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QATAR UNIVERSITY

Research 101

LaTeX: Writing Professional Scientific Documents

Eng. Maram Hasanain

LaTeX is Typesetting System

Plain Text

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

\title{\LaTeX: The better way}
\begin{document}
\maketitle

\section{Introduction}
\LaTeX is a robust typesetting language in which one can prepare
publication-quality documents with ease. It allows you to shift your focus
from the formatting of your document to the content. Results are
consistent, compatible across a multitude of operating systems, and best
of all, the programs are open source. Below are two examples of equations
as generated by \LaTeX.

%This is comment text, it won't be visible in the final document, but is
useful for annotation.

\section{Equations}
\subsection{pH equation}
\begin{equation}
pH = pK'_a + log \frac{[R^-]}{[RH]}
\end{equation}
\subsection{Enzyme kinetics equation}

\begin{equation}
\frac{1}{v} = \left(\frac{K_m}{V_{max}}\right) \left(
1+\frac{[I]}{K_i} \right) \left(\frac{1}{[S]}\right) +
\frac{1}{V_{max}}
\end{equation}
```

LaTeX

Formatted Output

LaTeX: The better way

1 Introduction

LaTeXis a robust typesetting language in which one can prepare publication-quality documents with ease. It allows you to shift your focus from the formatting of your document to the content. Results are consistent, compatible across a multitude of operating systems, and best of all, the programs are open source. Below are two examples of equations as generated by LaTeX.

2 Equations

2.1 pH equation

$$pH = pK'_a + log\frac{[R^-]}{[RH]} \quad (1)$$

2.2 Enzyme kinetics equation

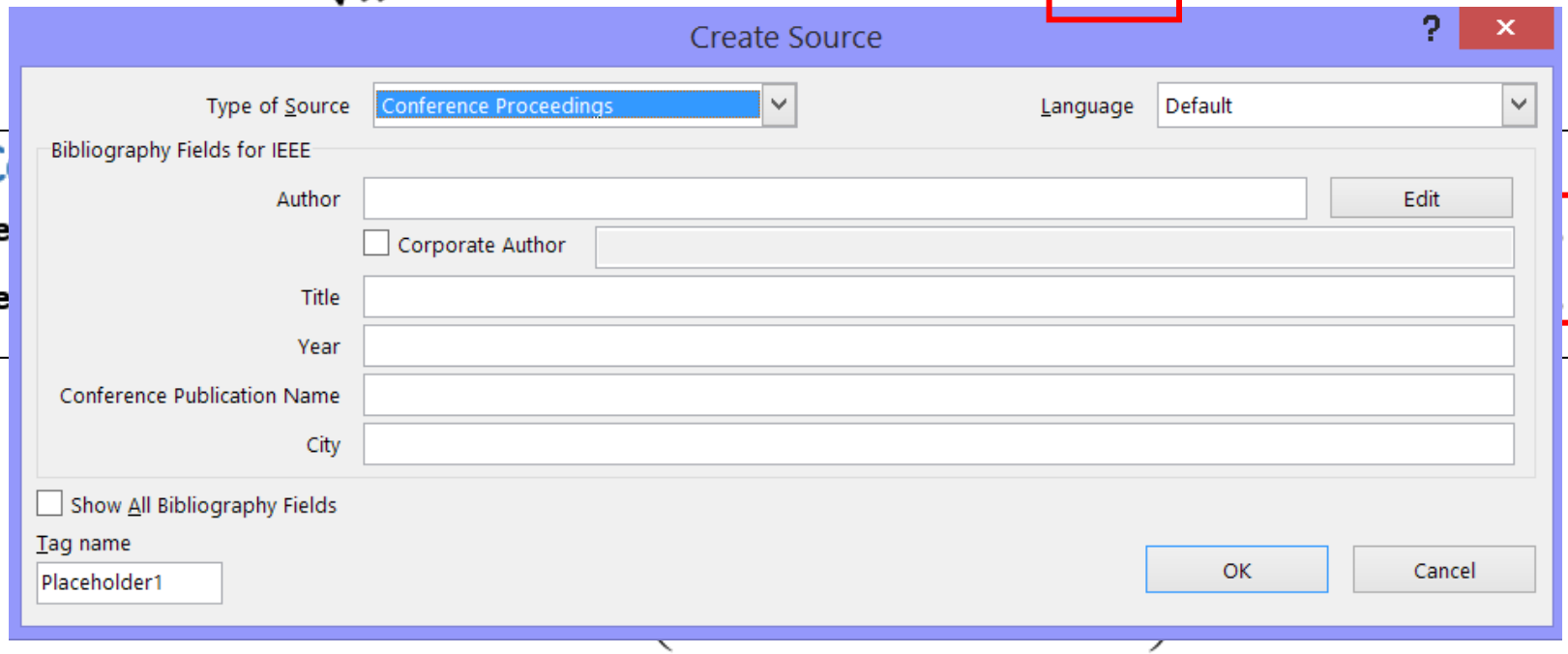
$$\frac{1}{v} = \left(\frac{K_m}{V_{max}}\right)\left(1+\frac{[I]}{K_i}\right)\left(\frac{1}{[S]}\right)+\frac{1}{V_{max}} \quad (2)$$

Content

Layout

Why LaTeX?

$$\int \frac{x^3 + 3x + 4}{\sqrt{x}} dx$$

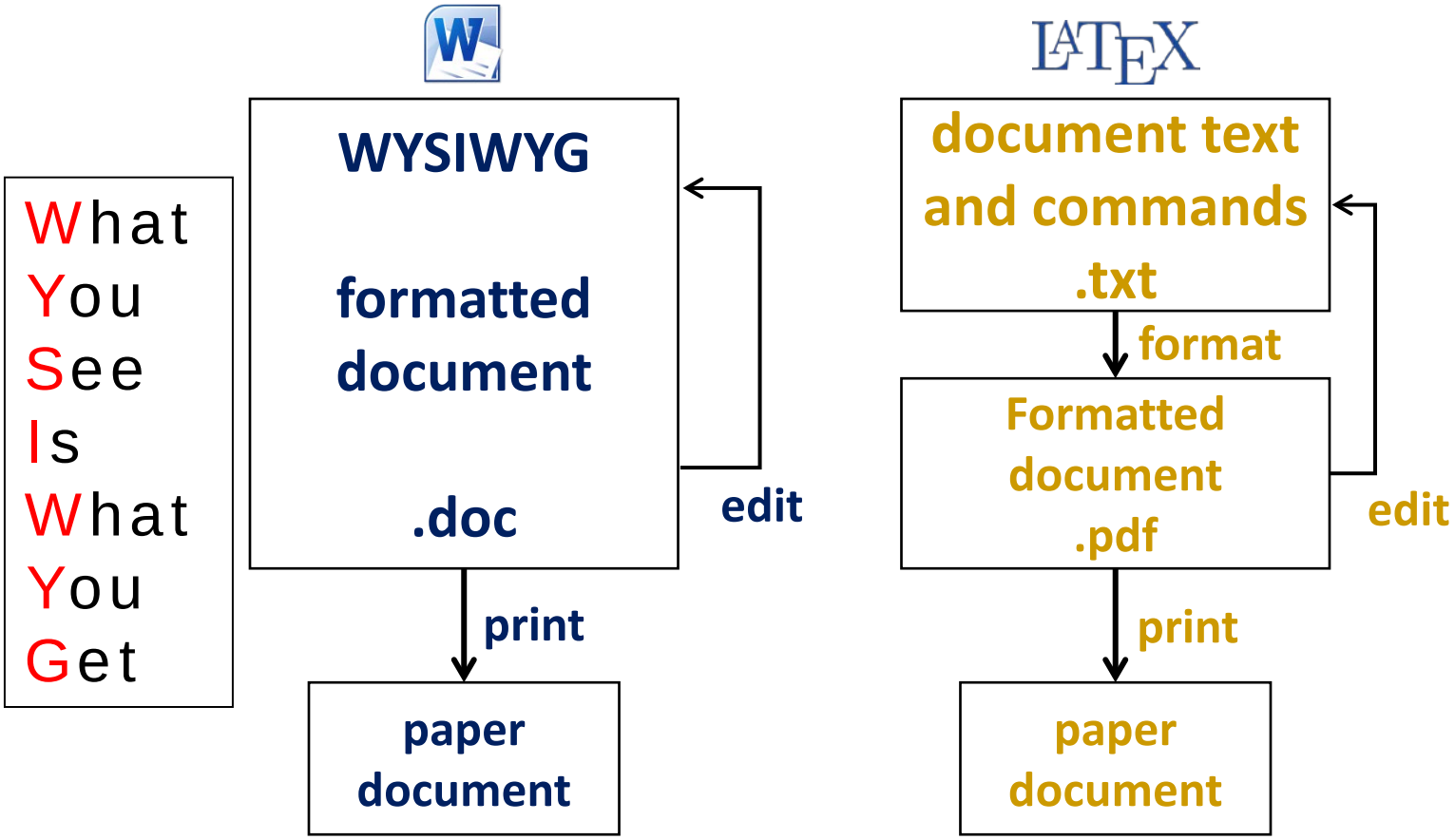


$$= \int \left(x^{\frac{5}{2}} + 3x^{\frac{1}{2}} + 4x^{-\frac{1}{2}} \right) dx$$

Why LaTeX?

- Powerful formatting
- Easily generate complex structures
  - e.g., References, table of contents
- Easy to include math
- **Free** ☺

MS Word vs. LaTeX



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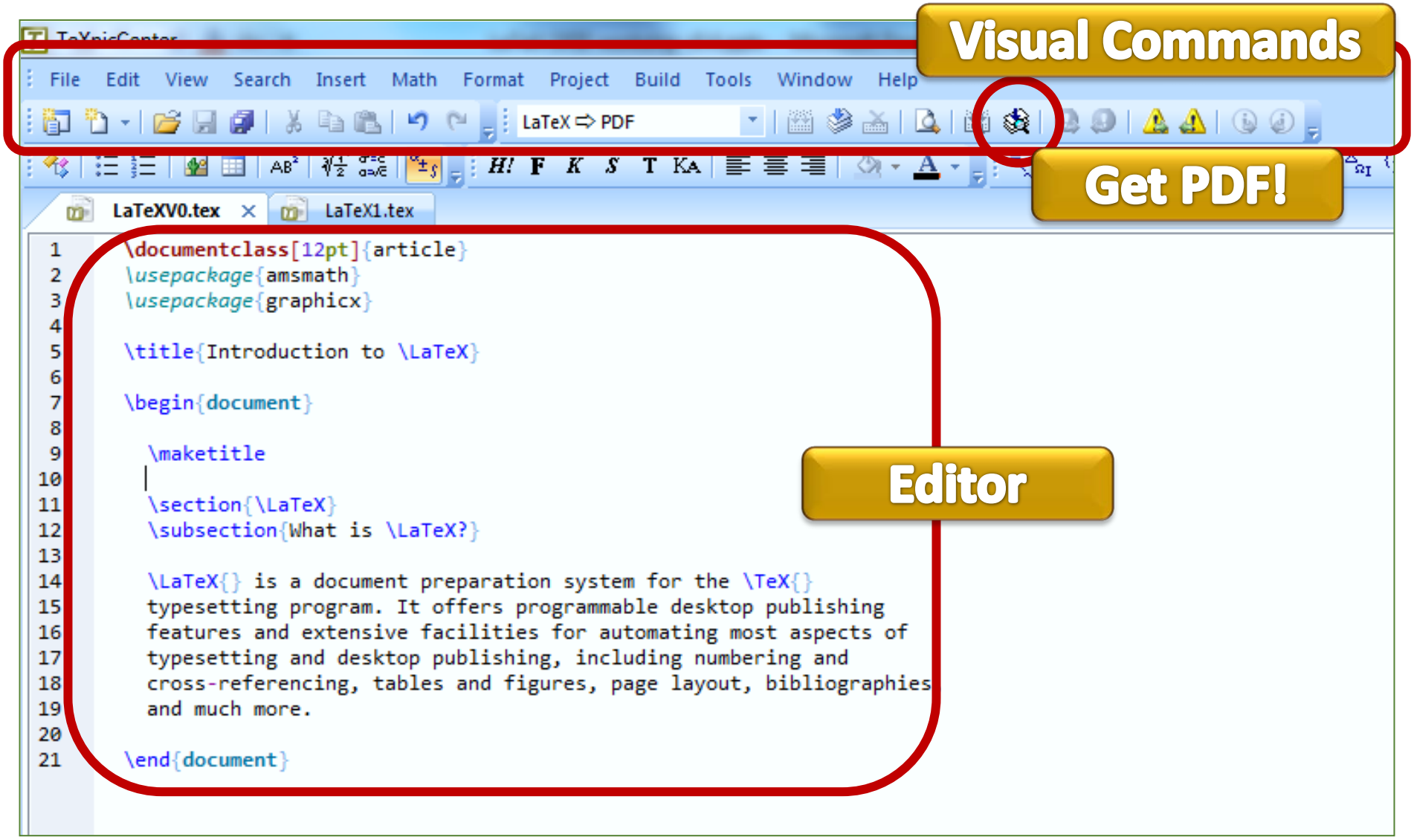
***BUT* … it's not so easy to learn…**

… without a powerful TeX editor ☺

TeXnicCenter!



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LaTeX document:
How it looks like

Document Type

```
\documentclass[12pt]{article}
\usepackage{amsmath}
\usepackage{graphicx}

\tit

\beg

  \m

  \s
  \subsection{What is \LaTeX?}
  % this is a comment
  \LaTeX{} is a document preparation system for the \TeX{}
  typesetting program. It offers programmable desktop publishing
  features and extensive facilities for automating most aspects of
  typesetting and desktop publishing, including numbering and
  cross-referencing, tables and figures, page layout, bibliographies,
  and much more.

\end{document}
```

\documentclass[*options*]{class}

predefined formats (article, report, book, letter, …)

options = a4paper, 11pt, 12pt, 10pt, twocolumn, landscape,...

class = article, report, book,...

```
\documentclass[12pt]{article}
\usepackage{amsmath}
\usepackage{graphicx}

\title{Introduction to \

\begin{document}

  \maketitle

  \section{\LaTeX}
  \subsection{What is \LaTeX?}
  % this is a comment
  \LaTeX{} is a document preparation system for the \TeX{}
  typesetting program. It offers programmable desktop publishing
  features and extensive facilities for automating most aspects of
  typesetting and desktop publishing, including numbering and
  cross-referencing, tables and figures, page layout, bibliographies,
  and much more.

\end{document}
```

Packages

\usepackage{package name}

added functionality (graphics, reference style,...).

```latex
\documentclass[12pt]{article}
\usepackage{amsmath}
\usepackage{graphicx}

\title{Introduction to \LaTeX}

\begin{document}

  \maketitle

  \section{\LaTeX}
  \subsection{What is \LaTeX?}
  % this is a comment
  \LaTeX{} is a document preparation system for the \TeX{}
  typesetting program. It offers programmable desktop publishing
  features and extensive facilities for automating most aspects of
  typesetting and desktop publishing, including numbering and
  cross-referencing, tables and figures, page layout, bibliographies,
  and much more.

\end{document}
```

Title

```
\documentclass[12pt]{article}
\usepackage{amsmath}
\usepackage{graphicx}

\title{Introduction to \LaTeX}

\begin{document}

  \maketitle

    \section{\LaTeX}
    \subsection{What is \LaTeX?}
    % this is a comment
    \LaTeX{} is a document preparation system for the \TeX{}
    typesetting program. It offers programmable desktop publishing
    features and extensive facilities for automating most aspects of
    typesetting and desktop publishing, including numbering and
    cross-referencing, tables and figures, page layout, bibliographies,
    and much more.

\end{document}
```

Body


KEEP
CALM
AND
LEARN
LATEX

Setup

1. Create a folder (anywhere)
2. Place any test image in it (for later!)
3. Start TeXnicCenter
4. Create new file
5. Type in:

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

6. Save file to same folder

Adding Title and Author(s)

```
\title{Introduction to \LaTeX}
\author{Tamer Elsayed and Maram Hasanain}
```

Document Title

Authors names

Introduction to LaTeX

Tamer Elsayed and Maram Hasanain

Let's try it now!

Before you Start Writing!

Your document starting point

```
\begin{document}
\maketitle
```

Insert title

.
.
.

```
\end{document}
```

End your document

Let's try it now!

Our First File!

Intro to LaTeX

Maram Hasanain

October 16, 2014

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Sections

Section Headings

Use commands to define sections:

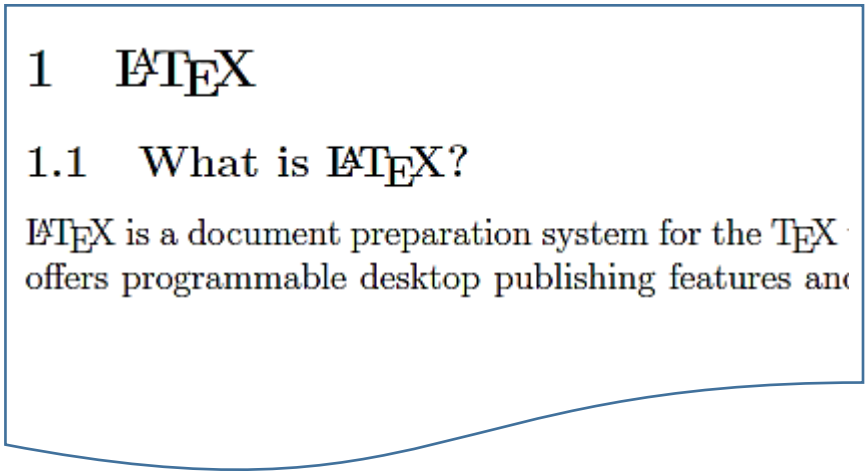
```
\section{Section Name}
   content of section here
   \subsection{Sub-section Name}
      content of sub section here
      \subsubsection{Sub-Sub-section Name}
         content of sub sub section here
```

Example

LaTeX commands

```
\section{\LaTeX}
 \subsection{What is \LaTeX?}
 Section content goes here.
```

Resulting sections



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Figures

Example

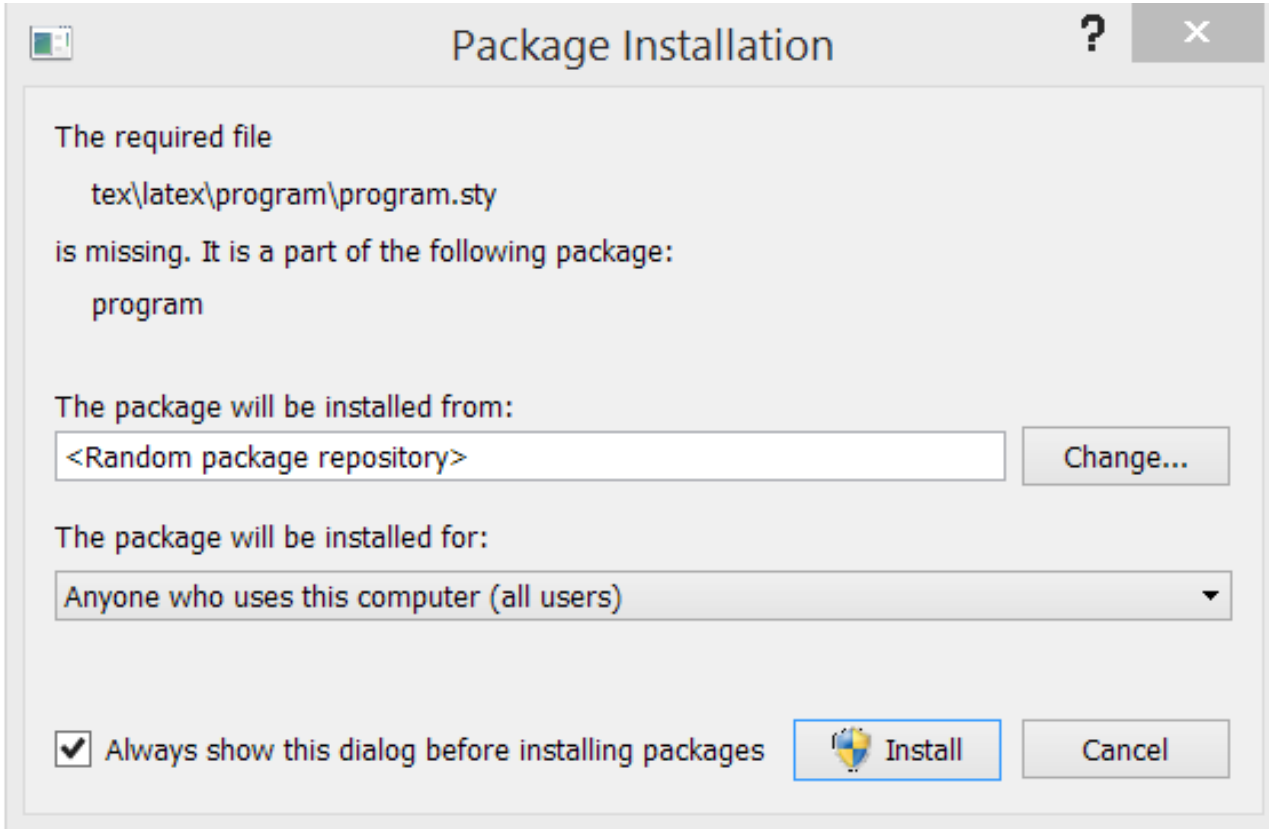
```
\documentclass[12pt]{article}
\usepackage{graphicx}
```

```
\begin{figure}[h]
   \centering
   \includegraphics[scale=0.2]{test.png}
   \caption{Inserting our first image}
   \label{fig:img}
\end{figure}
```

Label: give a unique id to your figure

Let's try it now!

Installing packages



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Inserting math!

Two Approaches

1) Inline: Within text using `$equation$`

Example:

$$y = \cos(x)$$

LaTeX command

```
$y=\cos(x)$
```

Two Approaches

2) Separate block

Example:

equation in its own block of text

$$y = \frac{3x}{x+1}$$

```
\begin{equation}
\centering
y = \frac{3x}{x+1}
\end{equation}
```

Let's try it now!

Typesetting Mathematics

Greek Symbols

\alpha, \beta, \gamma ⟶ α , β , γ

Superscript, Subscript

x^y ⟶ x^y

x_y ⟶ x_y

x_y^z ⟶ x_y^z

Example (Using Superscript)

Example commands

```
\begin{equation}
\centering
     E = mc^2
\end{equation}
```

Formatted output

Using superscripts in equations

$$E = mc^2$$

Let's try it now!

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BibTeX and References

BibTeX

- Tool to manage references
- References stored in a .bib file as entries.
- Entries follows a certain format.

The whole Story!

Add references as BibTeX entries in a .bib file

example.bib

```
@book{1994latex
  title={LaTEX: User's Guide
                \& Reference Manual},
  author={Lamport, Leslie},
  volume= {14},
  year={1994},
  publisher={Addison-Wesley}}
```

Entry ID

example.bib

hello-world.tex*

```
\subsection{What's LaTeX?}
LaTeX is a high-quality typesetting system;
features designed for the production of tec
scientific documentation~\cite{          }.
```

hello-world.tex

Example of a BiBTeX entry

[1] Leslie Lamport. *LaTEX: User's Guide & Reference Manual*, volume 14. Addison-Wesley, 1994.

Publication Type

Entry ID

```
@book{1994latex,
  title={LaTEX: User's Guide
                \& Reference Manual},
  author={Lamport, Leslie},
  volume= {14},
  year={1994},
  publisher={Addison-Wesley}}
```

Let's try it now!

Using BiBTeX in your LaTeX file

Entry in .bib file

```
@book{1994latex,
  title={LaTEX: User's Guide
        \& Reference Manual},
  author={Lamport, Leslie},
  volume= {14},
  year={1994},
  publisher={Addison-Wesley}}
```

Point to .bib file in LaTeX

```
\bibliography{example}
\bibliographystyle{plain}
\end{document}
```

The name of your .bib file

Reference style to use in your document

```
\cite{exLabel}
```

Add the entry label of your source in text

Let's try it now!

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Your Turn!

What would you like us to try?

There is A LOT more!

- **We scratched the surface!**
- Fonts
- Lists
- Tables
- Table of Content and Index
- Theorems
- Boxes
- Floats
- Footnotes
- Chapters
- Margins
- Templates
- Class files
- Cross referencing
- Thesis
- Dissertations
- ……
- **Even discussed topics: lots of other options**

References & Resources

- Some slides adopted from online LaTeX slides.
- **LaTeX Primer** (very rich tutorial) (http://www.tug.org/twg/mactex/tutorials/ltxprimer-1.0.pdf)
- **LaTeX examples (**http://denethor.wlu.ca/latex/)
- **Writing LaTeX online(**https://www.writelatex.com/)
- **WinEdt** (another powerful editor, but *shareware*) (http://www.winedt.com/)

Needed Software

- **Acrobat Reader**

http://get.adobe.com/reader/

- **MiKTex**

http://miktex.org/download

- **TeXnicCenter**

http://www.texniccenter.org/resources/downloads/29-downloads/12-texniccenter-installer

Thank You!

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\end{Have fun with \LaTeX :-)}

- We will be sending you the slides
- We will share links to good resources
- Feel free to contact us

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telsayed@qu.edu.qa