Technical Writing and Presentation

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Proudly created by

Except for the figures created by Matlab[1], this thesis has been created by *open source software* (OSS) packages. Special thanks go to the numerous generous developers behind the following projects:

GNU project free software, mass collaboration project aiming to give users freedom

LaTeX document markup language

TeX Live cross-platform LaTeX distribution

MiKTeX LaTeX distribution for Windows

LyX cross-platform LaTeX-based document preparation system

Beamer LaTeX class for creating presentation slides and handouts

Inkscape cross-platform vector graphics editor

TeX Text Inkscape plugin for creating and editing LaTeX formulae

Other great projects I failed to mention ...

Other software packages

Other software packages that greatly helped me during this research include:

Areca cross-platform incremental backup package

pdfcrop a tool for removing white margins of a pdf file; indispensable for exported Matlab figures

GoldenDict cross-platform feature-rich dictionary lookup program

[1] For your information, NumPy + SciPi + Matplotlib + Spyder offer very competitive alternative to Matlab. For Windows, all these packages and more are distributed by *Python(x,y)*.

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1 Free and Open-Source Software (FOSS)

1.1 Free Software

Free software respect users' freedom and the community.

- Roughly, it means that the users have the **freedom** to run, copy, distribute, study, change and improve the software
- Thus, "free software" is a matter of **liberty, not price**

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1.2 Open-Source Software (OSS)

They are computer software with source code published and made available with a ***license***.

- OSS are very often developed in a collaborative public manner through ***community cooperation***
  - Communities may be composed of:
    * individual programmers
    * very large companies
- Many individuals programmers who start an open source project usually end up as large companies with open source programs

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1.2.1 The Brute Force of Public Collaboration

The main power of a OSS project comes from the collaboration[2] of minds and efforts of large number of savvy contributors.

- This enabled many FOSS projects to surpass big commercial competitors.
  - Typical examples are Linux and Firefox as compared to Windows and Internet Explorer
- On the other hand, FOSS may suffer from serious drawbacks such as:
  - no warranty/guarantee/support[3]
  - less polished/stable
  - less friendly user interface
  - lack of complete and high quality documentation
  - Slow download server
  - ...

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1.3 FOSS

[https://en.wikipedia.org/wiki/Free_and_open-source_software]

A FOSS is computer software that can be classified as both *free SW* and OSS. 4

Notable FOSS Projects

Application Software

- 7-Zip
- Blender
- Eclipse
- GIMP
- Inkscape
- Firefox
- Chromium
- Thunderbird
- NASA World Wind
- OpenOffice.org
- LibreOffice
- PrestaShop

Programming Languages

- Perl
- PHP
- Python
- Ruby

Operating Systems

- Android
- FreeBSD
- Linux
- OpenIndiana
- ReactOS
- Haiku

Server Software

- Apache
- Drupal
- MediaWiki
- MongoDB
- Moodle
- WordPress
- TYPO3

The Widespread of FOSS Nowadays

FOSS such as Linux, BSD descendants[4] and Firefox, are very widely utilized nowadays, powering millions of servers, desktops, smart-phones[5], and other devices.

- FOSS even became a part of many commercial software and hardware.

Useful Links

- Introduction to Open Source Software (in Arabic) (http://ojuba.org/wiki/%D9%85%D9%82%D8%AF%D9%85%D8%A9_%D9%81%D9%8A_%D8%A7%D9%84%D8%A8%D8%B1%D9%85%D8%AC%D9%8A%D8%A7%D8%AA_%D8%A7%D9%84%D8%AD%D8%B1%D8%A9)

[2]Constructive collaboration requires good management by wise and clever board.

[3]Community support cannot be accepted by serious customers who are unwilling to publishing their work to the public.

[4]such as MacOS and iOS

[5]e.g. Android

- Open source is the backbone for Startups (www.findbestopensource.com/article-detail/open-source-startups)
- How to contribute to open source (www.findbestopensource.com/article-detail/contribute-to-opensource)
- en.opensuse.org/portal:How_to_participate
- How to learn from open source projects (www.findbestopensource.com/article-detail/learn_from_open-source)
- How to make money from Open Source (www.findbestopensource.com/article-detail/make_money_opensource)
- Arabic websites
  - www.linuxac.org
  - http://itwadi.com
  - www.ojuba.org/
- Imagine Publishing
  - Linux User&Developer magazine (www.linuxuser.co.uk/)
  - Linux Tips, Tricks, Apps & Hacks (https://www.imagineshop.co.uk/bookazines.html)
  - Linux & Open Source Genius Guide (https://www.imagineshop.co.uk/bookazines.html)

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1.4 Open Source Licenses

License defines the rights and obligations the copyright holder grants to licensees.

- Open Source licenses may grant or deny users the right to copy, modify and redistribute the software (or content)
- Licenses, however, may also impose obligations, such as:
  - modifications to the code that are distributed must be made available in source code form
  - an author attribution must be placed in a program/documentation using that Open Source
  - any dependent software must be licensed under the same license
  - ...
- Example OSS licenses are[6]:
  - Apache License 2.0

[6] Software licensing, Linux User & Developer magazine, Issue 180, pages 28–31

    - Recommended for software if you want a permissive license but also want to grant patent rights.
    - Being permissive, it allows for derivative works to be released under different terms which can also be distributed commercially.
    - Apache and Android are released under this license.
- BSD license
    - Latest version requires that derivative works do not use the name of the original project or its developers for promotion without express permission.
    - Only recommended for software and not other works.
- GNU General Public License (GPL)
    - Requires the release of complete source code of licensed work.
    - Modifications and derivative works should also be released under the same license.
    - Recommended only for software.
    - Bash and GIMP are released under GPLv3.
- GNU Lesser General Public License (LGPL)
    - Makes it possible to release derivative works under a different license if it only makes use of LGPL's code as shared libraries.
    - This allows for code to be used even in proprietary projects.
    - This is why the license is used primarily for software libraries.
    - It is similar to GPLv3 in all other aspects.
- MIT License
    - A short and very permissive license.
    - Allows for licensed work to be used for commercial use.
    - Derivative works may be released under different terms and without source code.
    - Modifications can be used privately and don't have to be released publicly.
    - Used by Rails, jQuery and many others for its simplicity.
- Creative Commons (CC) License
    - Recommended for non-software works such as images, artwork and music.
    - The copyleft CC-BY-SA allows for modifications of licensed work, distribution of derivative work for commercial use, but under the same license.
    - Permissive and only requires attribution.
- Eclipse Public License
- Mozilla Public License
- ...

- Open Source Licenses comparison (http://web.archive.org/web/20090317083515/http://developer.kde.org/documentation/licensing/licenses_summary.html)

License	Proprietary Software linking	Distribution	Redistributing of modified code
GPL	Not allowed	Only with GPL compatible software	Only if derivative is GPL compatible
LGPL	Allowed	Allowed[7]	Only if the derivative is LGPL or GPL
Apple Public	Allowed	Allowed	Only under Apple Public license
Apache Public	Allowed	Allowed	Allowed[8]
BSD	Allowed	Allowed	Allowed
CPL	Not clear[9]	Not clear[9]	Only under CPL compatible license
Jabber	Allowed	Allowed[10]	Allowed[11]
MIT (X11)	Allowed	Allowed	Allowed
MPL	Allowed	Allowed	Only under MPL
Python	Allowed (?)	Allowed	Allowed, assuming the package includes a list of changes to the original Python and copyright notices on all files.
Sun Public	Allowed	Allowed	Only under Sun Public

- If you want help choosing a license for your ***open source*** project, check http://choosealicense.com/

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[7] You have to provide source code of the distributed LGPL library with (if any) modifications, changes to the LGPL library should be allowed to third parties and if BC your app/lib should still work with the modified LGPL lib/app.

[8] As long as the name "Apache" isn't used in the name of the derivative work

[9] But do not mix code covered by this license with incompatible licenses.

[10] Only the portions of "the Work" licensed under the Jabber license needs to stay licensed as such.

[11] Can be under a different license as long as the source code is provided and a few License specific requirements are fulfilled.

1.5 OSS Alternatives

Clone vs Non-clone Alternative

- Clone software always follow the original software, hence clones are
  - always lagging
  - usually inferior
- In conclusion, often you won't be satisfied

Examples

- MS-Word vs Libre-office-Writer vs Abi-Word vs Calligra-Words vs Lyx
- Matlab vs Scilab vs GNU-Octave vs SciPython-MatPlotLib

Useful Links

- www.findbestopensource.com/
- Cool list of Linux programs (www.dedoimedo.com/computers/new-cool-list-linux.html)
- Ohloh (www.ohloh.net/): very useful for checking the current state of an OSS

1.6 Learning New Software Packages

Try/Explore/Read about capabilities of the new software package

Find good examples

Short course/training/tutorial/user-guide

Test your knowledge through a real project

Use a book/manual/reference

If you find expert who is willing to answer your questions;

- you are lucky
- don't waste the chance

FOSS or Commercial SW?

Source: [http://www.code-aster.de/code-aster.html].

When using a free sw, you might experience pitfalls such as:

- installation is difficult or fails
- sw crashes
- graphics problems
- lack of documentation
- lack of experiences (or experiences are spread all over the web)
- ...

This is why many serious users rely on a commercial sw which assures the proper functioning of a software on a determinate computer system.

Customers Fear

Serious customers fear that saved license costs at the end must be payed by harder work and more time of the engineers in order to make the free sw work well.

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The Cultural Gap between Commercial and FOSS

- A commercial software company usually has:
  - enough number of programmers
  - clear plans/decisions based on accumulated experience with serious customers
  - financial resources that enable them to outsource difficult unexpected problems to experts anywhere in the world to obtain high quality solutions.
- On the other hand, a small group of clever and dedicated programmer work for free[12], and hence they intermittently in their spare time.
- What the commercial company can achieve in 1~2 months usually takes about 1~2 years by the small programmers group[13].
  - That is, the fruit of a month of hard work in the commercial company does differ in quality and quantity from that of the small programmers group.
- However, the monthly announcements, of both the company and the programmers group, usually use similar words/expressions.
  - Both of them are saying the truth, from their points of view.
  - In other words, there is a ***cultural gap*** between commercial companies and small programmer groups.

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[12] or for scarce non-regular donations

[13] Of course, if the number of programmers is increased and more importantly, harmony could be achieved during their collaboration, careful design and planning of the software may be achieved vary fast, even faster than commercial companies. This may be the case for small projects such as a web browser or video player projects. But this is hardly possible for very big projects spanning a multitude of different disciplines such as a multiphysics software package such as Ansys, or big CAD software package spanning drafting, part design, assembly, generating detailed drawings, CAE (spanning multiphysics problems, using FEA and other essentially different methods, dynamics, ...), CAM, Testing, PLM, ...

Confusion of the User

From the point of view of an announcement reader seeking to select either the commercial of the FOSS, he will understand the announcements according to his background experience.

- That is, if the reader is not aware of the aforementioned cultural gab, he may think there is no big difference between commercial and FOSS.
- That is, the reader must be aware of the cultural gab between both the commercial and free worlds in order to weight the respective announcements correctly and take the correct decision.

2 Technical Writing

Word Processors

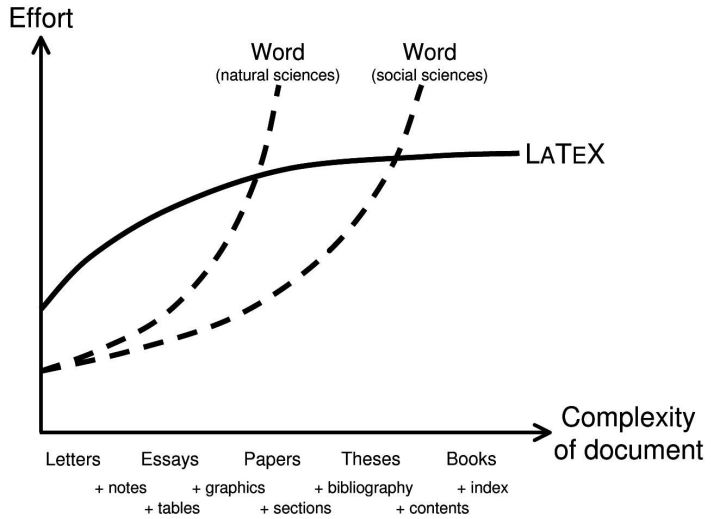
Usually there are two categories of word processing software packages

- What You See Is What You Get (WYSIWYG)
- What You See Is What You Mean (WYSIWYM)

WYSIWYG	WYSIWYM
Microsoft Word LibreOffice Writer AbiWord Calligra Words	LaTeX LyX

Roughly, you can compare LaTeX to Word as you compare Matlab to Excel

LaTeX vs Microsoft Word



2.1 LaTeX

LaTeX is a document markup language.

- Simply you can think of it as similar to HTML[14]
- In order to create a document in LaTeX, a **.tex** file must be created using some **text editor**
- The **.tex** file is then **compiled** to produce the document
- LaTeX can generate several document formats including "pdf"

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LaTeX is Free

Although being free is an advantage, but it is a drawback at the same time

- Slow download server
- No clean official documentation
- Several alternatives to do the same thing

However; LaTeX is very mature and widely used by professional/enterprise publishers

- Also it has a big user community
  - when you encounter a problem, google it. Most likely you will find others had encountered it and found a solution

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[14] (HyperText Markup Language)

LaTeX 2ε Cheat Sheet

Document classes

`book` Default is two-sided.
`report` No `\part` divisions.
`article` No `\part` or `\chapter` divisions.
`letter` Letter (?).
`slides` Large sans-serif font.

Used at the very beginning of a document: `\documentclass{`*class*`}`. Use `\begin{document}` to start contents and `\end{document}` to end the document.

Common `documentclass` options

`10pt/11pt/12pt` Font size.
`letterpaper/a4paper` Paper size.
`twocolumn` Use two columns.
`twoside` Set margins for two-sided.
`landscape` Landscape orientation. Must use `dvips -t landscape`.
`draft` Double-space lines.

Usage: `\documentclass[`*opt,opt*`]{`*class*`}`.

Packages

`fullpage` Use 1 inch margins.
`anysize` Set margins: `\marginsize{`*l*`}{`*r*`}{`*t*`}{`*b*`}`.
`multicol` Use *n* columns: `\begin{multicols}{`*n*`}`.
`latexsym` Use LaTeX symbol font.
`graphicx` Show image: `\includegraphics[width=`*x*`]{`*file*`}`.
`url` Insert URL: `\url{`*http://...*`}`.

Use before `\begin{document}`. Usage: `\usepackage{`*package*`}`

Title

`\author{`*text*`}` Author of document.
`\title{`*text*`}` Title of document.
`\date{`*text*`}` Date.

These commands go before `\begin{document}`. The declaration `\maketitle` goes at the top of the document.

Miscellaneous

`\pagestyle{empty}` Empty header, footer and no page numbers.
`\tableofcontents` Add a table of contents here.

Document structure

`\part{`*title*`}`
`\chapter{`*title*`}`
`\section{`*title*`}`
`\subsection{`*title*`}`
`\subsubsection{`*title*`}`
`\paragraph{`*title*`}`
`\subparagraph{`*title*`}`

Use `\setcounter{secnumdepth}{`*x*`}` suppresses heading numbers of depth $> x$, where `chapter` has depth 0. Use a `*`, as in `\section*{`*title*`}`, to not number a particular item—these items will also not appear in the table of contents.

Text environments

`\begin{comment}` Comment (not printed). Requires `verbatim` package.
`\begin{quote}` Indented quotation block.
`\begin{quotation}` Like `quote` with indented paragraphs.
`\begin{verse}` Quotation block for verse.

Lists

`\begin{enumerate}` Numbered list.
`\begin{itemize}` Bulleted list.
`\begin{description}` Description list.
`\item` *text* Add an item.
`\item[`*x*`]` *text* Use *x* instead of normal bullet or number. Required for descriptions.

References

`\label{`*marker*`}` Set a marker for cross-reference, often of the form `\label{sec:item}`.
`\ref{`*marker*`}` Give section/body number of marker.
`\pageref{`*marker*`}` Give page number of marker.
`\footnote{`*text*`}` Print footnote at bottom of footer.

Floating bodies

`\begin{table}[`*place*`]` Add numbered table.
`\begin{figure}[`*place*`]` Add numbered figure.
`\begin{equation}[`*place*`]` Add numbered equation.
`\caption{`*text*`}` Caption for the body.

The *place* is a list valid placements for the body. `t`=top, `h`=here, `b`=bottom, `p`=separate page, `!`=place even if ugly. Captions and label markers should be within the environment.

Text properties

Font face

Command	*Declaration*	*Effect*
`\textrm{`*text*`}`	`{\rmfamily` *text*`}`	Roman family
`\textsf{`*text*`}`	`{\sffamily` *text*`}`	Sans serif family
`\texttt{`*text*`}`	`{\ttfamily` *text*`}`	`Typewriter family`
`\textmd{`*text*`}`	`{\mdseries` *text*`}`	Medium series
`\textbf{`*text*`}`	`{\bfseries` *text*`}`	**Bold series**
`\textup{`*text*`}`	`{\upshape` *text*`}`	Upright shape
`\textit{`*text*`}`	`{\itshape` *text*`}`	*Italic shape*
`\textsl{`*text*`}`	`{\slshape` *text*`}`	*Slanted shape*
`\textsc{`*text*`}`	`{\scshape` *text*`}`	Small Caps shape
`\emph{`*text*`}`	`{\em` *text*`}`	*Emphasized*
`\textnormal{`*text*`}`	`{\normalfont` *text*`}`	Document font
`\underline{`*text*`}`		Underline

The command (*tttt*) form handles spacing better than the declaration (*ttt*) form.

Font size

`\tiny` tiny
`\scriptsize` scriptsize
`\footnotesize` footnotesize
`\small` small
`\normalsize` normalsize
`\large` large
`\Large` Large
`\LARGE` LARGE
`\huge` huge
`\Huge` Huge

These are declarations and should be used in the form `{\small ...}`, or without braces to affect the entire document.

Verbatim text

`\begin{verbatim}` Verbatim environment.
`\begin{verbatim*}` Spaces are shown as ␣.
`\verb!text!` Text between the delimiting characters (in this case '`!`') is verbatim.

Justification

Environment	*Declaration*
`\begin{center}`	`\centering`
`\begin{flushleft}`	`\raggedright`
`\begin{flushright}`	`\raggedleft`

Miscellaneous

`\linespread{`*x*`}` changes the line spacing by the multiplier *x*.

Text-mode symbols

Symbols

& `\&` _ `\_` ... `\ldots` • `\textbullet`
$ `\$` ^ `\^{}` | `\textbar` \ `\textbackslash`
% `\%` ~ `\~{}` # `\#` § `\S`

Accents

ò `\‘o` | ó `\’o` | ô `\^o` | õ `\~o` | ō `\=o`
ȯ `\.o` | ö `\"o` | o͡o `\t oo` | ǒ `\v o` | ő `\H o`
ç `\c c` | ǫ `\d o` | o̲ `\b o` | o͡o `\t oo` | œ `\oe`
Œ `\OE` | æ `\ae` | Æ `\AE` | å `\aa` | Å `\AA`
ø `\o` | Ø `\O` | ł `\l` | Ł `\L` | ı `\i`
ȷ `\j` | ¡ `~‘` | ¿ `?‘`

Delimiters

‘ ‘ “ ‘‘ { \{ [[((< `\textless`
’ ’ ” ’’ } \}]])) > `\textgreater`

Dashes

Name	*Source*	*Example*	*Usage*
hyphen	`-`	X-ray	In words.
en-dash	`--`	1–5	Between numbers.
em-dash	`---`	Yes—or no?	Punctuation.

Line and page breaks

`\\` Begin new line without new paragraph.
`\\*` Prohibit pagebreak after linebreak.
`\kill` Don't print current line.
`\pagebreak` Start new page.
`\noindent` Do not indent current line.

Miscellaneous

`\today` February 25, 2014.
`$\sim$` Prints ∼ instead of `\~{}`, which makes ˜.
`~` Space, disallow linebreak (`W.J.~Clinton`).
`\@.` Indicate that the `.` ends a sentence when following an uppercase letter.
`\hspace{`*l*`}` Horizontal space of length *l* (Ex: $l =$ `20pt`).
`\vspace{`*l*`}` Vertical space of length *l*.
`\rule{`*w*`}{`*h*`}` Line of width *w* and height *h*.

Tabular environments

`tabbing` environment

`\=` Set tab stop. `\>` Go to tab stop.

Tab stops can be set on "invisible" lines with `\kill` at the end of the line. Normally `\\` is used to separate lines.

tabular environment

```
\begin{array}[pos]{cols}
\begin{tabular}[pos]{cols}
\begin{tabular*}{width}[pos]{cols}
```

tabular column specification

`l`	Left-justified column.
`c`	Centered column.
`r`	Right-justified column.
`p{`*width*`}`	Same as `\parbox[t]{`*width*`}`.
`@{`*decl*`}`	Insert *decl* instead of inter-column space.
`|`	Inserts a vertical line between columns.

tabular elements

`\hline`	Horizontal line between rows.
`\cline{`x`-`y`}`	Horizontal line across columns x through y.
`\multicolumn{`n`}{`*cols*`}{`*text*`}`	A cell that spans n columns, with *cols* column specification.

Math mode

For inline math, use `\(...\)` or `$...$`. For displayed math, use `\[...\]` or `\begin{equation}`.

Superscript^x	`^{x}`	Subscript$_x$	`_{x}`
$\frac{x}{y}$	`\frac{x}{y}`	$\sum_{k=1}^{n}$	`\sum_{k=1}^n`
$\sqrt[n]{x}$	`\sqrt[n]{x}`	$\prod_{k=1}^{n}$	`\prod_{k=1}^n`

Math-mode symbols

$\leq$	`\leq`	$\geq$	`\geq`	$\neq$	`\neq`	$\approx$	`\approx`
$\times$	`\times`	$\div$	`\div`	$\pm$	`\pm`	$\cdot$	`\cdot`
$\circ$	`^{\circ}`	$\circ$	`\circ`	$\prime$	`\prime`	$\cdots$	`\cdots`
∞	`\infty`	$\neg$	`\neg`	$\wedge$	`\wedge`	$\vee$	`\vee`
$\supset$	`\supset`	$\forall$	`\forall`	$\in$	`\in`	$\rightarrow$	`\rightarrow`
$\subset$	`\subset`	$\exists$	`\exists`	$\notin$	`\notin`	$\Rightarrow$	`\Rightarrow`
$\cup$	`\cup`	$\cap$	`\cap`	$\mid$	`\mid`	$\Leftrightarrow$	`\Leftrightarrow`
$\dot{a}$	`\dot a`	$\hat{a}$	`\hat a`	$\bar{a}$	`\bar a`	$\tilde{a}$	`\tilde a`
α	`\alpha`	β	`\beta`	γ	`\gamma`	δ	`\delta`
ϵ	`\epsilon`	ζ	`\zeta`	η	`\eta`	ε	`\varepsilon`
θ	`\theta`	ι	`\iota`	κ	`\kappa`	ϑ	`\vartheta`
λ	`\lambda`	μ	`\mu`	ν	`\nu`	ξ	`\xi`
π	`\pi`	ρ	`\rho`	σ	`\sigma`	τ	`\tau`
υ	`\upsilon`	ϕ	`\phi`	χ	`\chi`	ψ	`\psi`
ω	`\omega`	Γ	`\Gamma`	Δ	`\Delta`	Θ	`\Theta`
Λ	`\Lambda`	Ξ	`\Xi`	Π	`\Pi`	Σ	`\Sigma`
Υ	`\Upsilon`	Φ	`\Phi`	Ψ	`\Psi`	Ω	`\Omega`

Bibliography and citations

When using BibTeX, you need to run `latex`, `bibtex`, and `latex` twice more to resolve dependencies.

Citation types

`\cite{`*key*`}`	Full author list and year. (Watson and Crick 1953)
`\citeA{`*key*`}`	Full author list. (Watson and Crick)
`\citeN{`*key*`}`	Full author list and year. Watson and Crick (1953)
`\shortcite{`*key*`}`	Abbreviated author list and year. ?
`\shortciteA{`*key*`}`	Abbreviated author list. ?
`\shortciteN{`*key*`}`	Abbreviated author list and year. ?
`\citeyear{`*key*`}`	Cite year only. (1953)

All the above have an `NP` variant without parentheses; Ex. `\citeNP`.

BibTeX entry types

`@article`	Journal or magazine article.
`@book`	Book with publisher.
`@booklet`	Book without publisher.
`@conference`	Article in conference proceedings.
`@inbook`	A part of a book and/or range of pages.
`@incollection`	A part of book with its own title.
`@misc`	If nothing else fits.
`@phdthesis`	PhD. thesis.
`@proceedings`	Proceedings of a conference.
`@techreport`	Tech report, usually numbered in series.
`@unpublished`	Unpublished.

BibTeX fields

`address`	Address of publisher. Not necessary for major publishers.
`author`	Names of authors, of format ....
`booktitle`	Title of book when part of it is cited.
`chapter`	Chapter or section number.
`edition`	Edition of a book.
`editor`	Names of editors.
`institution`	Sponsoring institution of tech. report.
`journal`	Journal name.
`key`	Used for cross ref. when no author.
`month`	Month published. Use 3-letter abbreviation.
`note`	Any additional information.
`number`	Number of journal or magazine.
`organization`	Organization that sponsors a conference.
`pages`	Page range (`2,6,9--12`).
`publisher`	Publisher's name.
`school`	Name of school (for thesis).
`series`	Name of series of books.
`title`	Title of work.
`type`	Type of tech. report, ex. "Research Note".
`volume`	Volume of a journal or book.
`year`	Year of publication.

Not all fields need to be filled. See example below.

Common BibTeX style files

`abbrv`	Standard	`abstract`	`alpha` with abstract
`alpha`	Standard	`apa`	APA
`plain`	Standard	`unsrt`	Unsorted

The LaTeX document should have the following two lines just before `\end{document}`, where `bibfile.bib` is the name of the BibTeX file.

```
\bibliographystyle{plain}
\bibliography{bibfile}
```

BibTeX example

The BibTeX database goes in a file called *file*`.bib`, which is processed with `bibtex file`.

```
@String{N = {Na\-ture}}
@Article{WC:1953,
  author  = {James Watson and Francis Crick},
  title   = {A structure for Deoxyribose Nucleic Acid},
  journal = N,
  volume  = {171},
  pages   = {737},
  year    = 1953
}
```

Sample LaTeX document

```
\documentclass[11pt]{article}
\usepackage{fullpage}
\title{Template}
\author{Name}
\begin{document}
\maketitle

\section{section}
\subsection*{subsection without number}
text \textbf{bold text} text. Some math: $2+2=5$
\subsection{subsection}
text \emph{emphasized text} text. \cite{WC:1953}
discovered the structure of DNA.

A table:
\begin{table}[!th]
\begin{tabular}{|l|c|r|}
\hline
first  &  row  &  data \\
second &  row  &  data \\
\hline
\end{tabular}
\caption{This is the caption}
\label{ex:table}
\end{table}

The table is numbered \ref{ex:table}.
\end{document}
```

LaTeX Editors/IDE

- To write C/C++ code, any text editor can be used
  - But using a good IDE can greatly ease your job
- LaTeX is similar
  - Any text editor is OK, but a dedicated LaTeX editor/IDE is strongly recommended
- A dedicated LaTeX editor/IDE
  - can highlight and auto complete LaTeX keywords
  - has several LaTeX templates for several types of documents
  - facilitates compiling and debugging
  - ...
- Sample LaTeX editors are:

  Texstudio; cross-platform

  Kile; for Linux

  and many others

Arabic Support

Thanks to the "Arabi"[15] package, Arabic and Farsi languages are supported with the "Babel" package.

- However, since arabic users are few, "Arabi" package is not mature enough and some minor bugs do exist
  - Googling about these bugs, usually you find the same of similar bugs do exist in other languages, and hence you can infer solutions/workarounds

Keep Concentrating

Due to its WYSIWYM nature, I feel more concentrating while using **LaTeX** as compared to **Ms-Word**

Installing LaTeX

proText is a TeX/LaTeX distribution for Windows. It includes:

MiKTeX LaTeX Implementation for MS Windows

TexStudio TeX/LaTeX IDE

...

TeX Live is a cross platform[16] LaTeX implementation

[15] Thanks to GOD at first of course

[16] Available for MS-Windows, Mac OS and Linux

Porting LaTeX Documents
Usually .tex files often reference other files (images, bibliography databases, ...).

- Hence, if you want to copy a LaTeX document to another computer, you have to copy all the referenced files as well

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2.2 LyX

LyX is a graphical front-end to LaTeX

- You can think of the LyX-LaTeX relationship as similar to the Visual Studio-C++ compiler relationship
- Unlike LaTeX, LyX comes with tidy and very good documentation
- Also it has a big community, i.e.,
  - it is mature enough
  - when you encounter a problem, google it. Most likely you will find others had encountered it and found a solution

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Keep your concentration
Due to its WYSIWYM nature, I feel very concentrating while using **LyX** as compared to **Ms-Word**

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Arabic Support
Arabic is supported in LyX

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Installing LyX

Linux packages are usually available in most Linux distributions' repositories

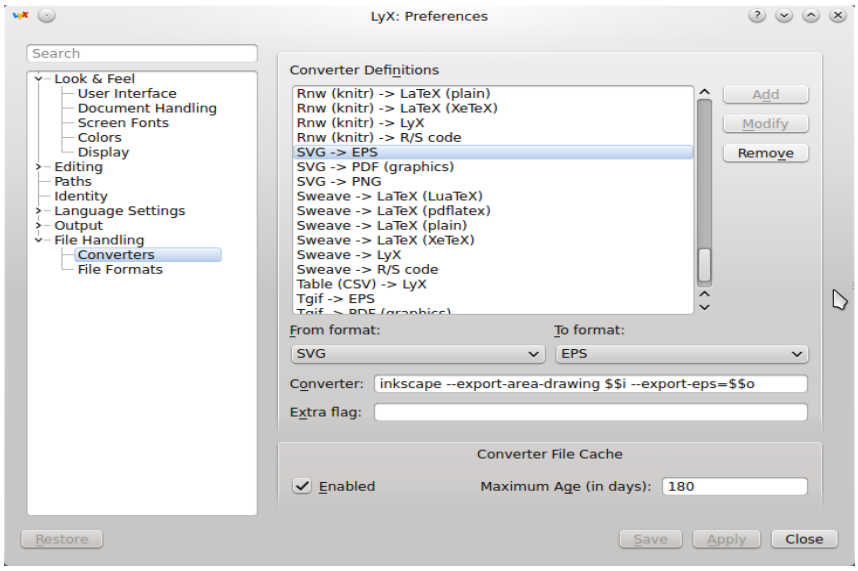
Windows installer is available at www.lyx.org/

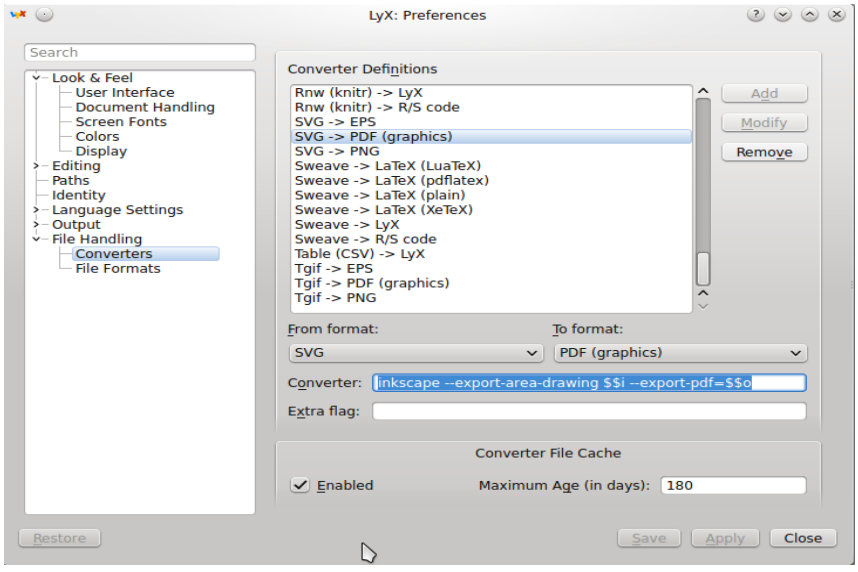
- There are two installer variants
  1. Installer (recommended)
     This needs a pre-installed LaTeX distribution
  2. Bundle
     It includes a minimal LaTeX distribution

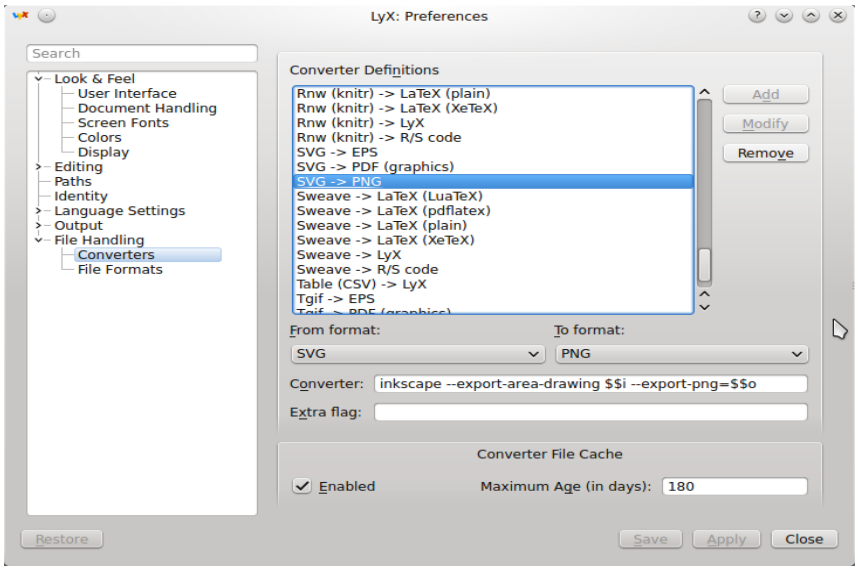
I recommend installing as follows:

1. Install Inkscape
   - Confirm path to inkscape.exe is added to the "PATH" environment variable
2. Install MiKTeX (or TeX Live)
3. Install LyX (Installer option)

For both Linux & Windows installations, make sure to modify LyX configurations to use Inkscape as svg graphic translator







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Learning LyX

Explore style-list, menus and toolbars

Help menu includes very good manuals

- Manuals themselves are LyX documents
  - So they are essentially very good LyX examples
- You may begin with:
  1. Introduction
  2. Tutorial

  Then if needed, read necessary sections of
  1. User's Guide
  2. rest of manuals ...

lyx\examples folder contains wide variety of very good examples

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Porting LyX Documents

Similar to LaTeX documents, .lyx files often reference other files (images, bibliography databases, ...).

- Hence, if you want to copy a LyX document to another computer, you have to copy all the referenced files as well

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Laboratory Work

- Practice the task explained in section 4.1

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2.3 Presentations using Beamer

Beamer is a LaTeX class for creating **professional** presentation slides

- Beamer can also be easily used within LyX

  Beamer template is a built in template LyX provides to enable easily building presentations in LyX

Presentation Handouts

Beamer-Article class is also available

It renders the slides on standard sized paper (like A4 or letter), with frame titles used as paragraph titles, no special slide layout/colors and keeps the sectioning.

- It is suitable for creating ***professional*** presentation handouts
- You can have a single source file for the slides and its handouts
- You can still control the single source file so that the **slides** and the **article** are different
- Beamer-Article class is also available within LyX

Keep your concentration

Due to its WYSIWYM nature, I feel very very very concentrating while using **LyX-Beamer** as compared to **Ms-Power Point**.

Installing Beamer

- Beamer class is usually installed by default with MiKTeX, TeXLive
- Also templates for both Beamer-presentation and Beamer-article are included by default with LyX

Learning Beamer

- From **LyX**

  Help >Specific Manuals>Beamer Presentations

  Explore the styles list and Insert menu[17]

- **Beamer User Guide** explain creating Beamer presentations in plain LaTeX and LyX as well
- For **customization** of Beamer presentations, check the "BEAMER appearance cheat sheet" at http://science.thilucmic.fr
- For various **themes** of Beamer presentation, check http://www.hartwork.org/beamer-theme-matrix/
- Also a very good variety of presentations are attached to this course

[17] Styles will be available after you set the current document type to Beamer. This is done from the menu command "Document>Settings>Document Class>Beamer"

Laboratory Work

- Practice the task explained in section 4.2

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2.4 Microsoft Word

Important Practices using Microsoft Word

- In fact, MS word is too simple to give a traditional tutorial
- Instead, I will stress on important practices using it
  - Unfortunately, many MS-Word users are not aware about these practices
  - Hence, many MS-Word users do not use Word efficiently and waste considerable time trying to control it
- Numerous tutorials are also available
  - Word for new users (http://office.microsoft.com/en-us/word-help/word-for-new-users-HA101631510.aspx)
  - Word 2013 (http://www.gcflearnfree.org/word2013)

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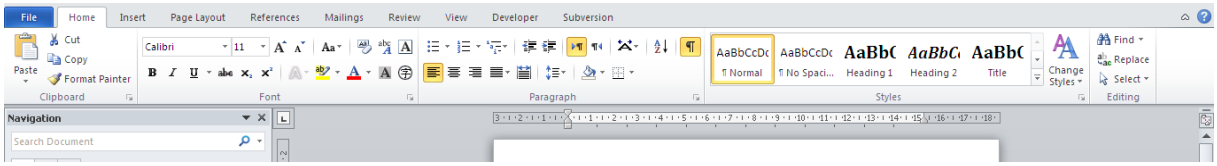
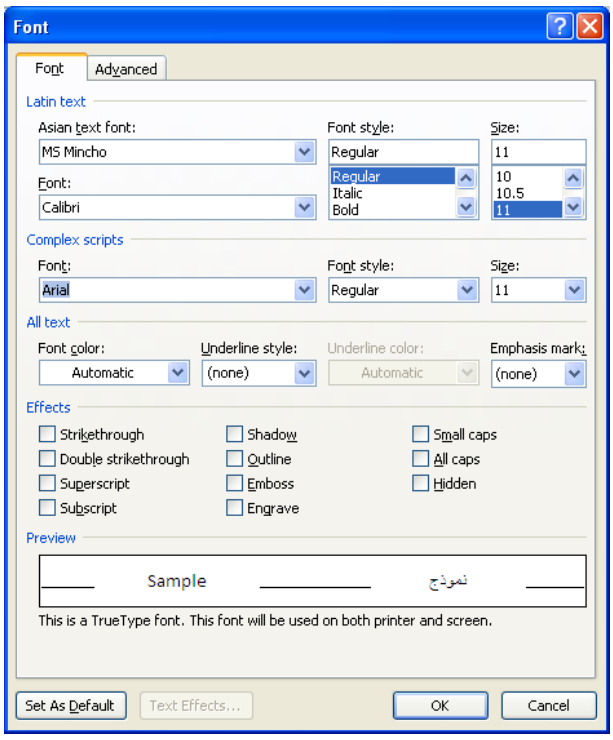
The Font





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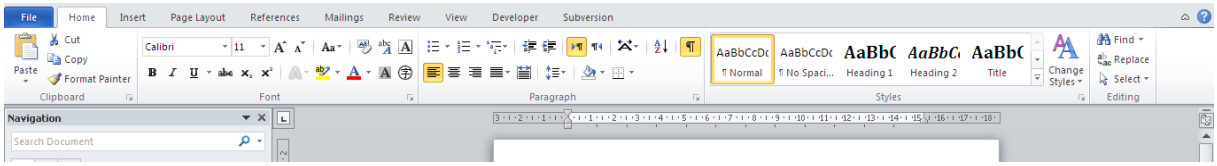
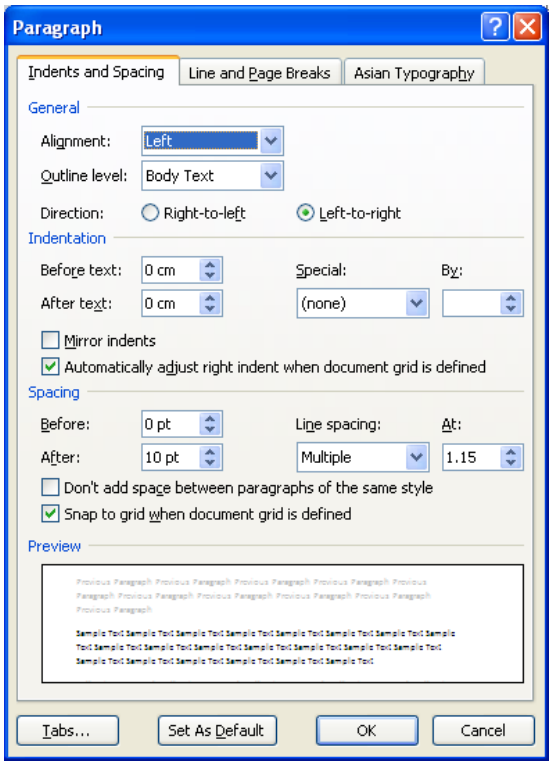
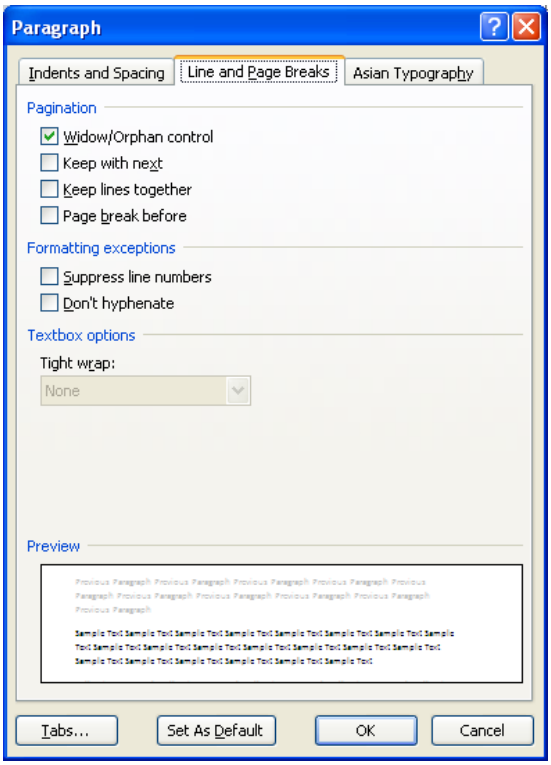
The Paragraph

Paragraph is a sequence of words ended by the line-end character "¶"



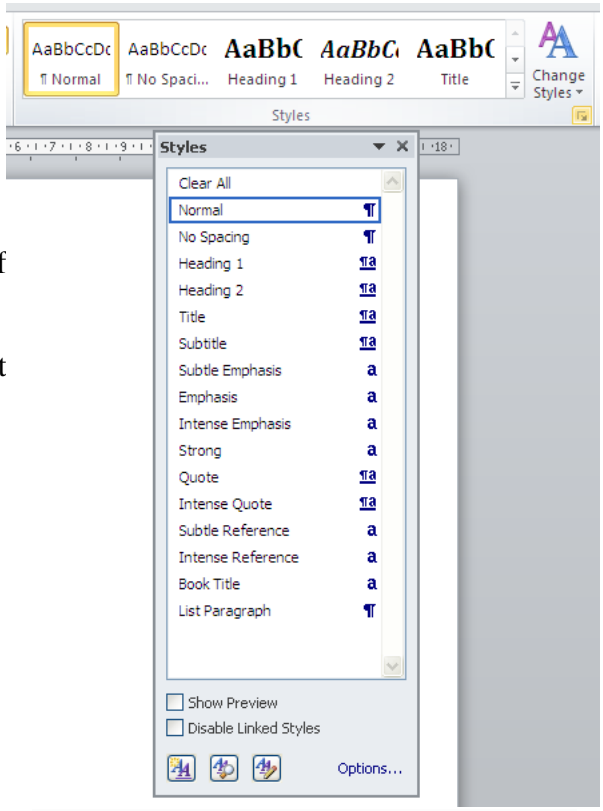




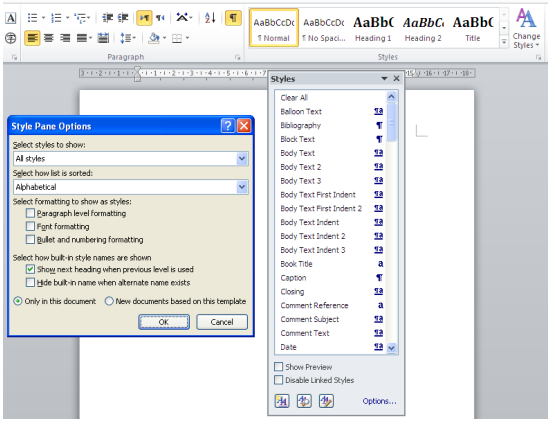
- Note the "Right-to-left" and "Left-to-right" radio buttons
  - They are equivalent to the  buttons

The Style

- It is a collection of formattings for
  - Font
  - Paragraph
  - …
- MS Word already ships with a variety of built-in styles
  - Most of them are ***hidden*** by default

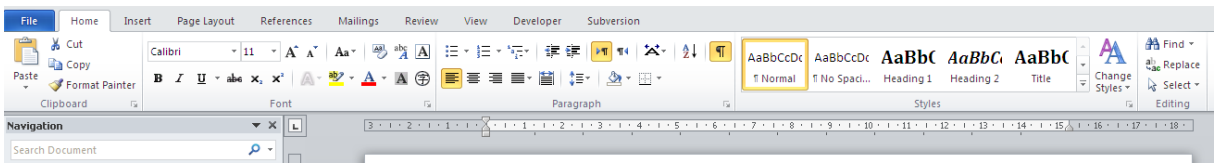


- Notable styles include:
  - Normal
    - It is the parent of most styles
    - Changing its formattings affects many styles
  - Heading 1, 2, …, 9
  - Body Text First Indent
  - Title
  - …



- More information about styles can be found at
  - Style basics in Word (http://office.microsoft.com/en-us/word-help/style-basics-in-word-HA102647012.aspx)

Always Minimize Formatting

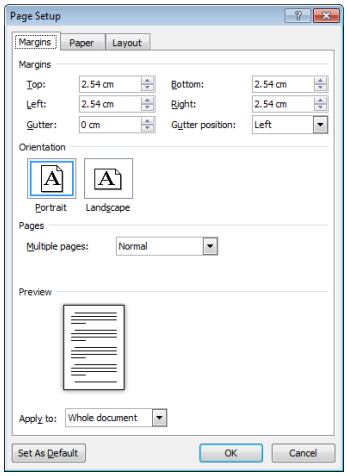


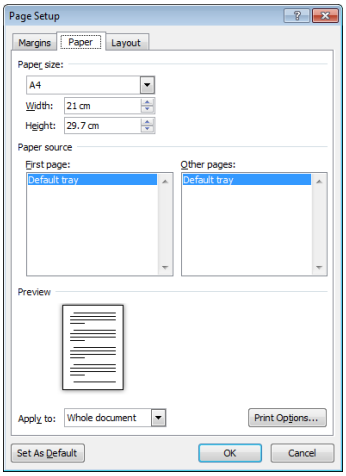
- Set the paragraph direction using either of the  buttons

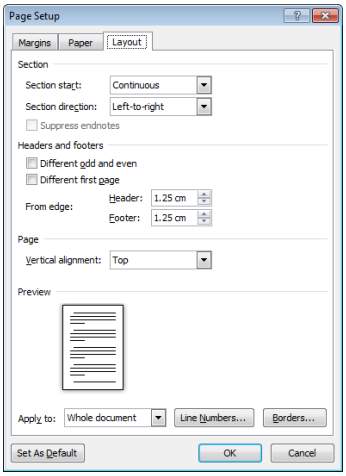
- Use styles whenever possible
- Check hidden details of your document by using the ¶ button
- Understand how you can use the ruler tools
- Understand the “Tab” and how to set the Tab type

In Summary; Recommended Initial Preparations

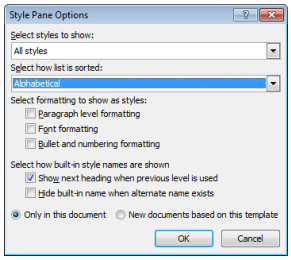
- Page Setup
  - All margins = “2.5 cm”
  - Gutter position = “left” or “right”
  - Paper size = “A4”
  - Section start = “Continuous”
  - Section direction = “Left-to-right” or “Right-to-left”
  - Apply to “Whole document”



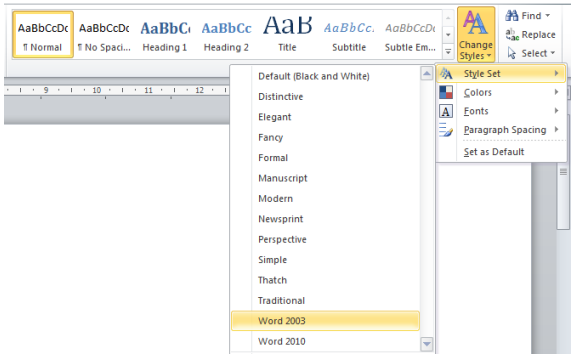




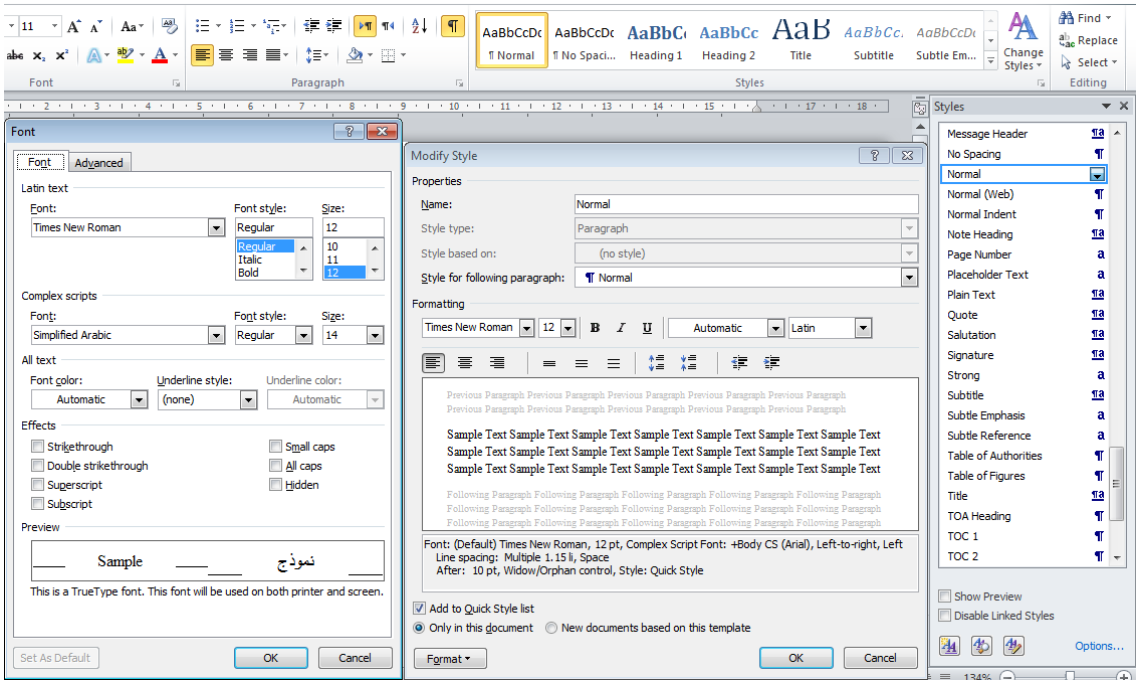
- Set the “Style Pane Options” as shown

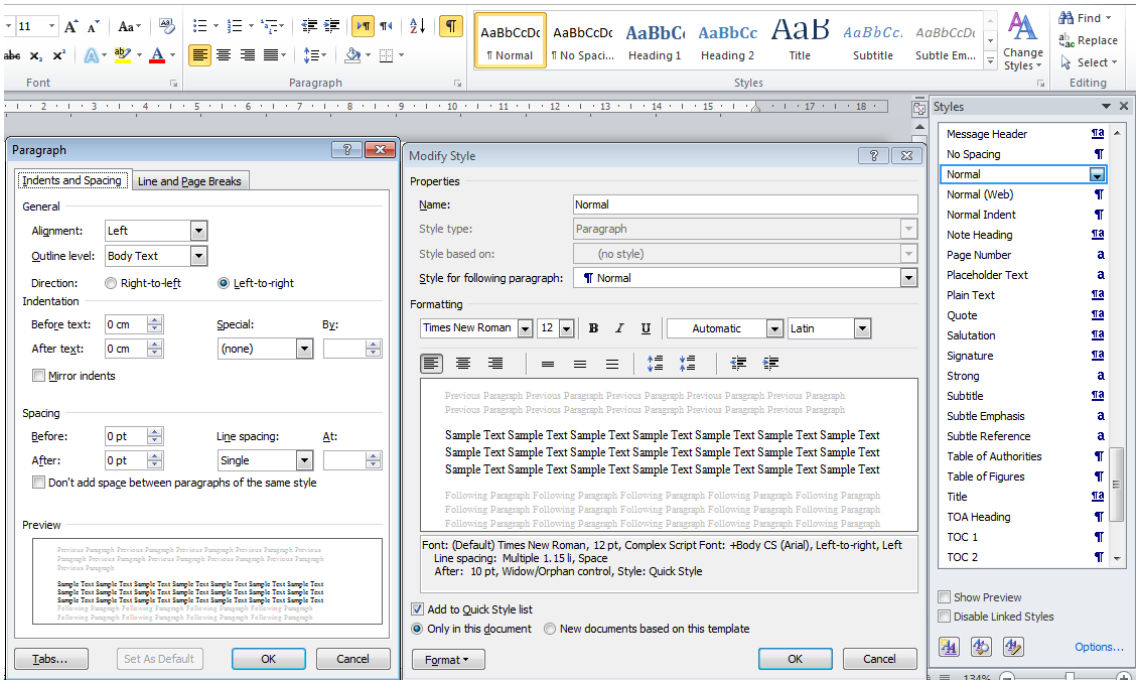


- Set “Style Set” as shown



- Set the “Normal” style as follows
  - Very important is the “Right-to-left” or “Left-to-right”





Templates

Word default template is called "Normal.dotm" and is located at "%appdata%\Microsoft\Templates"

- It is recommended to modify it as explained earlier instead of repeating the same modifications for every new document
- Be very careful when you modify it

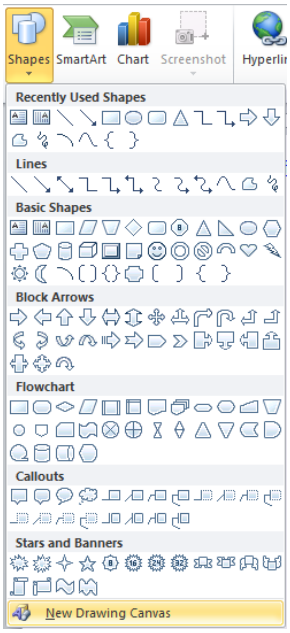
If you corrupted the "Normal.dotm" template,

you can reset it as follows:

1. close MS word
2. delete the corrupted "%appdata%\Microsoft\Templates\Normal.dotm" file
3. launch MS_Word again
    - MS-Word creates a new virgin template when it cannot find it

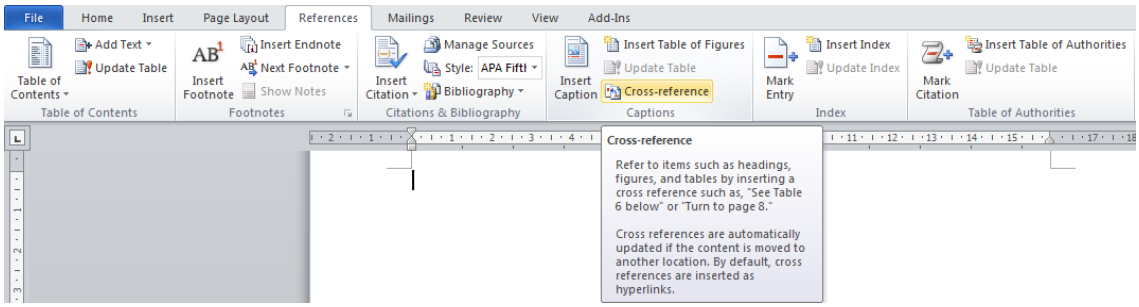
Drawing

- If your drawing contains *more than one* drawing object, always collect your drawing objects in a "Drawing Canvas"



Cross-References

- Always use cross-references to refer to any part of your document



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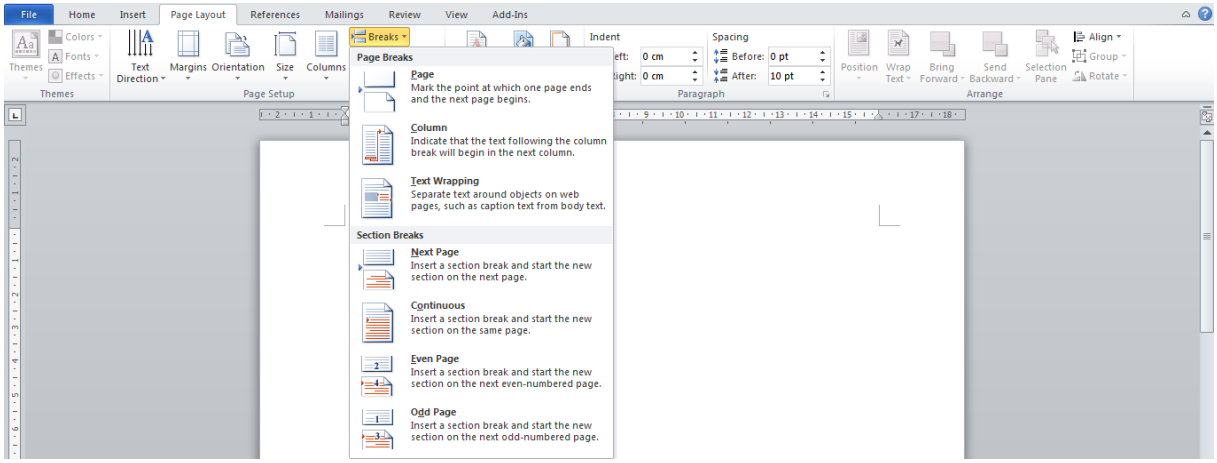
Section Breaks

- They are used to divide the document into sections
- Every section can have a different layout, for example:
  - page orientation
  - margins
  - number of columns
  - header/footer
  - …
- However, selecting a part of the document for printing becomes a bit more difficult



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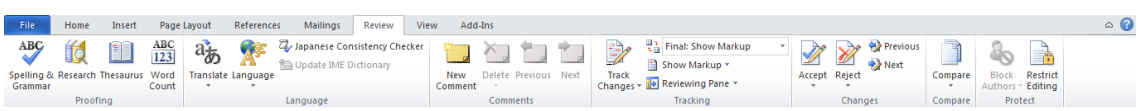
Collaboration

- Use the review features when collaborating with others



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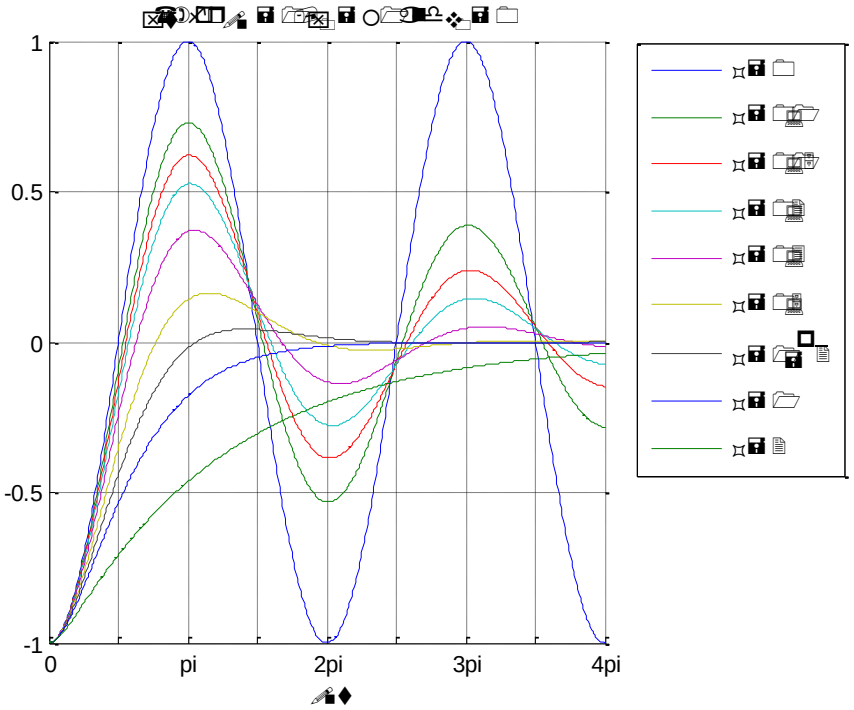
Portability

- **doc\docx** files are not portable



- **pdf**[18] files however are portable

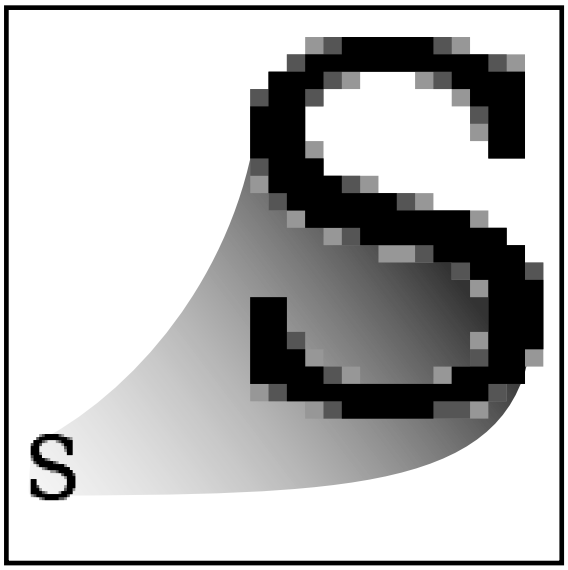
Laboratory Work

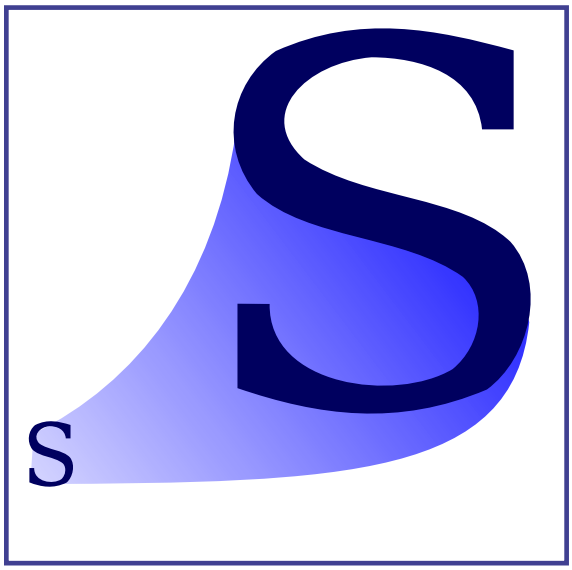
- Practice the task explained in section 4.4

[18] pdf is an acronym for Portable Document Format

3 Vector Graphics using Inkscape

Raster vs Vector Graphics



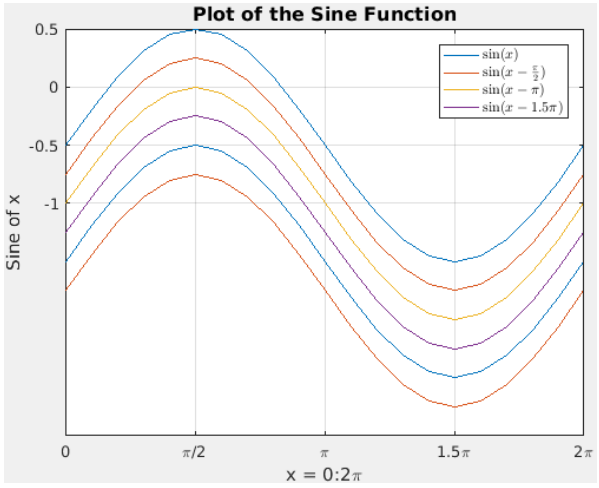


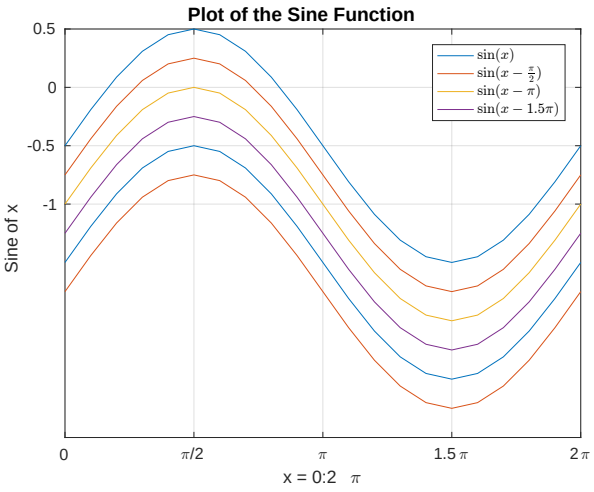
Raster

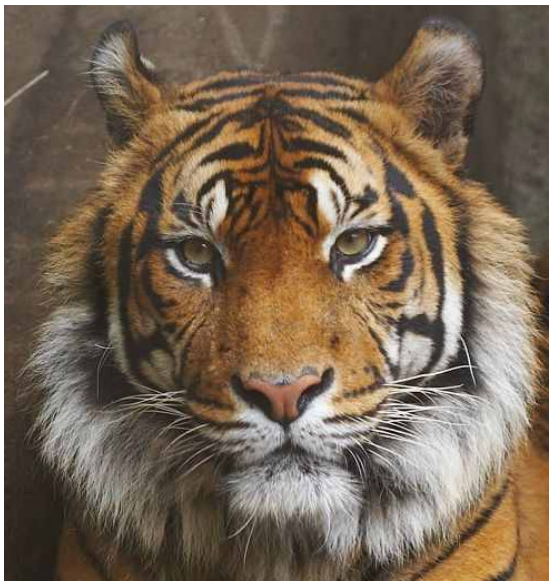
.bmp .jpeg .png

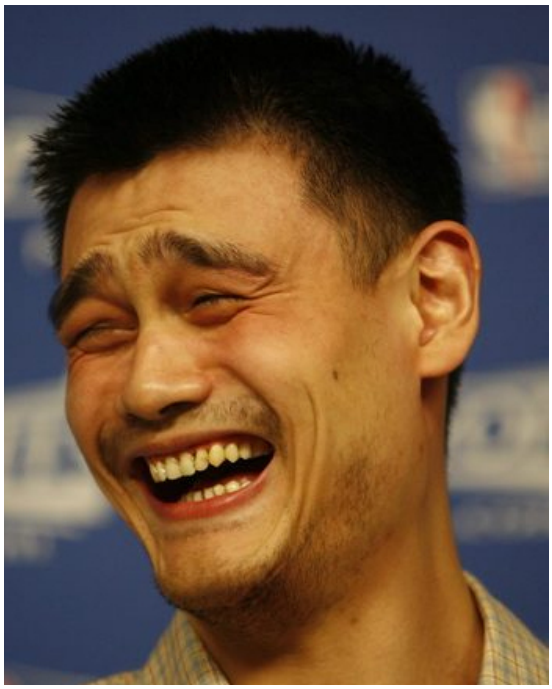
Vector

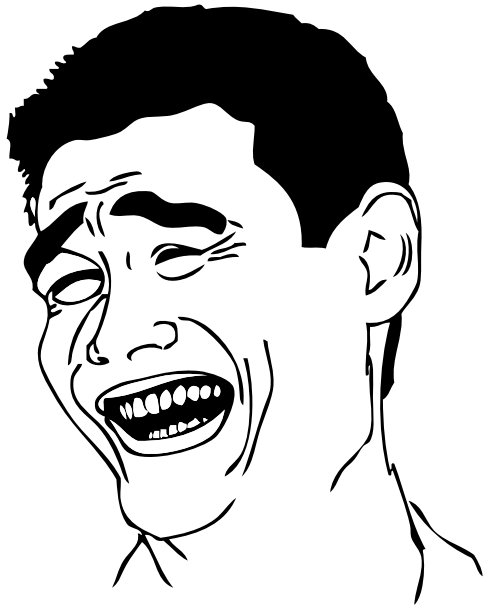
.emf .svg .pdf .eps











Graphics Formats

Raster		Vector	
.bmp	Uncompressed	.pdf	Compressed
.png	Loose-less compression	.eps	
.jpg	Lossy compression	.emf	Compatible with MS office
		.svg	
⋮		⋮	

Vector Graphics Editors

- Adobe Illustrator (*de facto* standard; bloated)
- Corel Draw (bloated)
- Inkscape (light, open source, free, cross-platform and popular; my favorite)
- LibreOffice Draw
- …

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- Free
- Open source
- Cross platform
- Has a big community, i.e.,
  - it is mature enough
  - when you encounter a problem, google it. Most likely you will find others had encountered it and found a solution
- Much much powerful than MS-Word or MS-Power point sketching capabilities
- Has several plugins that greatly expand its capabilities

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Inkscape Capabilities

- Inkscape is based on brazier curves
  - Defines a curve using four information, **start**, **end**, **start tangent** and **end tangent**
- Additionally, you can draw and edit:
  - straight lines
  - circles/arcs/ellipses
  - text
  - LaTeX formulas
  - function curves
  - …

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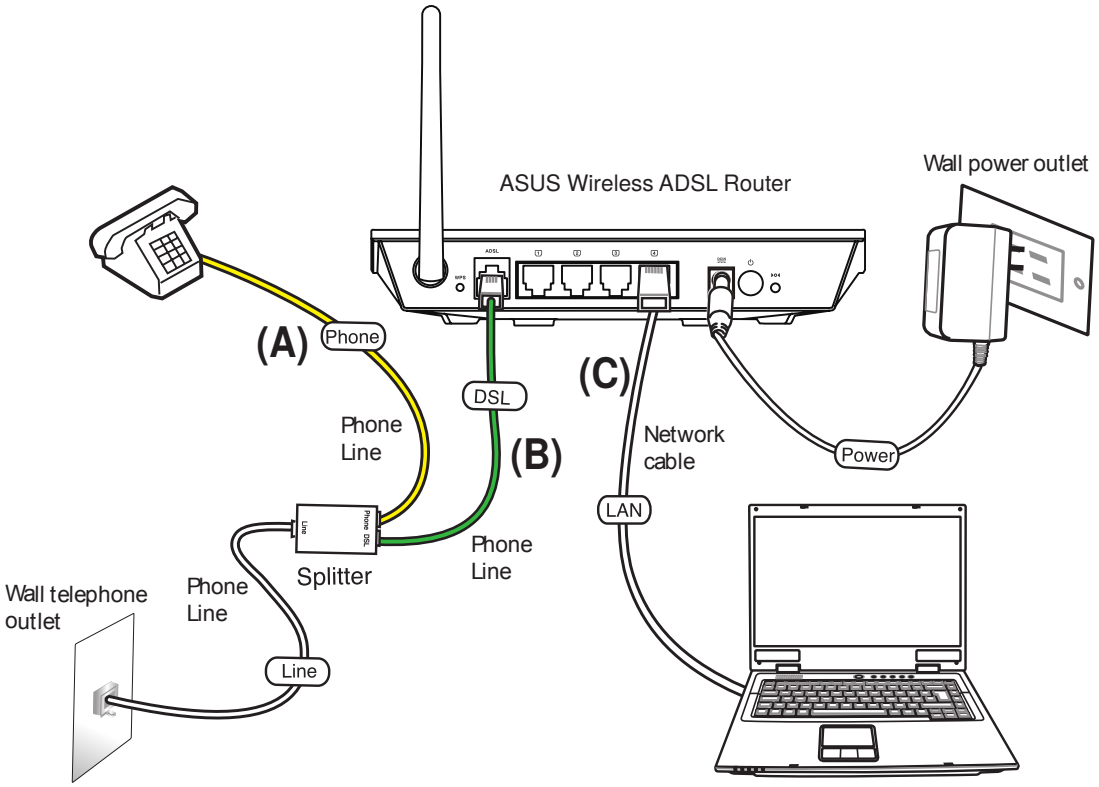
Import Graphics from pdf



- You can import vector graphics from pdf files, and even edit them

3.1 Interesting Plug-ins

Function Plotter

- It is a built in plugins
- It uses brazier curves, same as Inkscape
- It calculates the function derivative and use it to adjust the curve slope
  - It produces very smooth curves using much less points than Matlab
  - You can still adjust/correct the curve manually

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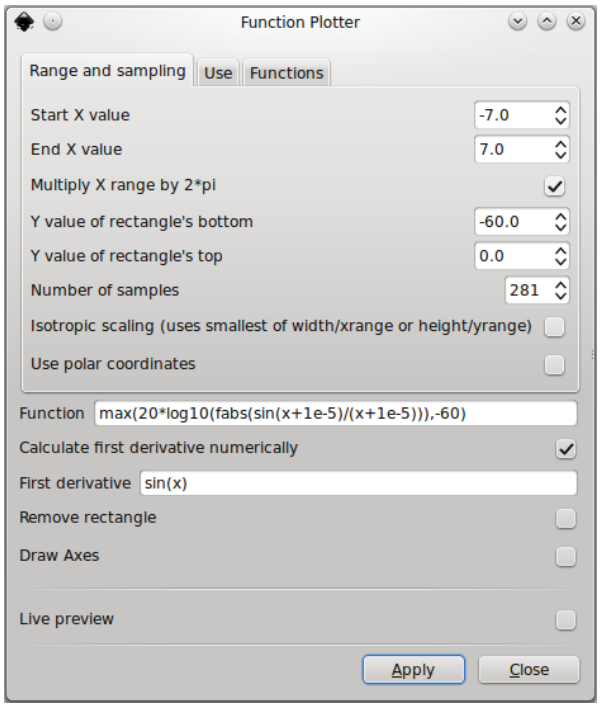
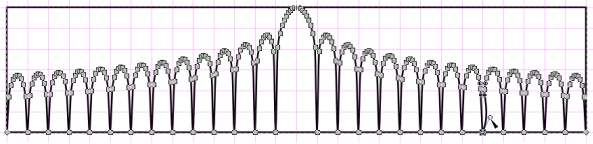
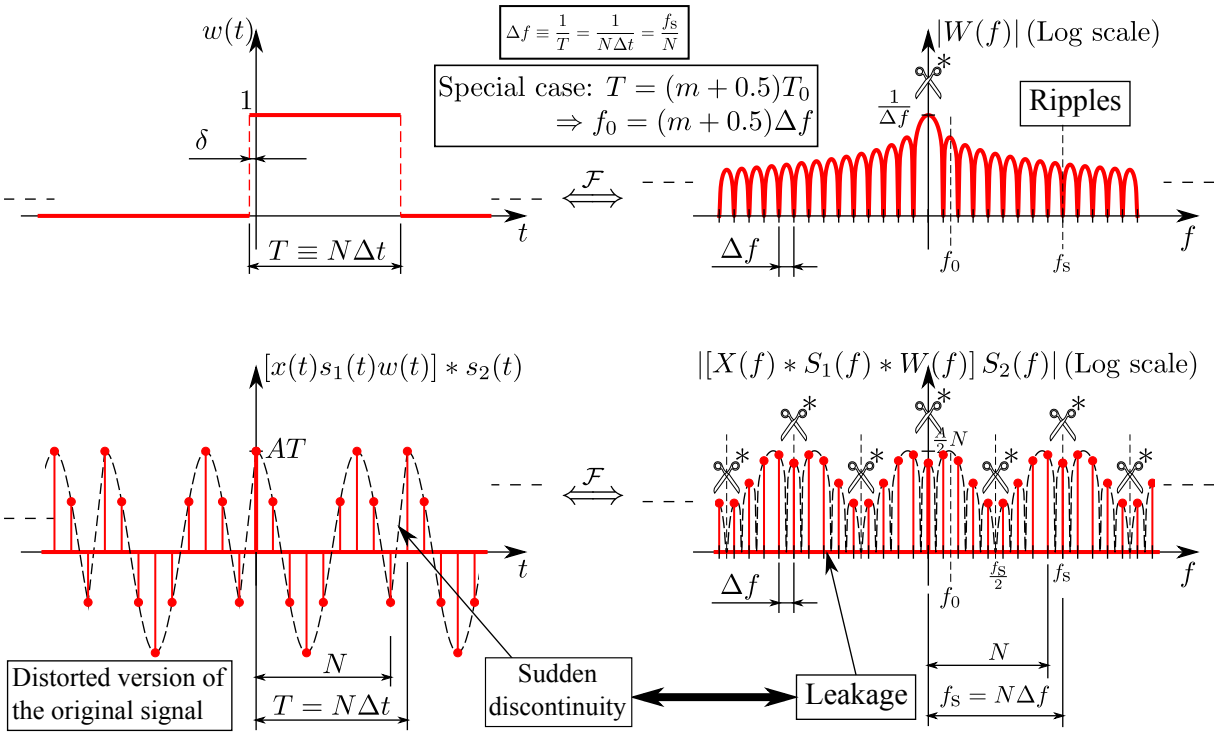




TexText

It allows you to write/edit LaTeX formulas inside Inkscape



3.2 Learning Inkscape

- **Explore** menus and toolbars
- **Official manual** [1] is very good and detailed
  - Chapters 1 includes 10 examples
    - The first 3 examples are enough for a good start
  - Chapters 5 explains editing
    - Surf it fast
- **Help menu** includes tutorials, FAQ, ...
- http://inkscapetutorials.org/

Laboratory Work

- Practice the task explained in section 4.3

4 Laboratory Work

4.1 Technical Writing using LyX

- Re-create the attached document using LyX
- This document is available at https://github.com/ahmed-rashed/Sample-LyX-Report

4.2 Presenting using Beamer

- Recreate the attached document
- Create the presentation handouts
- This document is available at https://github.com/ahmed-rashed/Sample-Beamer-Presentation-By-Lyx

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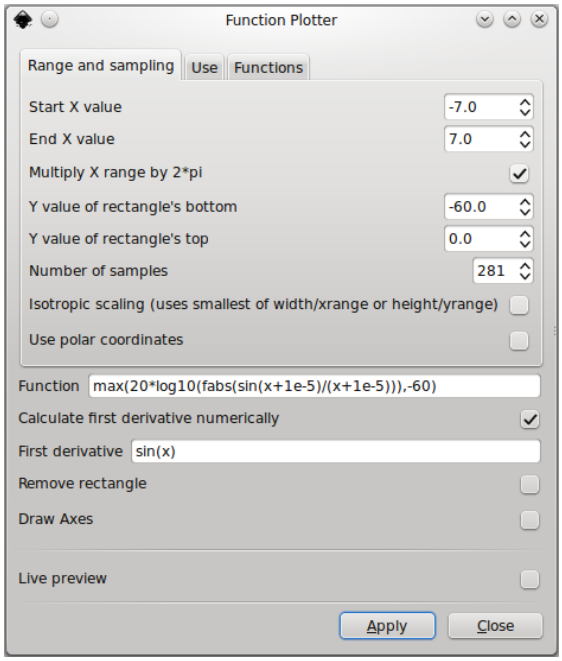
4.3 Vector Graphing using Inkscape

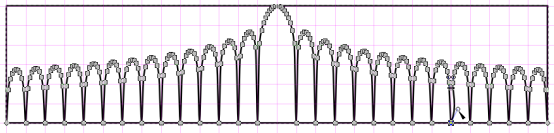
1. Implement examples 1 and 2 of chapter 1 of [1]
2. Write the mathematical formula

$$\sin(x) = \sum_{n=0}^{\infty} \frac{(-1)^n}{(2n+1)!} x^{2n+1}$$

   - Edit it

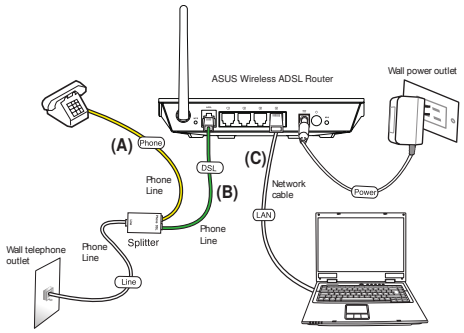
3. Plot $20 \log \left| \frac{\sin(\pi x)}{\pi x} \right|$





   - modify function curve points: merge/split points, make points corners, smooth, symmetric or auto-smooth

4. Import a pdf document and edit it



4.4 Technical Writing using MS Word

- Re-create the attached document
- This document is available at https://github.com/ahmed-rashed/Sample-Word-Report

References

[1] T. Bah, *Inkscape*. Prentice Hall, 2011. [Online]. Available: http://www.ebook.de/de/product/14765413/tavmjong_bah_inkscape.html

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