chap1,chap3,close}
\title{My Most Excellent Monograph}
\author{W. H. K. Bester}
\begin{document}
\maketitle
\tableofcontents
\include{intro}
\include{chap1}
\include{chap2}
\include{chap3}
\include{close}
\end{document}
```

Environments

- Between `\begin{<env>}` and `\end{<env>}`
- The whole document, excluding the preamble, is an environment
- Standard environments include those for:
 - **Displayed paragraphs:** quotations, centred text, verses, or verbatim text
 - **Lists:** itemised, enumerated, or descriptive
 - **Maths:** equations and theorems
 - **Tabular data:** tables and arrays
 - **Floating structures:** pictures, floats, and figures

Displayed paragraphs

Example (Centred text)

- Use the *center* environment

This text is normal.

```
\begin{center}
```

This one is centred.

And this one.

```
\end{center}
```

This one is normal again.

This text is normal.

This one is centred.

And this one.

This one is normal again.

Example (Quotations)

- Use the *quote* or *quotation* environments

My favourite quotation is:

```
\begin{quote} Sic
```

```
gorgiamus allus
```

```
subiectatus nunc.
```

```
\end{quote}
```

My favourite quotation is:

Sic gorgiamus allus

subiectatus nunc.

Example (Verses)

- Use the `verse` environment
- Note the use of `\\` to end a line

```
By e.e. cummings
\begin{verse}
since feeling is first \\
who pays any attention \\
to the syntax of things \\
will never wholly kiss
you; \\
\end{verse}
```

```
By e.e. cummings
since feeling is first
who pays any atten-
tion
to the syntax of things
will never wholly kiss
you;
```

Verbatim text

Simulating typed text

- Use the *verbatim* or *verbatim** environments
- Use the `\verb` command; note delimiters

Example (Verbatim text)

```
\begin{verbatim}
What the #|&$_\^~ is
  ‘going’ {on} here
  \today \\???????
\end{verbatim}
```

```
What the #|&$_\^~ is
  ‘going’ {on} here
  \today \\???????
\end{verbatim}
```

Example (Verbatim text)

```
\begin{verbatim*}
The \LaTeX command
\end{verbatim*}
The \verb+&$+ and \verb73\7
are silly.
```

```
The_\LaTeX_\command
The &$ and 3\ are silly.
```

Example (Itemised lists)

- Use the *itemize* environment

Here is an itemised list:

```
\begin{itemize}
\item First item
\item Second item
\item Another item
\end{itemize}
```

As easy as this!

Here is an itemised list:

- First item
- Second item
- Another item

As easy as this!

Example (Enumerated lists)

- Use the *enumerate* environment

Enumerated lists are just as easy to make:

```
\begin{enumerate}
\item First item
\item Second item
\item Another item
\end{enumerate}
```

As easy as this!

Enumerated lists are just as easy to make:

1. First item
2. Second item
3. Another item

As easy as this!

Example (Nested lists)

```
\begin{enumerate}
\item Item
\begin{enumerate}
\item Subitem
\item Another subitem
\begin{enumerate}
\item But yet
\item it moves
\item again
\end{enumerate}
\item Continuing
\item Until here
\end{enumerate}
\item Another item
\item Last item
\end{enumerate}
```

1. Item
 - (a) Subitem
 - (b) Another subitem
 - i. But yet
 - ii. it moves
 - iii. again
 - (c) Continuing
 - (d) Until here
2. Another item
3. Last item

Example (Description lists)

- Use the *description* environment

Some animals explained.

```
\begin{description}
\item[Porcupine] An animal
with many sharp things on
its back.
\item[Rabbit] A fast
animal with long ears.
\end{description}
```

Some animals explained.

Porcupine An animal with
many sharp things on its
back.

Rabbit A fast animal with
long ears.

Numbered equations and references

Numbered equations

- You already know how to use the math mode
- Either in running text
- Or as displayed mathematics
- Equations can be numbered automatically
- Use the *equation* environment

References

- Use `\label{<name>}` to give an environment (or section or item) a name
- Use `\ref{<name>}` to get the “number” of `<name>`
- These numbers are updated automatically

Example (References to equations)

The length of the curve
 $y = y(x)$ is therefore

```
\begin{equation}
\label{length}
L = \int_a^b \sqrt{1 + \left(\frac{dy}{dx}\right)^2} dx.
\end{equation}
```

When we now differentiate
(\ref{length}) with respect
to x , it follows \ldots

The length of the curve
 $y = y(x)$ is therefore

$$L = \int_a^b \sqrt{1 + \left(\frac{dy}{dx}\right)^2} dx. \quad (1)$$

When we now differentiate (1)
with respect to x , it follows ...

Equation arrays

Example (Systems of equations)

The linear system

```
\begin{eqnarray}
a_{11}x_1+\ldots+a_{1n}x_n
& = & b_1 \nonumber \\
\vdots & & \vdots \nonumber \\
a_{n1}x_1+\ldots+a_{nn}x_n
& = & b_n \\
\end{eqnarray}
may now be \dots
```

The linear system

$$\begin{array}{rcl}
 a_{11}x_1 + \dots + a_{1n}x_n & = & b_1 \\
 & \vdots & \vdots \\
 a_{n1}x_1 + \dots + a_{nn}x_n & = & b_n \quad (2)
 \end{array}$$

may now be ...

Equation arrays

Example (Long equations)

The compound Simpson rule for numerical integration is

```
\begin{eqnarray}
\int_a^b f(x) dx & = & -\frac{(b-a)h^4}{180} f^{(iv)}(\mu) + \frac{h}{3} \left[ f(a) + 2 \sum_{j=1}^{m-1} f(x_{2j}) \right. \\
& & \left. + 4 \sum_{j=1}^m f(x_{2j-1}) + f(b) \right] \\
\label{simpson} \\
\end{eqnarray}
```

The compound Simpson rule for numerical integration is

$$\int_a^b f(x) dx = -\frac{(b-a)h^4}{180} f^{(iv)}(\mu) + \frac{h}{3} \left[f(a) + 2 \sum_{j=1}^{m-1} f(x_{2j}) + 4 \sum_{j=1}^m f(x_{2j-1}) + f(b) \right] \quad (3)$$