The University of Sydney
School of Physics

Formula Sheet Template Guide

November 21, 2022

Alex Gray

Contents

1 What This Is

Here I've used the `Formula Sheet Template.tex` document to create a guide to said document. Below is a guide to how to edit the LaTeX if you are new, as well as the different commands that have been added on top of the default LaTeX commands.

2 The Custom Commands / Macros

2.1 Maths Commands

`\begin{fleqn}` ⋯ `\end{fleqn}`
Flush left equation environment, all equations are by default left aligned within this environment.

`\eqexp{<explanation>}`
A custom macro that indents and italicises text such that when placed below an equation it can be used to provide an explanation of what that equation does.

`\d` [1]
A different font 'd' for integrals.

$$x = \int v_x \mathrm{d}x$$

`\ud`
A different font 'd' for integrals with a space.

$$x = \int v_x \ \mathrm{d}x$$

`\Reals` $\mathbb{R}$

`\Complexs` $\mathbb{C}$

`\Integers` $\mathbb{Z}$

`\Naturals` $\mathbb{N}$

`\Rationals` $\mathbb{Q}$

`\Primes` $\mathbb{P}$

`\emf` $\mathcal{E}$

`\deq` $\coloneqq$

`\bfrac{}` and `\bint{}`
Commands that force sizing of fractions and integrals to be big.

`\vect{}` and `\vhat{}`
Custom vector formatting e.g. $\vec{\mathbf{v}}$ and $\hat{\mathbf{v}}$.

[1] overrides underdot accent.

`\hvec{}`
Vector with harpoon accent e.g. $\vec{v}$

`\svec{}`
Vector with squiggle accent e.g. $\underset{\sim}{v}$

`\bvec{}`
Vector with bold text e.g. $\mathbf{v}$.

`\lhvec{}` and `\lvect{}`
A long vector with harpoon accent e.g. $\overrightarrow{AB}$ and $\overrightarrow{\boldsymbol{AB}}$.

`\vmod{}`
Vector modulus notation e.g. `\vmod{x}` $= \|x\|$.

`\Matrix{}`
Shortcut for matrix environment surrounded by square brackets e.g. `\Matrix{1 & 2 \\ 3 & 4}`

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$

`\proj{a}{b}`
Projection of a onto b e.g. $\text{proj}_b\, a$

2.2 Multi-Column Commands

`\begin{paracol}{<n>}` $\cdots$ `\end{paracol}`
A paragraph column environment with `<n>` columns, has better text alignment than other packages in the use case of formula sheets.

`\switchcolumn`
Switches the column you're typing in.

`\newpage`
Pushes text to the next page **only in the current column**.

`\alignColumns`
A custom macro that aligns the other column to the current vertical alignment of the current column.

2.3 Cross Referencing Other Sections

Internal cross referencing allows you to refer the reader to another part of the document using the corresponding `\label`. The default LaTeX commands are not terrible but by default it only generates a hyperlinked form of the number of whatever you're referring to. Instead we can use the commands below.

`\eqnum{<label>}`
Just grabs the number of an equation. If you want to repeat an equation but keep the original number you can use `\tag{\eqnum{<label>}}` where `<label>` is the label of the original equation.

`\eqref{<label>}` or `\Eqref{<label>}`
This generates a cross reference to an equation, `\Eqref` capitalises the word "Equation". E.g. there is equation A.1 or Equation A.1.

`\secref{<label>}`
This references a section by number and name e.g. §3:Editing the Preamble and Titlepage. This can also be changed to just reference by just number or name by changing the line in the preamble from `\newcommand{\secref}[1]{\secrefNumName{#1}}` to:
`\newcommand{\secref}[1]{\secrefNum{#1}}` → §3
`\newcommand{\secref}[1]{\secrefName{#1}}` → §Editing the Preamble and Titlepage

`\figref{<label>}` or `\Figref{<label>}`
This generates a cross reference to a figure, `\Figref` capitalises the word "Figure". E.g. there is figure 1 or Figure 1.

`\tableref{<label>}` or `\Tableref{<label>}`
This generates a cross reference to a table, `\Table` capitalises the word "Table". E.g. there is table 1 or Table 1.

`\appref{<label>}` or `\Appref{<label>}`
This generates a cross reference to an appendix, `\Appref` capitalises the word "Appendix". E.g. there is appendix A.1 or Appendix A.1.

2.4 Creating References and Appendices

To streamline creating the references list and appendices there are two commands:

`\references`
This prints the list of (cited[2]) references and adds a line to the table of contents for the references. To change the referencing style change the line
`\usepackage[backend=biber, style=ieee]{biblatex}`. See Overleaf [1] for other styles.

`\appendices`
This starts the appendices section, changes the header and reformats the titles so that subsections look like sections etc. This is because to get the numbering correct each appendix has to be a subsection.

2.5 Title Page Commands

There are two titlepage commands that can be used:

`\fullPageTitle`
Creates full title page as is in this document. To customise the titlepage edit the parameters in the preamble as per §3.1:The Parameters and What They Do.

`\topTitle`
Creates a title at the top of the page. This is intended for scientific reports which are typically more understated with an abstract below the title.

2.6 Extra Section Command

Typically LaTeX only allows 3 levels of sections: `\section`, `\subsection` and `\subsubsection`. I have added a 4th command `\subsubsubsection`.

2.7 Superscript and Subscript

Shortcuts for superscript and subscript in text `\super{}` and `\sub{}`.
E.g. `1\super{st}` → 1^{st} and `12\sub{dec}` → 12_{dec}.

3 Editing the Preamble and Titlepage

To edit the preamble (provided you're somewhat new to LaTeX) scroll to the bottom of `Report Preamble.tex` until you see the comment:

```
% ------------------------------------------------------------------------
%   ---- New LaTeX users feel free to edit what is below ----    |
% ------------------------------------------------------------------------
```

[2] LaTeX uses the BibTeX engine to generate references. The advantage is you can have a big file of references and it does all the styling for you, the downside is that it only adds to the referencing list the ones that you in-text cite.

3.1 The Parameters and What They Do

`\newcommand{\Uni}{The University of Sydney}`
This command edits part of the header of the titlepage. Edit the second field to change the header, making it empty removes that part of the header.

`\newcommand{\School}{School of Physics}`
This command edits part of the header of the titlepage. Edit the second field to change the header, making it empty removes that part of the header.

`\newcommand{\Unit}{Unit Code}`
This command edits part of the body of the titlepage. Edit the second field to change the text, making it empty removes that part of the titlepage.

`\newcommand{\Year}{Year}`
This command edits part of the body of the titlepage and the header. Edit the second field to change the text, making it empty removes it from the titlepage and the header.

`\newcommand{\Class}{}`
This command edits part of the body of the titlepage. Edit the second field to change the text, making it empty removes that part of the titlepage.

`\newcommand{\Assignment}{}`
This changes the title of the titlepage. Edit the second field to change the text.

`\newcommand{\SID}{123456789}`
This edits your student ID that appears in the headers.

`\author{Author 1 \\[0.5em] Author 2 \\[0.5em] Author 3 \\}`
This edits the author field on the titlepage. To add a new author add a `\\` between names. To increase the spacing change it to a `\\[<extra spacing>]` e.g. `\\[2mm]`.

`\date{}`
This adds the date to the titlepage. If the field is empty it doesn't add it to the page. Making the field `\today` automatically changes the field to the date of compilation.

`\title{\Assignment}`
Changes the title field. By default uses the `\Assignment` macro but can be edited to add extra text. (LaTeX tries to outsmart you if you add text after a command by removing the space between the command text and the new text, use a "`~`" e.g. `\Assignment~extra text` to force it to add text.)

`\numberwithin{equation}{section}`
Changes the numbering of equations. As above it numbers them as (`<sec num>.<eq num>`) where the equation number counter gets reset at the start of each section. To just number them by equation (ignoring sections) make the second field empty.

`\setlength{\parindent}{0em}`
This sets the indent at the start of a paragraph. LaTeX treats a new paragraph as starting whenever within your `.tex` file there is an empty line followed by new text. By default LaTeX indents the first line of this new text, changing the second field changes this indent.

`\setlength{\parskip}{1em}`
This sets the length of a space between paragraphs. LaTeX treats a new paragraph as starting whenever within your `.tex` file there is an empty line followed by new text. By default LaTeX doesn't add any space between paragraphs, changing the second field changes the spacing between paragraphs.

`\newcommand{\headercase}[1]{\scshape\nouppercase{#1}}`
Macro for controlling the header style, takes the header text as its argument. `\scshape` sets it to small caps, you can change this or add multiple styles. Other options include `\itshape` (*italic*), `\bfseries` (**bold**) and `\slshape` (*slanted*).
Remove the `\nouppercase` command to force it to all uppercase.

`\fancyhead[L]{\headercase{\leftmark}}`
This changes the left side of the header. `\leftmark` contains the last section that is started on a given page, `\rightmark` contains the last heading (i.e. including subsections etc.) that is started on a given page.

`\fancyhead[R]{\SID}`
Changes the right side of the header. By default uses the custom macro `\SID` but can be changed.

`\fancyfoot[C]{\small\thepage}`
Changes the centre of the footer, by default adds the page number with `\thepage`.

References

[1]Overleaf, *Biblatex citation styles*, https://www.overleaf.com/learn/latex/Biblatex_citation_styles, Accessed: 2022-11-21, 2022.

Appendices

A.1 Example Figure

Figure 1: The LaTeX logo. Figure captions typically go below a figure.

A.2 Example Table

Table 1: An example table. Table captions typically go above a table.

Test	text
Test	text
Test	text

A.3 Example Equation

$$\oiint_S \vec{\mathbf{E}} \cdot \mathrm{d}\vec{\mathbf{A}} = \frac{Q_{\mathrm{enc}}}{\varepsilon_0} \tag{A.1}$$