

Better LaTeX?

– some hints for improved code and writing style

Lars Madsen daleif@imf.au.dk

IMF-AU DK-TUG

16 April 2010

Goals for this talk

- 1 Better source quality
- 2 Better source structure
- 3 Eradicating some bad habits

Part I

Better LaTeX

Non-LaTeX related

- Find a good editor, and learn to use it
- Use BibTeX for the bibliography
 - see <http://www.imf.au.dk/en/library/search/> for links to large article databases
- Use version control
 - at least use it to back up the data on your laptops
 - at IMF we provide access to Subversion

Typographical considerations

- Do not remove the paragraph *indentation*
 - without it readers will never be sure where a new paragraph starts
- Do not increase the *space between* paragraphs
 - if it feels a little cramped increase the line space a little
- never ever use `\\` or `\newline` in the text
 - start a *new paragraph* instead
- in articles, you are the *content provider*, not the *journal designer*, so changing the layout is a waste of time

Structure your documents

- use `\section{<title>}` and friends
 - add blank lines before and after
- use `\emph{<text>}` not `{\em text}`
 - generally never use `\rm`, `\it` and friends
- use environments whenever possible and make them readable

Bad

```
blah blah \begin{equation}
...
\end{equation} blah blah
```

Good

```
\begin{align}
...
\end{align}
```

- In tables and in math alignment write `\\` on lines of their own
 - makes it easier to distinguish between rows

A few recommendations

- Use the **memoir**-class for teaching materials and **article** for articles
- Always use

```
\usepackage{amsmath,amssymb,bm,mathtools}
```

- At least learn to use the geometry package
 - this is a big no-no:

```
...  
\setlength{\textheight}{9in}  
\setlength{\textwidth}{5.7in}
```

- clean up your preambles, remove junk that aren't used anymore
 - or at least let me have a go at it, improving it

A personal crusade

Disregard all use of the `eqnarray` environment

Example (Inconsistent spacing)

If $A = B$ then

$$A = B$$

Example (Bad eq no)

$$A = 2B + B + 3B + B + \textcircled{1}$$

- For more reasons see <http://tug.org/pracjourn/2006-4/madsen>
- learn to use the `align` environment instead

Align tip

This construction

Code

```
\begin{eqnarray*}
\lefteqn{XXXXXXXX} \\
&= & X^2 \quad \& = & 5 \\
\end{eqnarray*}
```

Example

$$\begin{aligned} &XXXXXXXX \\ &= X^2 \\ &= 5 \end{aligned}$$

can be replaced by

Code (require mathtools)

```
\begin{align*}
\MoveEqLeft XXXXXXXX \\
&= X^2 \quad \& = 5 \\
\end{align*}
```

Example

$$\begin{aligned} &XXXXXXXX \\ &= X^2 \\ &= 5 \end{aligned}$$

Other bad math

- **\$\$...\$\$**
 - does not comply to LaTeX configuration and is easy to miss in the source
- **\[...\]**
 - not really bad but

```
\begin{equation*}
...
\end{equation*}
```

provides better structure and easier to change

- **\left(...\right)**
 - use with care.

Excessive

$$\left(\sum_{k=1}^n f(k)\right)$$

Better (manually scaled)

$$\left(\sum_{k=1}^n f(k)\right)$$

Some tips

- use `\bm{...}` for bold math, not `\mathbf{...}`
- Do not use multiline for more than two lines
 - align plus `\MoveEqLeft` is generally better
- Alignment to the right of a relation:

Code

```
\begin{align*}
\MoveEqLeft[3] XXXXXXXXXXXX \\
= {}& YYYYYY \\
& + 7 \\
\end{align*}
```

Result

$$\begin{array}{r} \text{XXXXXXXXXXXXXXXXX} \\ = \text{YYYYYY} \\ + 7 \end{array}$$

Functions, sets and indices

- multi letter names should be typeset upright
 - Var not Var
- Missing function names are easily added using

```
\DeclareMathOperator{\Var}{Var}
```

- Do *NOT* use \mbox{Var} or Var
 - they are wrong, and adds unnecessary noise to the source
- Others does not need extra space

```
\newcommand\SDD{\mathrm{SDD}}
```

- Named indices should be written in the upright text font

```
R_{\textup{max}}
```

 R_{\max}

Math source readability and maintainability

- The math source is often hard to understand for co-authors
- What does `\tilde{\phi}(z_{i-1}, z_i)` mean?
- Simple measures can make the source much more readable
 - 1 provide context related names for important symbols

```
X \isomorph Y   versus   X \cong Y
```

- 2 Hide the formatting in the macro definition (reduce noise)

```
\newcommand\grassmannian{\mathcal{L}}
```

- 3 Be very careful regarding short macro names
 - `\NN` is *not* a good name for \mathbb{N}
- *Always* add a short comment explaining what the macro is for
 - also a good idea for all packages you include
 - Using macros also makes changing symbols or syntax easier

Math source readability and maintainability

- 1 Never use `\def` to define macros
- 2 Never use `\renewcommand` on some macro unless you *really* know what you are doing (and what the macro is used for)

Examples:

```
% marks a variable to be distributed as
\let\DistAs\sim
% observation from distribution
\newcommand\obsFromDist{\mathbin{\sim\sim}}
% marks a process (require mathtools)
\DeclarePairedDelimiter\process{\}{\}
% error function
\newcommand\error{\varepsilon}
% Covarians operator
\DeclareMathOperator\Cov{Cov}
% sim log
\newcommand\simlog{\mathbin{\approx_{\log}}}
```

Tip

- if $|X|$ and $|a|$ means two different things, use different macros

```
\let\cardinal\abs => \cardinal{X} \abs{a}
```

- `\DeclarePairedDelimiter`** (mathtools) is very handy

Code

```
% norm
\DeclarePairedDelimiter{\norm}%
{\lVert}{\rVert}

\norm*{ \frac{a}{b} }
\norm[\Big]{ \sum_k \dots }
```

Output

$$\left\| \frac{a}{b} \right\| \quad \left\| \sum_k \dots \right\|$$

Spaces

- it is OK to add spaces in the source:

```
H\tilde{H}=\psi(z_0)\tilde{\psi}(z_0)f(W_1)\tilde{f}(W_1)
vs
H\tilde{H} = \psi(z_0) \tilde{\psi}(z_0) f(W_1) \tilde{f}(W_1)
```

- but use math space intelligently

```
f(x) = 0 \ \ \ \text{for } x < 1$
vs
f(x) = 0 \quad \text{for } x < 1$
```

- and *never* do this:

```
for $x \ = \ 4$ we have ...
```

– that will just annoy the editors

Cross references

- Always remember the *tie*:

```
Theorem~\ref{thm1}, page~\pageref{xx}
```

- ties should be second nature when adding a new reference
- use `\eqref{key}` for equation references
- might be an idea to learn to use the `varioref` package, especially handy for references to figures

Use proof environments

Bad proof

```
\noindent\textit{Proof}. blah blah ...  
\hfill$\square$
```

Always use a proof-like environment

Good proof

```
\begin{proof}  
  Blah blah ...  
\end{proof}
```

Handy

```
\begin{proofof}[Proof of  
Theorem~\ref{thm5}]  
  Blah blah ...  
\end{proofof}
```

- use at least the `amsthm` (or `ntheorem`) package
- better structure, better placement of the end marker

Learn to configure theorems

Do not do this:

Bad!

```
\begin{remark} { \rm  
... text ...  
}  
\end{remark}
```

Better (using amsthm):

Correct

```
\theoremstyle{definition}  
\newtheorem{remark}[theorem]{Remark}  
...  
\begin{remark}  
... text ...  
\end{remark}
```

Tables 1

- vertical lines does not belong in professional tables
 - similar effect can be achieved using space
- use the booktabs package for its better spaced horizontal lines

```
\begin{tabular}{...}  
\toprule  
Heading...  
\midrule  
table contents ..  
\bottomrule  
\end{tabular}
```

Comparison

$\mu_i - \mu_j$	$\bar{x}_i. - \bar{x}_j.$	Lower 95%	Upepr 95%
$\mu_3 - \mu_4$	35.23	11.63	58.83
$\mu_3 - \mu_1$	58.77	35.17	82.37
$\mu_3 - \mu_2$	91.15	67.56	114.75
$\mu_4 - \mu_1$	23.54	-0.06	47.14

$\mu_i - \mu_j$	$\bar{x}_i. - \bar{x}_j.$	Lower 95%	Upper 95%
$\mu_3 - \mu_4$	35.23	11.63	58.83
$\mu_3 - \mu_1$	58.77	35.17	82.37
$\mu_3 - \mu_2$	91.15	67.56	114.75
$\mu_4 - \mu_1$	23.54	-0.06	47.14

Tables 2

- present comparable data
 - packages dcolumn or (better) siunitx can help
- Units belong in the headers or in the stub
- Learn to make table notes, see `threeparttable(x)`

Header 1	Header 2	Header 3
23.4	87.5 ^a	334
4.0	10.2	99 ^a

Source: daleif inc

Note: This is fictitious data

^a This is just wrong

- Note that long explanations does not belong in the `\caption`, if needed add it to the table notes or write it in the text.

Handling units

Use the `siunitx` package

Code

```
\sisetup{per=slash}  
\SI{34.5}{\mole\per\litre}  
\SI{10}{\micro\gram}  
\SI{4 x 5 x 6}{mm}  
\si{\kg\per\second\squared}  
\SIrange{25}{57}{mm^2}
```

Example

34.5 mol/l

10 μg

4 mm \times 5 mm \times 6 mm

kg/s²

25 mm² to 57 mm²

- `siunitx` can also be used to format numbers, and to format columns in tables

Part II

A plea from journals

- If writing to a specific journal; find, read and follow their instructions (*ignore eqnarray*)
- If the journal is not decided in advance, use the **article** class, do *not* change the margins, make sure your material fits within the margins
- use only publicly available packages, i.e. package from CTAN
- Include only the packages that you actually *need/use*
 - if you do not include any graphics, then remove *graphicx...*
- include only those macros that are actually *used*
- do not include large chunks of outcommented text

- do not change the layout (not your job)
- keep the use of symbols in article titles and abstract to a minimum
- never use homemade macros in the abstract or in the bibliography
 - abstract and bibliography are often used in context where those macros are not defined

Part III

Outro

DK-TUG Lecture

About memoir

Tuesday, 27 April 2010, Auditorium E, at 16:00

QUESTIONS?