Scientific Computing 372

LaTeX: Section 4

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Last updated: 12 February 2015

Admin

Schedule

1. Introduction and setting text
2. Setting mathematics
3. Standard environments
4. Tables and figures
5. Boxes and new environments
6. $\mathcal{AMS}$-LaTeX
7. Beamer and PGF

Arrays

Example (Matrices in mathematics mode)

- Use the `array` environment
- Separate columns with `&`
- End rows with `\\`

```
The matrix \[
\begin{array}{clcr}
a+b+c & uv & x-y & 27 \\
a+b & u-v & z & 134 \\
a & 3u\times vw & xyz
& 2.978
\end{array} \]
is easy to produce.
```

The matrix

$$\begin{array}{clcr} a+b+c & uv & x-y & 27 \\ a+b & u-v & z & 134 \\ a & 3u\times vw & xyz & 2.978 \end{array}$$

is easy to produce.

Nested arrays

Example (More with `arrays`)

```
Watch this:
\[\frac{
\left[\begin{array}{cc}
\left|\begin{array}{cc}
a & b \\ c & d
\end{array}\right| & 1 \\
2 & \sum_{i=1}^{n}x_{i}^{2}
\end{array}\right]}
{\left|
\begin{array}{ccc}
1 & 2 & 3 \\
4 & 5 & 6 \\
7 & 8 & 9
\end{array}\right|}\]
Beautiful, yes?
```

Watch this:

$$\frac{\left[\begin{array}{cc}\left|\begin{array}{cc}a & b \\ c & d\end{array}\right| & 1 \\ 2 & \sum_{i=1}^{n}x_{i}^{2}\end{array}\right]}{\left|\begin{array}{ccc}1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9\end{array}\right|}$$

Beautiful, yes?

Arrays

Example (Something else with `arrays`)

- Note that `\left` and `\right` have to be balanced

```
Thus, we have
\begin{eqnarray}
x & = & \left\{
\begin{array}{ll}
3z, & z\geq 0 \\
z+3, & 0>z\geq -5 \\
2z+8, & z<-5 \end{array}
\right. \nonumber \\
y & = &
\frac{z^{2}}{\sin z}.
\label{y}
\end{eqnarray}
Now, take (\ref{y}), and
```

Thus, we have

$$\begin{aligned} x &= \begin{cases} 3z, & z \geq 0 \\ z+3, & 0 > z \geq -5 \\ 2z+8, & z < -5 \end{cases} \\ y &= \frac{z^2}{\sin z}. \end{aligned} \tag{1}$$

Now, take (1), and ...

Tables

Example (Tabular data)

- Use the `tabular` environment

```
\begin{tabular}{|p{2.6cm}||c|r|}
\hline
Subject & Prac & Tut \\
\hline\hline
Physics & 7 & 3 \\
\hline
Maths & None & 10 \\
\cline{1-1}\cline{3-3}
Computer Science, the best
subject in the whole universe,
but then again, I am
biased & 5 & 5 \\
\hline
\end{tabular}
```

Subject	Prac	Tut
Physics	7	3
Maths	None	10
Computer Science, the best subject in the whole universe, but then again, I am biased	5	5

Tables

Example (Multicolumn `tabular` data)

- Use `\multicolumn{`⟨n⟩`}{`⟨align⟩`}{`⟨entry⟩`}`, where ⟨n⟩ is the number of columns to spread over
- Also note the mischief I get up to with the `@{`⟨text⟩`}` column specifier

```
\begin{center}
\begin{tabular}{|l|l|r@{.}l|}
\hline
\multicolumn{2}{|c}{Item} &
\multicolumn{2}{|c|}{Price} \\
\hline Apples & (per dozen)
& 12 & 99 \\
Onions & (each) & 0 & 75 \\
\hline
\end{tabular}
\end{center}
```

Item		Price
Apples	(per dozen)	12.99
Onions	(each)	0.75

Tables

Column specifiers

`l`	Left-aligned items
`r`	Right-aligned items
`c`	Centred items
`@{`⟨text⟩`}`	Inserts ⟨text⟩ in every row; in math mode when in an `array`, left-to-right when in `tabular`
`p{`⟨w⟩`}`	Produces a justified paragraph box of width ⟨w⟩

Horizontal lines

- `\hline` draws a line the full width of the environment
- `\cline{`⟨c1⟩`-`⟨c2⟩`}` draws a line from column ⟨c1⟩ to ⟨c2⟩
- The columns are numbered 1, 2, …

Tabs

Example (Arbitrarily aligned items)

- Use the `tabbing` environment
- Set tabs with \=
- Move to next tab with \>
- End lines with \\

```
The environment starts on
a new line, as follows.
\begin{tabbing}
When \= it rains, \= then \\
  \> the \> road is very, \\
  \> \> very wet! \\
  \> Don't slip\ldots.
\end{tabbing}
Afterwards, normal text
continues on a new line.
```

The environment starts on a new line, as follows.

When it rains, then
the road is very,
very wet!
Don't slip....

Afterwards, normal text continues on a new line.

Floating bodies

Figures and other floating bodies

- TEX will happily break sentences over pages
- Things such as pictures cannot be split
- They must be “floated” to convenient places, like the top of a page, to prevent half-empty pages
- Use the `figure` environment for figures
- Use the `table` environment for tables
- Inside a floating environment, use `\caption{`⟨text⟩`}` for an automatically numbered caption
- The optional arguments `h` (here), `t` (top of page), `b` (bottom of page) , and `p` (separate floats page) specifies where the float may be put

Floating bodies

Rules to determine where a float is put

- Placed in the earliest place that does not violate subsequent rules, except that `h` takes precedence over `t`
- Will not be printed on an earlier page than the environment appears
- No figure will be printed before an earlier figure; no table before an earlier table
- It may appear only at a position allowed by the optional arguments; `tbp` is assumed if the argument is missing
- Placement of a float cannot produce an overfull page

Tables

Example (Floating table)

- Note that the `\label` command must go inside or after the `\caption` command
- Where may the following be put?[1]

```
\begin{table}[tb]
\begin{center}
\begin{tabular}{|c|c|}
\hline A silly & little table \\
\hline to illustrate & the point \\
\hline \end{tabular}\end{center}
\caption[Nice table]{A nice little table}
\label{t:nice}
\end{table}
```

[1] top of page, bottom of page

Loose ends

A Table of …

- `\tableofcontents`, `\listoffigures`, `\listoftables`
- The optional argument to `\caption` gives the text of the entry in the `listof` commands

Graphics

- Include the package `graphicx`
- Use the `\includegraphics` command

Text in the margins

- Use the `\marginpar[`⟨right text⟩`]{`⟨left text⟩`}` command