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LaTeX

Lecture 3 – Fancy elements

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Lists

- Lists often appear in documents, especially academic, as their purpose is often to present information in a clear and concise fashion.
- List structures in LaTeX are simply environments which essentially come in three types:
  - `itemize` for a bullet list
  - `enumerate` for an enumerated list and
  - `description` for a descriptive list.
- LaTeX will allow you to insert a list environment into an existing one. LaTeX will sort out the layout and any numbering for you.

```
\documentclass{article}
\usepackage{blindtext}
\begin{document}

\begin{itemize}
  \item \blindtext
  \item \blindtext
\end{itemize}

\begin{enumerate}
  \item \blindtext
  \item \blindtext
\end{enumerate}

\begin{description}
  \item [Ant] \blindtext
  \item [Elephant] \blindtext
\end{description}

\end{document}
```

Special lists

```
\documentclass[twocolumn]{article}
\usepackage{blindtext}
\usepackage{scrextend}
\addtokomafont{labelinglabel}{\sffamily}
\begin{document}
\blindtext
\begin{labeling}{alligator}
  \item [ant] really busy all the time
  \item [chimp] likes bananas
  \item [alligator] very dangerous animal, sharp teeth, long
muscular tail and a bit of text that is longer than one
line and shows the alignment of text quite nicely
\end{labeling}
\end{document}
```

ris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

ant really busy all the time

chimp likes bananas

alligator very dangerous animal, sharp teeth, long muscular tail and a bit of text that is longer than one line and shows the alignment of text quite nicely

Special lists

```
\documentclass[twocolumn]{article}
\usepackage{blindtext}
\usepackage[inline]{enumitem}
\usepackage{xcolor}
\begin{document}
\blindtext Coco likes fruit. Her favorites are:
\begin{enumerate*}[label={\alph*)},font={\color{red!50!black}\bfseries}]
\item bananas
\item apples
\item oranges and
\item lemons.
\end{enumerate*}
\blindtext
\end{document}
```

ipsum. Nunc quis urna dictum turpis accumsan semper. Coco likes fruit. Her favourites are: **a)** bananas **b)** apples **c)** oranges and **d)** lemons. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque phare-

```latex
\documentclass[12pt]{article}
\usepackage{tasks}
\usepackage{exsheets}
\SetupExSheets[question]{type=exam}
\begin{document}
\begin{question}
    Which one of the entries does not fit with the others?
    \begin{tasks}(4)
        \task mercury
        \task iron
        \task lead
        \task zinc
    \end{tasks}
\end{question}
\settasks{
    counter-format=(tsk[r]),
    label-width=4ex
}
\begin{question}
    What is a funkyton?
    \begin{tasks}(2)
        \task A dancing electron
        \task A dancing proton
        \task A dancing neutron
        \task A Dixie Dancing Duck
    \end{tasks}
\end{question}
\end{document}
```

Question 1.
Which one of the entries does not fit with the others?

a) mercury b) iron c) lead d) zinc

Question 2.
What is a funkyton?

(i) A dancing electron (ii) A dancing proton

(iii) A dancing neutron (iv) A Dixie Dancing Duck

```
\documentclass[twocolumn]{article}
\usepackage{blindtext}
\usepackage{enumitem}
\begin{document}
\blindtext Coco likes fruit. Her favourites are:
\begin{description}[align=left]
  \item [Kate] some detail
  \item [Christina]some detail
  \item [Laura]some detail
\end{description}

\begin{description}[align=right]
  \item [Kate] some detail
  \item [Christina]some detail
  \item [Laura]some detail
\end{description}

\begin{description}[align=right,labelwidth=3cm]
  \item [Kate] some detail
  \item [Christina]some detail
  \item [Laura]some detail
\end{description}

\blindtext
\end{document}
```

ris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Kate some detail

Christina some detail

Laura some detail

Kate some detail

Christina some detail

Laura some detail

Kate some detail

Christina some detail

Laura some detail

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et

Tables

- LaTeX has built-in support to typeset tables and provides two environments: `tabular` and `table`. To typeset material in rows and columns, the tabular environment is needed; the optional table environment is a container for floating material similar to figure, into which a tabular environment may be included.

```
\begin{tabular}[pos]{table spec}
```

- The table spec argument tells LaTeX the alignment to be used in each column and the vertical lines to insert.
- The optional parameter pos can be used to specify the vertical position of the table relative to the baseline of the surrounding text.

`l`	left-justified column
`c`	centered column
`r`	right-justified column
`p{'width'}`	text vertically aligned at the top
`m{'width'}`	text vertically aligned in the middle (requires array package)
`b{'width'}`	text vertically aligned at the bottom (requires array package)
|	vertical line
||	double vertical line

`b`	bottom
`c`	center (default)
`t`	top

Table commands

Once in the environment, you have to introduce the text you want, separating between cells and introducing new lines. The commands you have to use are the following:

- `&` column separator
- `\\` start new row
- `\hline` horizontal line
- `\newline` start a new line within a cell (in a paragraph column)
- `\cline{i-j}` partial horizontal line beginning in column i and ending in column j

```
\begin{tabular}{ l c r }
  1 & 2 & 3 \\
  4 & 5 & 6 \\
  7 & 8 & 9 \\
\end{tabular}
```

1	2	3
4	5	6
7	8	9

```
\begin{tabular}{ l | c | r }
  1 & 2 & 3 \\
  4 & 5 & 6 \\
  7 & 8 & 9 \\
\end{tabular}
```

1	2	3
4	5	6
7	8	9

Table examples

```
\begin{tabular}{ l | c | r }
  \hline
  1 & 2 & 3 \\
  4 & 5 & 6 \\
  7 & 8 & 9 \\
  \hline
\end{tabular}
```

1	2	3
4	5	6
7	8	9

```
\begin{center}
  \begin{tabular}{ | l | c | r }
    \hline
    1 & 2 & 3 \\ \hline
    4 & 5 & 6 \\ \hline
    7 & 8 & 9 \\
    \hline
  \end{tabular}
\end{center}
```

1	2	3
4	5	6
7	8	9

```
\begin{center}
  \begin{tabular}{ l | c | r }
    \hline
    1 & 2 & 3 \\ \hline
    4 & 5 & 6 \\ \hline
    7 & 8 & 9 \\
    \hline
  \end{tabular}
\end{center}
```

1	2	3
4	5	6
7	8	9

Tables rule spacing

- You can re-define the `\arraystretch` command to set the space between rows:

```
\renewcommand{\arraystretch}{1.5}
```

- An alternative way to adjust the rule spacing is to add `\noalign{\smallskip}` before or after the `\hline` and `\cline{i-j}` commands:

```
\begin{tabular}{ | l | l | r | }
        \hline\noalign{\smallskip}
        \multicolumn{2}{c}{Item} \\
        \cline{1-2}\noalign{\smallskip}
        Animal & Description & Price (\$) \\
        \noalign{\smallskip}\hline\noalign{\smallskip}
        Gnat  & per gram & 13.65 \\
        Armadillo & frozen & 8.99 \\
        \noalign{\smallskip}\hline
\end{tabular}
```

Tables

If you use some LaTeX environments inside table cells, like `verbatim` or `enumerate`:

```
\begin{tabular}{c c}
        \hline
        \begin{verbatim}
                code
        \end{verbatim}
        & description
        \\ \hline
\end{tabular}
```

you might encounter errors similar to:

```
! LaTeX Error: Something's wrong--perhaps a missing \item.
```

To solve them, change column specifier to "paragraph" (p, m or b).

```
\begin{tabular}{m{5cm} c}
```

Multicolumn...

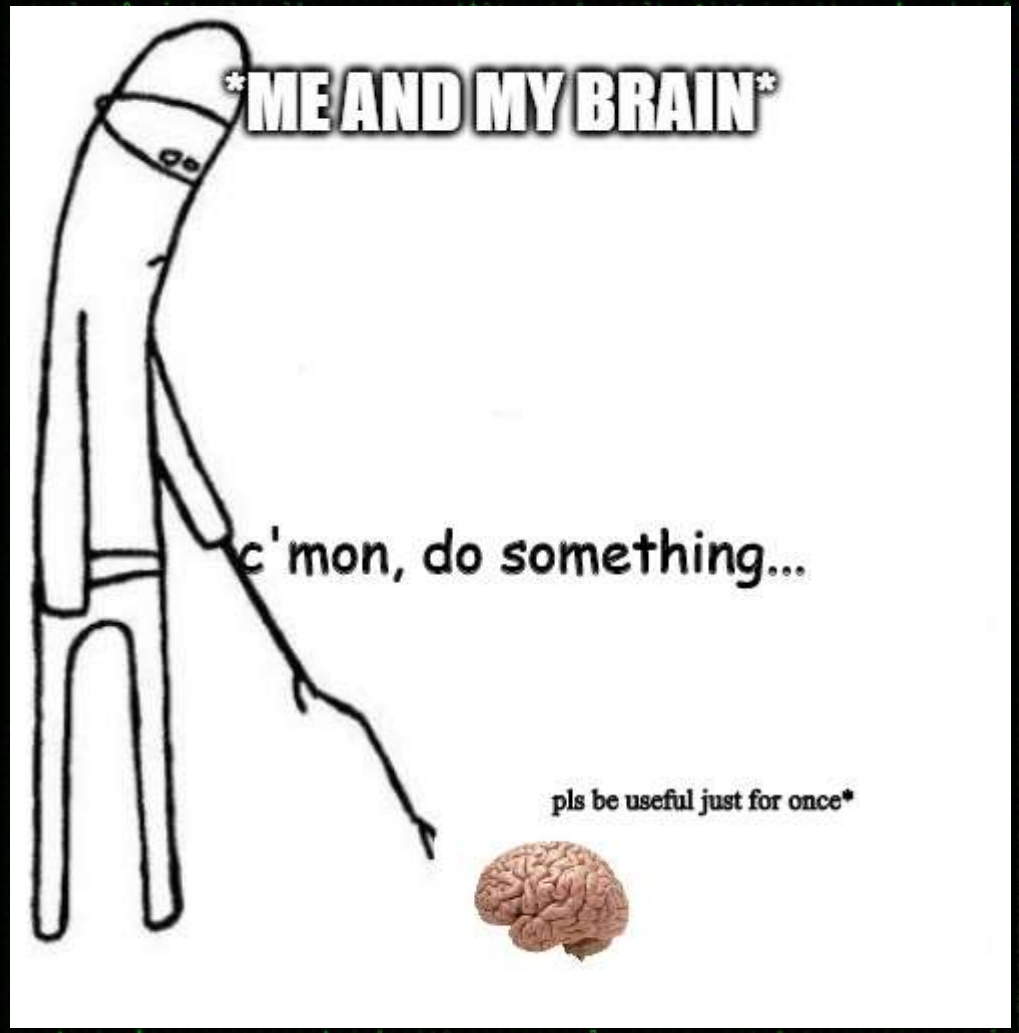
```
\begin{tabular}{ |1|1| }
  \hline
  \multicolumn{2}{|c|}{Team sheet} \\
  \hline
  GK & Paul Robinson \\
  LB & Lucas Radebe \\
  DC & Michael Duberry \\
  DC & Dominic Matteo \\
  RB & Dider Domi \\
  MC & David Batty \\
  MC & Eirik Bakke \\
  MC & Jody Morris \\
  FW & Jamie McMaster \\
  ST & Alan Smith \\
  ST & Mark Viduka \\
  \hline
\end{tabular}
```

Team sheet	
GK	Paul Robinson
LB	Lucus Radebe
DC	Michael Duberry
DC	Dominic Matteo
RB	Dider Domi
MC	David Batty
MC	Eirik Bakke
MC	Jody Morris
FW	Jamie McMaster
ST	Alan Smith
ST	Mark Viduka

… & multirow

```
...
\usepackage{multirow}
...

\begin{tabular}{ |l|l|l| }
\hline
\multicolumn{3}{ |c| }{Team sheet} \\
\hline
Goalkeeper & GK & Paul Robinson \\ \hline
\multirow{4}{*}{Defenders} & LB & Lucas Radebe \\
 & DC & Michael Duburry \\
 & DC & Dominic Matteo \\
 & RB & Didier Domi \\ \hline
\multirow{3}{*}{Midfielders} & MC & David Batty \\
 & MC & Eirik Bakke \\
 & MC & Jody Morris \\ \hline
Forward & FW & Jamie McMaster \\ \hline
\multirow{2}{*}{Strikers} & ST & Alan Smith \\
 & ST & Mark Viduka \\
\hline
\end{tabular}
```

Team sheet		
Goalkeeper	GK	Paul Robinson
Defenders	LB	Lucus Radebe
	DC	Michael Duberry
	DC	Dominic Matteo
	RB	Didier Domi
Midfielders	MC	David Batty
	MC	Eirik Bakke
	MC	Jody Morris
Forward	FW	Jamie McMaster
Strikers	ST	Alan Smith
	ST	Mark Viduka



More details on WikiBooks...

Title Creation

For documents such as basic articles, the output of `\maketitle` is often adequate, but longer documents (such as books and reports) often require more involved formatting.

There are several situations where you might want to create a title in a custom format, rather than in the format natively supported by LaTeX classes. While it is possible to change the output of `\maketitle`, it can be complicated even with minor changes to the title.

The Triangulation of Titling Data in Non-Linear Gaussian Fashion via ρ Series*

John Doe
Magic Department†, Richard Miles University

Richard Row, LaTeX Academy

2017
December

1 Introduction

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

*No procrastination
†I am no longer a member of this department

1

Try it by yourself

```
\documentclass{article}   % use option titlepage to get the title on a page
of its own.
\usepackage{blindtext}

\title{The Triangulation of Titling Data in Non-Linear Gaussian Fashion via
$\rho$ Series\thanks{No procrastination}}
\date{2017\\ December}
\author{John Doe\\ Magic Department\thanks{I am no longer a member of this
department}, Richard Miles University
\and Richard Row, \LaTeX\ Academy}

\begin{document}
    \maketitle
    \section{Introduction}
    \blindtext
\end{document}
```

Title Creation

```
\documentclass{scrbook}
\setkomafont{author}{\scshape}
\usepackage{blindtext}
\title{How hard would it be to build a spaceship from scrap}
\author{Carl Capybara\thanks{I never procrastinate} \and Walter Wombat}
\subtitle{A closer look at the expenses}
\subject{a funny paper}
\begin{document}
\maketitle
\addchap{Introduction}
\blindtext
\end{document}
```

a funny paper

How hard would it be to build a spaceship from scrap

A closer look at the expenses

Carl Capybara* Walter Wombat

December 10, 2017

*I never procrastinate

Custom titles

```
\documentclass{memoir}% use option titlepage to get the title on a page of its own.
\usepackage{blindtext}
\title{The influence of colour on the floating velocity of rubber ducks}
\author{Peter Piranha}
\renewcommand{\maketitlehookb}{\centering You won't expect the results}
\begin{document}
\maketitle
\chapter{Introduction}
\blindtext
\end{document}
```

The influence of colour on the floating velocity of rubber ducks

You won't expect the results

Peter Piranha

December 10, 2017

Try it by yourself

```
\documentclass[12pt,a4paper]{report}
\usepackage{graphicx}
\begin{document}
\begin{titlepage}
    \centering
    \includegraphics[width=0.15\textwidth]{example-image-1x1}\par\vspace{1cm}
    {\scshape\Jacksonville State University \par}
    \vspace{1cm}
    {\scshape\Large Final year project\par}
    \vspace{1.5cm}
    {\huge\bfseries Pigeons love doves\par}
    \vspace{2cm}
    {\Large\itshape John Birdwatch\par}
    \vfill
    supervised by\par
    Dr.~Mark \textsc{Brown}
    \vfill
% Bottom of the page
    {\large \today\par}
\end{titlepage}
\end{document}
```

Adelphi eBook

Richard P. Feynman

SEI PEZZI FACILI

ADELPHI

Floats

- Floats contain things that cannot be broken over a page.
- Default ones: `table`, `figure`.
- Floats are separate entities, positioned in an apposite part of the page.
- They always have a caption, and they are always numbered.
- If there are many consecutive floats, they're stacked all up and printed together, or they're left to the end of the chapter in protest.

```
\documentclass[a4paper,12pt]{article}

\usepackage[english]{babel}
\usepackage{graphicx}

\begin{document}

\begin{figure}
  \caption{A picture of a gull.}
  \centering
    \includegraphics[width=0.5\textwidth]{gull}
\end{figure}

\begin{figure}
  \centering
    \reflectbox{%
      \includegraphics[width=0.5\textwidth]{gull}}
  \caption{A picture of the same gull
           looking the other way!}
\end{figure}

\begin{table}
  \centering
    \begin{tabular}{| l c r |}
    \hline
    1 & 2 & 3 \\
    4 & 5 & 6 \\
    7 & 8 & 9 \\
    \hline
    \end{tabular}
  \caption{A simple table}
\end{table}

Notice how the tables and figures
have independent counters.

\end{document}
```

Figure 1: A picture of a gull.

Figure 2: A picture of the same gull looking the other way!

1	2	3
4	5	6
7	8	9

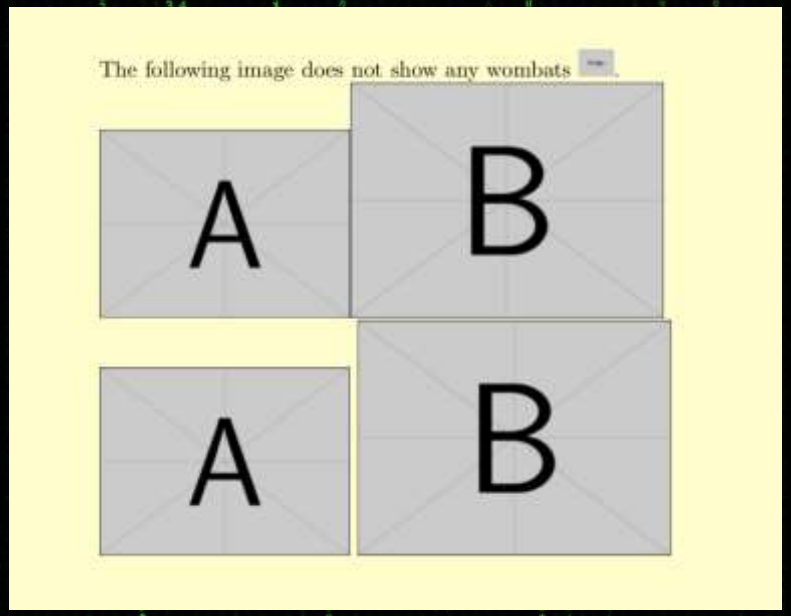
Table 1: A simple table

Notice how the tables and figures have independent counters.

Importing Graphics

- You can import external graphics using package `graphicx`.
- The most important command is `\includegraphics`.
- LaTeX itself treats the image like normal text.
- Using `pdflatex` you can import pdf, png and jpg files.
- If you think of a good width, you can align the images in a matrix.

```
\documentclass{article}
\usepackage{graphicx}
\begin{document}
The following image does not show any wombats
\includegraphics[height=\baselineskip]{example-image}.

\includegraphics[height=3cm]{example-image-a}\includegraphics[width=5cm]{example-image-b}

\includegraphics[height=3cm]{example-image-a} \includegraphics[width=5cm]{example-image-b}
\end{document}
```



Wrapping text around figures

```
\usepackage{wrapfig}
```

```
\begin{wrapfigure}[lineheight]{position}[overhang]{width}
```

r	R	right side of the text
l	L	left side of the text
i	I	inside edge–near the binding (in a twoside document)
o	O	outside edge–far from the binding

```
\begin{wrapfigure}{r}{0.5\textwidth}
  \begin{center}
    \includegraphics[width=0.48\textwidth]{gull}
  \end{center}
  \caption{A gull}
\end{wrapfigure}
```

Gulls are birds in the family Laridae. They are most closely related to the terns (family Sternidae), auks and skimmers, and more distantly to the waders. Most gulls belong to the large genus Larus.

They are in general medium to large birds, typically grey or white, often with black markings on the head or wings. They have stout, longish bills and webbed feet.

Figure 1: A gull

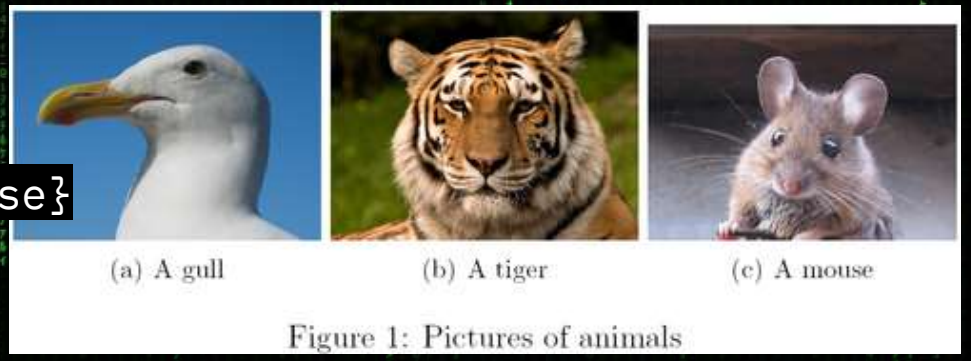
Most gulls, particularly Larus species, are ground nesting carnivores, which will take live food or scavenge opportunistically. The live food often includes crabs and small fish. Apart from the kittiwakes, gulls are typically coastal or inland species, rarely venturing far out to sea. The large species take up to four years to attain full adult plumage, but two years is typical for small gulls.

Gulls the larger species in particular are resourceful and highly-intelligent birds, demonstrating complex methods of communication and a highly-developed social structure. Certain species (e.g. the Herring Gull) have exhibited tool

Subfigures

```
\usepackage{graphicx}
\usepackage{subcaption}
```

```
\begin{figure}
    \centering
    \begin{subfigure}[b]{0.3\textwidth}
        \includegraphics[width=\textwidth]{gull}
        \caption{A gull}
        \label{fig:gull}
    \end{subfigure}
    \begin{subfigure}[b]{0.3\textwidth}
        \includegraphics[width=\textwidth]{tiger}
        \caption{A tiger}
        \label{fig:tiger}
    \end{subfigure}
    \begin{subfigure}[b]{0.3\textwidth}
        \includegraphics[width=\textwidth]{mouse}
        \caption{A mouse}
        \label{fig:mouse}
    \end{subfigure}
    \caption{Pictures of animals}
    \label{fig:animals}
\end{figure}
```



Labels and Cross/hyper-referencing

- They all use the same commands:

```
\section{Greetings}
\label{sec:greetings}
        Hello!
\section{Referencing}

I greeted in section~\ref{sec:greetings}.
```

1 Greetings

Hello!

2 Referencing

I greeted in section 1.

- LaTeX also enables typesetting of hyperlinks, via the package `hyperref`. Usage:

```
\hyperref[label_name]{''link text‘’}
```

- If the lemma labelled as `mainlemma` was number `4.1.1`:

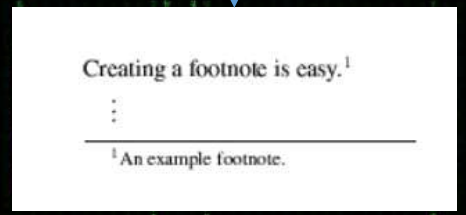
```
We use \hyperref[mainlemma]{lemma \ref*{mainlemma} }.
```

We use lemma 4.1.1.

Footnotes & Margin Notes

```
\documentclass[a4paper,twoside,english]{article}
\usepackage{lmodern}
\renewcommand{\sfdefault}{lmss}
\usepackage[T1]{fontenc}

\makeatletter
\special{papersize=\the\paperwidth,\the\paperheight}

\usepackage{lipsum}
\usepackage{marginnote}
\usepackage[top=1.5cm, bottom=1.5cm, outer=5cm, inner=2cm, heightrounded,
marginparwidth=2.5cm, marginparsep=2cm]{geometry}

\makeatother

\usepackage{babel}
\begin{document}

\section{Margin notes}

\marginnote{This is a margin note using the geometry package, set at 0cm vertical offset to
the first line it is typeset.}[0cm]
\marginnote{This is a margin note using the geometry package, set at 5cm vertical offset to
the first line it is typeset.}[5cm]
\lipsum[1-10]
\end{document}
```

```
Creating a footnote is easy.\footnote{An example footnote.}
```



More details here...

c Di seguito si riporta un elenco di funzioni di cui si lascia al Lettore, per esercizio, la verifica dell'eventuale linearità.

Applicazioni Lineari

Lo scopo di questo capitolo è quello di introdurre la nozione di applicazione lineare tra due spazi vettoriali, mettendoli così in relazione l'un l'altro e in modo da poter definire, come caso particolare, il concetto di movimento rigido o euclideo in uno spazio vettoriale.

Definizione 6.1 *Dati due spazi vettoriali reali V e W, si dice* applicazione lineare *o* trasformazione lineare *o* omomorfismo *da V in W una funzione $f : V \longrightarrow W$ che verifica le seguenti proprietà:*

$$f(\mathbf{x} + \mathbf{y}) = f(\mathbf{x}) + f(\mathbf{y}),$$
$$f(\lambda\mathbf{x}) = \lambda f(\mathbf{x}),$$

per ogni $\mathbf{x}$ e $\mathbf{y}$ in V e per ogni λ in $\mathbb{R}$, o, equivalentemente:

$$f(\lambda\mathbf{x} + \mu\mathbf{y}) = \lambda f(\mathbf{x}) + \mu f(\mathbf{y}),$$

per ogni $\mathbf{x}$ e $\mathbf{y}$ in V e per ogni λ e μ in $\mathbb{R}$.

V prende il nome di *dominio* di f e W è il *codominio* di f; $f(\mathbf{x}) \in W$ è detto *vettore immagine di $\mathbf{x} \in V$ mediante f*. Se $\mathbf{w} = f(\mathbf{x})$ allora il vettore $\mathbf{x} \in V$ è detto *vettore controimmagine di $\mathbf{w} \in W$ mediante f*.

Definizione 6.2 *Sia $f : V \longrightarrow V$ un'applicazione lineare in cui il dominio e il codominio coincidono, allora f è detta* endomorfismo *o* operatore lineare.

Di seguito si riporta un elenco di funzioni di cui si lascia al Lettore, per esercizio, la verifica dell'eventuale linearità.