UNIT - II

Fine tunning text:

(1) Spaces (2) Line breaks, blank spaces and page breaks
(3) Two-column pages (4) Controlling page breaks.

(1) Spaces: (See before)

(2) Line breaks, blank spaces:

The command \hfill is used to create a blank.

example:

"we \hfill deal with fuzzy matrices".

Output:

"we deal with fuzzy matrices".

The command \newline will break a line and move the further words to next line.

The command \hfill\break [both the commands together] will give same effect as \newline.

There is more than one way to insert line breaks:

\\
\newline
\hfill \break

example:

We \hfill \break deal with fuzzy matrices.

output:

We
deal with fuzzy matrices.

The command \break is also used to create a blank space.

example:

(1)
```
\documentclass[12pt]{article}
\begin{document}
We deal with fuzzy matrices, that is matrices with the
entries over the fuzzy algebra $F = \left[0, 1 \right]$
under the max-min operations (+, .).
\end{document}
```

output: We deal with fuzzy matrices, that is matrices with the entries over the fuzzy algebra $F = [0, 1]$ under the max-min operations (+, .).

(2)
```
\documentclass[12pt]{article}
\begin{document}
We deal with fuzzy matrices, that is matrices with the
entries over the fuzzy algebra $F = \left[0, 1 \right]$
under \break the max-min operations (+, .).
```

Output:

We deal with fuzzy matrices, that is matrices with the entries on the fuzzy algebra $F = [0,1]$ under the max-min operations $(t, \cdot)$.

Page breaks:

There are two commands to insert page breaks.

The command are, \clearpage
\newpage

Horizontal Blank Spaces:

Horizontal spaces of arbitrary length may be inserted with \hspace{space}.

example:

\noindent Horizonal \hspace{1 cm} spaces can be inserted manually. \par Left side \hfill Right side.

output:

Horizontal spaces can be inserted manually.
Left side Right side.

There are two commands that insert horizontal blank spaces in this example.

\hspace{1 cm}: Insert a horizontal space whose length is 1 cm. other LaTeX units can be used with this command.

\hfill: Insert a blankspace that will stretch accordingly to fill the space available.

The command \hrulefill do the same as the command \hfill but instead of blankspace they insert a horizontal ruler (_____).

The command \dotfill print the horizontal dotted line. (. . . . . .)

Vertical blank Spaces:

Vertical blank spaces have the same syntax as horizontal blank spaces.

example:

```
\documentclass[12pt]{report}
\begin{document}
Text at the top of the page. Text at the top of
the page.
Text at the top of the page. Text at the top of
the page.
Text at the top of the page.
\par \vspace{5mm} This text still at the top, 5mm
below the first paragraph.
\vfill
Text at the bottom of the page.
```

Out-put:

Text at the top of the page. Text at the top of the page. Text at the top of the page. Text at the top of the page. Text at the top of the page.

This text still at the top, 5mm below the first paragraph

Text at the bottom of the page. → comes in the last line of the page

Let us see the two commands that insert vertical blank spaces.

\vspace{5 mm}:

Inserts a vertical space whose length is 5 mm. Other LaTeX units can also be used with this command.

\vfill :

Insert a blank space that will stretch accordingly to fill the vertical space available. That is why the line "Text at the bottom of the page" is moved to the bottom of the page.

There are other three commands commonly used to insert vertical blank spaces.

\smallskip, \medskip, \bigskip

Additionally, LaTeX provides the following advanced option for line break (ie) \linebreak[number]

(3) Two-Column pages:

If the document class option two column has been chosen, or the command \twocolumn is in effect, then the two commands \pagebreak and \newpage end the current column and begin a new one, treating columns as pages. On the other hand use \clearpage and \cleardoublepage that terminates the current page inserting an empty right column if necessary.

(4) Controlling page breaks:

Increase the height of the current page by using the commands.

```
\enlargethispage{size}
\enlargethispage*{size}
```

which add the length size to \textheight for this one page only.

Document Layout and organization

(I) Document class

This is the first command in the preamble of a LaTeX file.

Its syntax is:

\documentclass[options]{class}

Here [options] may be omitted if default values are acceptable.

The standard values of class are, book, report, article (or) letter. The basic differences between these classes lie not only in the page layouts, but also in the organization. An article may contain parts, sections, subsections and so on. A report can also have chapters. A book also has chapters, but treats even and odd pages differently, also it prints heading of the chapter and section titles on each page.

The journals and book projects, will have their own set of options and additional commands for the document preparation.

Standard class options:

(1) Font size

We can select the size of the font for the normal text in the entire document with one of the options.

10pt 11pt 12pt

example: \documentclass[12pt]{article}

to set the normal text in our document in 12pt size. The default font size is 10 pt, if we do not specify any font size option.

Paper size

LATEX calculates the text line width and lines per page according to the selected font size and paper size.

The various options for selecting the paper size are given below:

Letterpaper	11 x 8.5 in	a4paper	29.7 x 21 cm
Legalpaper	14 x 8.5 in	a5paper	21 x 14.8 cm
Executivepaper	10.5 x 7.25 in	b5paper	25 x 17.6 cm

The default is letterpaper. American letter size paper, 11 x 8.5 in. Normally, the paper format is in portrait mode. We can change to landscape mode with the option Landscape.

Page formats

The text on the page may be formatted into one or two columns with the options

onecolumn twocolumn

The default is onecolumn.

The even and odd numbered pages may be printed according to the options,

oneside twoside

One of the differences is that with the twoside option, page numbers are printed on the right on odd-numbered pages and on the left on even numbered pages.

When these printed back to back, the numbers are always on the outside, for better visibility.

The default is Oneside for article, report and letter and twoside for book.

With the book class there is the additional restriction that chapters begin only on odd-numbered pages, leaving an entire page blank. Such behavior is controlled by the options,

openany openright

The default is openany for reportclass and openright for the bookclass.

Normally the title of a book (or) report will go on a separate page, but for an article it is placed on the same page as the first text.

These are set by the options,

notitlepage titlepage

The default is notitlepage for article and titlepage for report and book.

Further options

legno – Equation numbers in displayed formulas will appear on the left instead of normal right side.

fleqn – Displayed formulas will be set flush left instead of centered

openbib – The format of bibliographies may be changed.

parameters associated with some options

\mathindent – Specifies the indentation from the left margin for the equation number when fleqn is selected

Example: \setlength{\mathindent}{2.5 cm}

is a command to change \mathindent to 2.5 cm.

\columnsep – Specifies the space between the two columns for the twocolumn option

\columnseprule – determines the width of the vertical line between the two columns for the twocolumn option. The default is zero width, that is no vertical rule.

Loading Packages

LaTeX can be extended by packages which are either part of the core installation or contributed by engaged users.

A package is a set of LaTeX commands stored in a file with the extension .sty, to invoke a package, simply call \usepackage{package}

→ root name of the file

example:

```
\documentclass[12pt]{report}
\usepackage{textcomp}
\begin{document}
  \texteuro
\end{document}
```

output: €

A package may have options associated with it, which may be selected in the same way as for document classes: by including the options names within square braces.

The general syntax is

\usepackage [opt1, opt2, ...] {package1, package2, ...}

Global and Local options:

If several packages all takes the same option, it is only necessary to declare it once in \documentclass.

For example, one might design a package to modify article for generating a local house style that might do different things for single or double column text; this package could make use of the class options OneColumn and twocolumn to achieve this. Or it could elaborate on the draft option to produce double line spacing, as for a manuscript.

Alternatively several packages might have language dependent features that could be activated with options like french or german; it is sufficient to list such options only in \documentclass to apply them to all packages. Such options are called global. Global options need not be limited to the standard class options. A warning message is printed only if neither the class nor any of the package understand one or more of them. By contrast, any options specified with \usepackage will be applied only to those packages listed in that one command and it applied to all of them. A warning is printed if one or more of those packages does not recognize any one of these local options.

Class and package versions

Class and package files normally have an internal version specifications in the form of their release date, as yyyy/mm/dd. If you want to make use of some feature that you know was added on a certain date, you include that date in square brackets after the class or package name.

example:

\usepackage[parfill]{parskip}[2001/04/09]
is dated April 9, 2001

This update to the parskip package by Robin Fairbairns that includes the option parfill.

II Page Style:

The basic page format is determined by the page style. This command is normally given in the preamble.

Its syntax is: \pagestyle{style} → mandatory argument

where the mandatory argument can be any one of the following styles: plain empty headings myheadings

plain — The page head is empty, the foot contains the centered page number. This is the default for the article and report classes when no \pagestyle is specified in the preamble.

empty — Both head and footlines are empty.

headings - The head contains the page number as well as title, the foot is empty. This is the default for the book class.

myheadings - The same as headings except that the page titles in the head are not chosen automatically but to be given explicitly using the commands \markright and \markboth

Moreover, we can customize the style for the current page using the command,

\thispagestyle{style}

example:

\thispagestyle{empty}

Heading declarations:

As we mentioned above, in the page style myheadings, we have to specify the text to appear on the head of every page. It is done with one of the commands,

\markboth{left head}{right head}
\markright{right head}

where left head is the text to appear in the head on left hand pages and right head is the text to appear on the right hand pages.

The \markboth command is used with the twoside option with even numbered pages considered to be on the left and odd numbered pages on the right. With oneside option, all pages are considered to be right handed and in this case the command \markright can be used.

With the page style headings, the standard titles in the page headline are the chapter, section or subsection headings depending on the document and page style, according to the following scheme:

Style		Left Page	Right Page
book, report	One sided	–	chapter
	two sided	chapter	Section
article	One sided	–	section
	two sided	section	subsection

The following commands are available for producing chapter, section and subsection:

\chapter, \section, \subsection, \subsubsection

Customized head and footlines:

Creating header and footers in Latex can be done by using the package "fancyhdr". First of all, you need to tell Latex to use the package:

```
\usepackage{fancyhdr}
```

and change the style from plain to fancy;

```
\pagestyle{fancy}
```

[This package makes available an additional page style named fancy which the user can easily redefine.]

Head and footlines consist each of 3 parts, left, center, right, each of which can be individually defined with:

```
\lhead{Left head}   \chead{Center head}   \rhead{Right head}
\lfoot{Left foot}   \cfoot{Center foot}   \rfoot{Right foot}
```

Custom fancyhdr page style:

Even though fancyhdr has a default page style, you are free to define headers/footers yourself, which is not too difficult.

The more general commands are,

```
\fancyhead{}    \fancyfoot{}
```

There are seven letters you need to know before you can defined your own header/footer:

E: Even page O: odd page L: Left field C: center field

R: Right field H: Header F: Footer

Now it is time to start defining your own Layout. The definitions are added to the preamble: example,

```
\fancyhead[CO,CE]{Text 1}
\fancyhead[LE,RO]{Text 2}
\fancyhead[LO,RE]{Text 3}
\fancyfoot[C]{Text 4}
\fancyfoot[RO,LE]{Text 5}
```

The decorative lines can be changed by increasing/decreasing their thickness (0 pt means no line):

```
\renewcommand{\headrulewidth}{0.4pt}
\renewcommand{\footrulewidth}{0.4pt}
```

The default (two sided) definitions for the fancy page style are,

```
\fancyhead[EL,OR]{\textsl{\rightmark}}
\fancyhead[ER,OL]{\textsl{\leftmark}}
```

where \rightmark and \leftmark contain the automatic texts for the headings page style generated by the \chapter, \section, \subsection

Commands, while \textsl set its argument in a slanted typeface.

Page numbering:

The style of page numbers can be specified by the command;

\pagenumbering{num_style}

The allowed values of num_style are:

arabic — Arabic numerals
roman — lower case Roman numerals
Roman — upper case Roman numerals
alph — lower case letters
Alph — upper case letters

The default value is arabic.

We can make the pages start with any number by using the command:

\setcounter{page}{page_num}

where page_num is the number to appear on the current page.

Example:

```
\documentclass{article}
\pagestyle{myheadings} \markright{Exercises}
\pagenumbering{Roman}
\begin{document}
- - - - -
- - - -
\end{document}
```

paragraph formatting:

The following parameters affect the appearance of a paragraph and may be given new values with \setlength,

\parskip – The distance between paragraphs

\parindent – The amount of indentation for the first line of a paragraph.

example:

```
\setlength{\parskip}{1em}
\setlength{\parindent}{4em}
```

the command \setlength{\parskip}{1em} sets the paragraph seperation to 1em.

\baselinestretch – This is a number that magnifies the normal distance between baselines, the line on which the letters sit.

example:

```
\renewcommand{\baselinestretch}{1.5}
```

Page format

Each page consists of a head, the body containing the actual text, and a foot. The selection of the page style determines what information is to be found in the head and footlines.

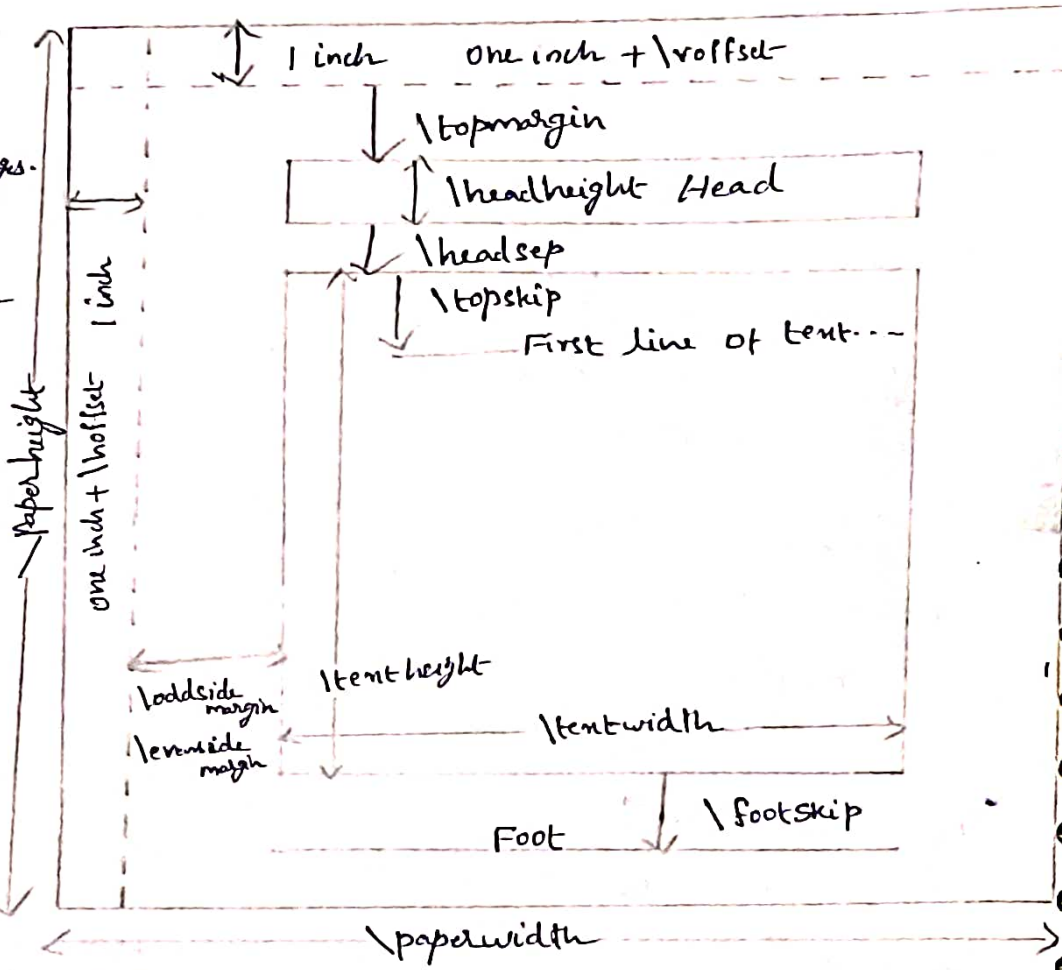
Latex uses default values for the distances between the head, body and foot, for the upper and left-margins and for the text-line width and heights of the head, body and foot.

They may be changed by declaring new values for them in the preamble, with the command \setlength,

For example, \setlength{\textwidth}{12.5cm}

There is also a parameter \linewidth equal to the text line width in whatever environment one is currently in.

You can examine your own page layout with the layout package from the tools collection. Simply issue the command \layout and a diagram similar to Fig (1).



\oddsidemargin – left margin for odd pages.

\evensidemargin – left margin for even pages.

\topmargin – upper margin to top of head.

\headheight – height of head.

\headsep – distance from top of body to bottom of headline

\topskip – distance from top of body to baseline of first line of text.

\textheight – height of main text.

\textwidth – width of main text.

\footskip – distance from bottom of body to bottom of foot

\paperheight, \paperwidth – total height and width of a paper including all margins.

Simplified page formatting:

The page dimensions in a Latex document are highly configurable and the geometry package offers a simple way to change the length and layout of different elements such as the paper size, margins, footnote, header, etc.

Suppose you have to create a document in a4paper and the text should not exceed 6 inch width and 8 inch height.

To create it with the package geometry is easy,

```
\usepackage[a4paper, total={6in, 8in}]
{geometry}
```

For example, let us create a document with legal paper size, landscape orientation and a 2 in margin:

```
\usepackage'[letterpaper, landscape, margin=2in]
{geometry}
```

Also, you can achieve the same in a slightly different way

```
\usepackage{geometry}
\geometry{legalpaper, landscape, margin=2in}
```

Let's see an example with some more options:

```
\usepackage{geometry}
\geometry{a4paper, total={170mm, 257mm}, left=20mm, top=20mm}
```

Single and double column pages:

The document class option twocolumn sets the entire document in two columns per page. The default is one column per page. Individual pages may be output in one or two columns with the declarations: \twocolumn - Terminates the current page, starting a new page with two columns per page.

\onecolumn - Terminates the current two-column page and continues with one column per page.

Multicolumn text

Two-column documents can be easily created passing the parameter \twocolumn to the document. If you want to create a document with multiple columns, the package multicol provides a set of commands for that.

Once this package has been loaded, one can switch the number of columns in the middle of a page with

optional → optional

```
\begin{multicols}{num_cols}[header text][pre-space]
   Text set in num_cols columns
\end{multicols}
```

The text enclosed inside the tags \begin{multicols} and \end{multicols} is printed in multicolumn format.

page breaking before and after switching to multicolumns is offered by the two lengths,

\premulticols and \postmulticols

The standard values of these lengths may be altered by the user with \setlength.

The lengths \columnsep and \columnseprule that apply to set the widths of the gaps between columns and a possible separating rule, respectively.

There is also a starred version,

```
\begin{multicols*}{num_cols}
   ...
   ...
\end{multicols*}
```

} → Text

In this case, the columns on the last page are not balanced with all the remaining space put in to the final column.

Parts of the document:

Documents are divided into chapters, sections, subsections and so on. There can be an appendix at the beginning and at the end of a title page, table of contents, an abstract, etc. Latex has a number of markup commands available to indicate these structures. In addition, sequencial numbering and sub-numbering of headings take place automatically.

Title:

The "title" part of a document usually consists of the name of the document, the name of the author(s) and sometimes a date.

To produce a title page, we make use of the commands,

```
\title{document name}
\author{author names}
\date{date text}
\maketitle
```

Note that after specifying the arguments of \title, \author and \date, we must issue the command \maketitle for this part to be typeset. By default, all entries produced by these commands are centered on the lines in which they appear.

example:

```
\title{Title}
\author{Author1 \\
        Address Line 11 \\
        Address line 12 \\
        Address line 13
        \and
        Author 2. \\
        Address line 21. \\
        Address line 22 \\
        Address line 23 \\ }
\date{Month Date, Year}
\maketitle
```

Output:

Title

Author 1
Address line 11
Address line 12
Address line 13

Author 2
Address line 21
Address line 22
Address line 23

Month Date, Year

The command \date{} prints no date. The command \date will print the current date.

The command

\thanks{footnote text}

can be given at any point within the \title, \author or \date. It places the footext as a footnote.

The general method of producing a footnote is by using the command, \footnote{footnote text}

Example:

```
\title{ HOW to Write the DVI Drivers}
\author{ Helmut Kopka \thanks{ Tel. [+49] 5556-401-451}
  Max-planck-Institute \\ fur Aeronomie
  \and
  Phillip G. Hardy \thanks{ Tel. [+1] 319-824-7134} \\
  University \\ of Iowa}
  \date{ January 15, 2004}
  \maketitle
```

Output:

How to Write DVI Drivers

Helmut Kopka
Max-Planck-Institut
für Aeronomie[1]

Phillip G. Hardy
University
of Iowa[2]

January 15, 2001

[1] Tel. [+49] 5556-401-451
[2] Tel. [+1] 319-824-7134

Abstract

The abstract is produced with the command,

```
\begin{abstract}
Text for the abstract
\end{abstract}
```

Note that we have to type the abstract ourselves. In the report class this appears on the separate title page and in the article class it appears below the title information on the first page. This command is not available in the book class.

Sections:

Latex provides the following hierarchy of sectioning commands in the book and report class:

```
\chapter
\section
\subsection
\subsubsection
\paragraph
\subparagraph
```

Except for \chapter all these are available in article class also.

The syntax of all these commands is,

\sec-command [short title] {title}

(or)

\sec-command* {title}

In the first case, the section is given the next number in the sequence, which is then printed together with a heading using the text title. If the optional short title is omitted it is equal to title.

In the second case (* - form), no section number is printed.

The size of the title heading and the depth of the numbering depend on the position of the sectioning command within the hierarchy.

For document class article, the \section command generates a single number (say 7), the \subsection command a double number with a period between two parts (say 7.3), and so on.

In document classes book and report, the chapter headings are given a single number with the \chapter command, the \section command creates the double number and so on. Furthermore, the command \chapter always starts a new page and prints chapter n over the chapter title, where n is the current chapter number.

At this point, we have chapter 3, section 3.1, subsection 3.1.1.

Paragraphs and subparagraphs do not have numbers. Though named "paragraph" we can have several paragraphs of text within this. Subparagraphs have an additional indentation too. And they can also contain more than one paragraph of text.

Appendix:

An appendix is introduced with the declaration,

```
\appendix
```

It has the effect of resetting the section counter for article and the chapter counter for book and report and changing the form of the numbering for these sectioning commands from numerals to capital letters A, B, ... Furthermore, the word 'chapter' is replaced by Appendix A, Appendix B etc.

Book Structure

To simplify the structuring of a book, the commands

```
\frontmatter
  preface, table of contents
\mainmatter
  main body of text
\backmatter
  bibliography, index, colophon
```

are provided in the book class.

→ a publisher's or printer's distinctive emblem, used as an identifying device on its books and other works.

Table of Contents:

LaTeX can prepare and print a table of contents automatically for the whole document. It will contain the section numbers and the corresponding headings as given in the standard form of the sectioning commands, together with the page numbers on which they begin. The sectioning depth to which entries are made in the table of contents can be set in the preamble with the command

```
\setcounter{tocdepth}{num}
```

The value 'num' has exactly the same meaning and effect as it does for the counter secnumdepth described above, by which the maximum level of automatic subsectioning is fixed. By default, the depth to which entries are included in the table of contents is the same as the standard level to which automatic sectioning is done.

Printing the table of contents:

The table of contents is generated and printed with the command

\tableofcontents

given at the location where the table of contents is to appear, which is normally after the title page and abstract.

This leads to a paradox, for the information in the table of contents is to be printed near the beginning of the document, information that cannot be known until the end. Latex solves this problem as follows: the first time the document is processed, no table of contents can be included but instead Latex opens a new file with the same name as the source file with the extension .toc; the entries for the table of contents are written to this file during the rest of the processing.

The next time Latex is run on this document, the \tableofcontents command causes the .toc file to be read and the table of content is printed.

In addition to the table of contents, lists of figures and tables can also be generated and printed automatically by Latex. The commands to produce these lists are

\listoffigures → reads and/or produces file.lof
\listoftables → reads and/or produces file.lot

The entries in these lists are made automatically by the \caption command in the figure and table environments. Additional entries are made by using commands,

\addcontentsline{file}{format}{entry}
\addtocontents{file}{entry}

where file stands for one of the 3 types toc, lof or lot. The argument format is one of the sectioning commands for the table of contents (or) figure for the list of figures (or) table for the list of tables. The argument entry stands for the text that is to be inserted in to the appropriate file.

The *-form sectioning commands are not entered automatically in the table of contents. To insert them (or) any other additional entries, the additional entry commands are used as specified above.