

Some misunderstood or unknown $\LaTeX 2_{\epsilon}$ tricks

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1 Introduction

Some simple things to do in $\LaTeX 2_{\epsilon}$ are often misunderstood (or simply unknown) to — even skilled — authors. We here present some useful coding for:

1. *pedagogical uses*: write a matrix with borders, show simplifications of terms in mathematical developments;
2. *presenting data*: make an accolade in a table;
3. *solving Springer's `tocdepth` problem in `svmono`*;
4. *writing European envelopes in an efficient way*;
5. *improving typography*: the `microtype` package.

These examples come from (Merciadri, 2009).

2 Pedagogical uses

It is always interesting to give students (whatever the institution) some clues about presented concepts. Sometimes, the \LaTeX skills of lecturers are not sufficient. Despite their great ideas, these ideas sometimes fall into oblivion. Why? All their material is illustrated using \LaTeX . If they decide to show something they cannot code in \LaTeX , they will need to write it in another form (a non- \LaTeX form). That makes it directly “less serious”, or at least less competent than they want to appear. Facing this situation, they may choose to put aside their idea rather than show anything.

That is a bad thing, as \LaTeX can do many things, even if it is sometimes tricky. A typesetting program should not limit the writer.

2.1 Matrix with borders

Let's say you want to explain an adjacency matrix to students. You first draw the triangle in Figure 1. (By the way, to make the drawing I used \LaTeX Draw (<http://latexdraw.sourceforge.net>), which can generate graphics in PSTricks.)

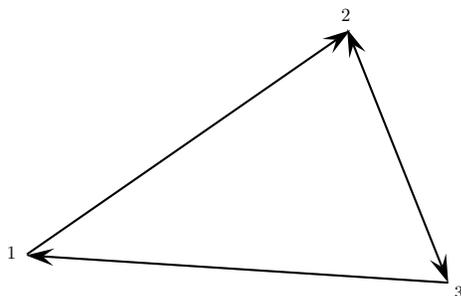


Figure 1: Graph example.

Next, you need to typeset its adjacency matrix. How? One of your colleagues has created this:

$$\mathcal{M}_S = \begin{matrix} & \begin{matrix} 1 & 2 & 3 \end{matrix} \\ \begin{matrix} 1 \\ 2 \\ 3 \end{matrix} & \begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 1 & 0 \end{pmatrix} \end{matrix}$$

He's away now, so you can't ask him how he did it. So here's how:

```
\mathcal{M}_{S} =
\bordermatrix{
& 1 & 2 & 3 \cr
1 & 0 & 1 & 0 \cr
2 & 0 & 0 & 1 \cr
3 & 1 & 1 & 0 \cr
}
```

Side note: `\bordermatrix` uses `\tabular` underneath, so, as with every `\tabular`, you can use `\hline` to draw a horizontal line.

2.2 Show simplifications

It is sometimes helpful, particularly when writing long mathematical developments, to show the simplifications which can be done, especially when the developments become tricky. (The opposite is also true: it sometimes happens in proofs that you choose to write, for example,

$$(x + 1)^2$$

as

$$(x + 1 + (1 - 1))(x + 1 + (1 - 1))$$

as a step on the way to the result you want to prove.)

For cancelling terms, you might use `\not`, but it is not very efficient, and was not implemented for this. A better alternative is to use the `cancel` package, thus:

```
\usepackage{cancel}
in your preamble, and then
\dfrac{\cancel{(b-a)} (a^2+ab+b^2)}
{\cancel{(b-a)}(b+a)}
```

in the body. The result is:

$$\frac{(b-a)(a^2 + ab + b^2)}{(b-a)(b+a)}$$

Typographically, cancelling terms like this is ugly, but, pedagogically, it can be very useful for students.

3 Presenting data

Tables constitute a natural way to display data without taking too much space. They can be very useful with judicious choice of data.

3.1 With braces

Let's say that you want to make a table. Everything is set up: you have the data, the bibliography references, and you have written the whole table. But you are puzzled, because you want to put a connecting brace at some place to help the reader. You can use:

```
\usepackage{multirow}
\usepackage{bigdelim}

in the preamble, and

\begin{tabular}{l|l|r}
\hline
$a$ & \rule{0pt}{10pt} & $b$ & \\
\hline
$c$ & $d$ & \rule{0pt}{12pt}
      \multirow{2}{*}{
        \rdelim}{2}{1cm}[text]\\
$e$ & $f$ &
\end{tabular}
```

in the body. The (invisible) `\rule` commands stop the *b* and the brace from touching the horizontal rule above. The result:

<i>a</i>	<i>b</i>	
<i>c</i>	<i>d</i>	}text
<i>e</i>	<i>f</i>	

4 Springer's tocdepth problem

Springer is one of the largest mathematical publishers. When writing a book with their `svmono` class, you may realize that it does not respect `tocdepth`. As a result, subparagraphs cannot be included in the table of contents — it can include chapters, sections, subsections, subsubsections, and paragraphs ... but not subparagraphs. The following code solves this:

```
\makeatletter
\renewcommand\subparagraph{%
  \@startsection{subparagraph}{4}{\z@}%
  {-18\p@}% \p@plus -4\p@ \@minus -4\p@}%
  {6\p@}% \p@plus 4\p@ \@minus 4\p@}%
  {\normalfont\normalsize\itshape
  \rightskip=\z@ \@plus 8em%
  \pretolerance=10000}%
}
\makeatother
```

5 Envelopes

You'd like to write envelopes with \LaTeX but do not know how. Here is one global solution. What could be better looking than a \LaTeX -generated envelope?

5.1 C6 standard and adaptations

Here is an example of an envelope document (using the C6 standard size).

```
\documentclass[12pt]{letter}
\usepackage{geometry}
\geometry{paperheight=162mm,paperwidth=114mm}
\usepackage{graphics}
\usepackage[c6envelope,noprintbarcodes,
  righthenvelopes,printreturnaddress]
  {envlab}

\makelabels
\begin{document}
\startlabels
\mlabel{%
% Sender's info:
  LastName FirstName\\
  Street No\\
  ZIPcode City (Country)}{
% Receiver's info:
  LastName FirstName\\
  Street No\\
  ZIPcode City (Country)}
\end{document}
```

You can directly print the output of such a code on a C6 envelope. If your envelopes have height *M* mm and width *N* mm, just replace the third line in this code with:

```
\geometry{paperheight=Mmm,paperwidth=Nmm}
```

5.2 In the printer

You need to put your C6 envelope in your printer as illustrated at Figure 2.

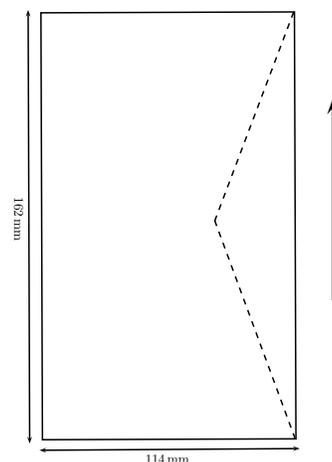


Figure 2: How to put your C6 envelope in the printer.

5.3 Sample output

An example of the envelope's output which will be produced is given in Figure 3.

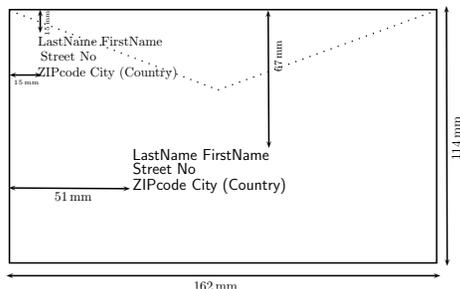


Figure 3: Generated C6 envelope.

5.4 Standard envelope sizes

Here are some standard sizes for envelopes:

1. C4 format: 22,9 cm \times 32,4 cm, to transport an A4 sheet,
2. C5 format: 16,2 cm \times 22,9 cm, to transport an A4 sheet folded one time,
3. C6 format: 11,4 cm \times 16,2 cm, to transport an A4 sheet folded two times.

You can directly modify the envelope code in Section 5.1 to match the dimensions of your envelope.

6 Improving typography

According to Schlicht (2009), the `microtype` package provides a \LaTeX interface to the micro-typographic extensions of `pdfTeX`: most prominently, character protrusion and font expansion. Furthermore, it provides for the adjustment of interword spacing and additional kerning, as well as hyphenatable letterspacing (tracking) and the possibility of disabling all or selected ligatures.

That is, `microtype` basically helps you produce better output when used in conjunction with `pdfTeX`.

You do not have to worry over the details; just use:

```
\usepackage{microtype}
```

in the preamble of your document. If you are using `babel`, for further refinement you may write

```
\usepackage[babel=true]{microtype}
```

An example of its interest is illustrated by the following phenomenon. This document has been typeset using `ltugboat` class and, among others, the `microtype` package, with the options which were given before. If this package is not added to the preamble, a black box appears in the first sentence of Section 2: the period was too far into the margin. With `microtype` loaded, all is well.

Many options can be selected with `microtype`. Reading its nice manual (Schlicht, 2009) is a fruitful way to learn more about typesetting.

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- Schlicht, R. *The microtype package: An interface to the micro-typographic extensions of pdfTeX*, 2009. <http://mirror.ctan.org/macros/latex/contrib/microtype/microtype.pdf>.