

\LaTeX - What Can it Do for You?

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Outline

- 1 Intro.
- 2 First document
- 3 Math mode
- 4 Tables
- 5 Figures
- 6 Citations
- 7 Resources
- 8 Writing a Thesis
- 9 References

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Writing your first \LaTeX document

First \LaTeX document

```
\documentclass[12pt,draft]{article}
\author{Your Name}
\title{The title of the document}
\begin{document}
\maketitle
\section{Introduction}
It all begins in a land far far away..
\end{document}
```

Writing your first \LaTeX document

- Document class [***.cls files**]
- Necessary packages [***.sty files**]

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Math mode

Examples of math equations

$$\bar{x} = \frac{\sum_{i=1}^N w_i x_i}{\sum_{i=1}^N w_i} \quad (1)$$

$$N(t) = N_0 e^{-\frac{t}{\tau}} = N_0 \exp\left(-\frac{t}{\tau}\right) \quad (2)$$

$$f = f(t, x, y, \dots)$$

$$\frac{df}{dt} = \frac{\partial f}{\partial t} + \frac{\partial f}{\partial x} \frac{dx}{dt} + \frac{\partial f}{\partial y} \frac{dy}{dt} + \dots \quad (3)$$

Math mode

Examples of math equations:Source

```
\begin{equation}
\bar{x} = \dfrac{\sum_{i=1}^N w_i x_i }
{\sum_{i=1}^N w_i}
\end{equation}
```

```
\begin{equation}
N(t) = N_0 e^{\{-\frac{t}{\tau}\}} =
N_0 \exp\left(\{-\frac{t}{\tau}\}\right)
\end{equation}
```

```
\begin{align}
f \&= f(t,x,y, \ldots)\nonumber \\
\totd{f}{t} \&= \pd{f}{t} + \pd{f}{x} \totd{x}{t} \\
+ \pd{f}{y} \totd{y}{t} + \cdots
\end{align}
```

Math mode

Examples of math equations:Source

```
\begin{align}
f &= f(t,x,y, \ldots)\nonumber \\
\totd{f}{t} &= \pd{f}{t} + \pd{f}{x} \totd{x}{t} \\
&+ \pd{f}{y} \totd{y}{t} + \cdots
\end{align}
```

Output

$$f = f(t, x, y, \dots)$$

$$\frac{df}{dt} = \frac{\partial f}{\partial t} + \frac{\partial f}{\partial x} \frac{dx}{dt} + \frac{\partial f}{\partial y} \frac{dy}{dt} + \dots$$

Create new shortcuts in \LaTeX

```
\newcommand{\pd}[2]{\frac{\partial #1}{\partial #2}}
\newcommand{\totd}[2]{\frac{d #1}{d #2}}
```

Exercise in Math mode

Exercise 1

Produce this inline text with \LaTeX : $\mu = \int_0^\infty f(x)dx$. Put the solution into `second.tex` and make sure the file compiles.

Exercise in Math mode

Exercise 2

Produce this equation with \LaTeX :

$$\xi(r) \equiv \langle \delta(\vec{r}') \delta(\vec{r}' + \vec{r}) \rangle. \quad (4)$$

Exercise in Math mode

Solution 1

```
$\mu = \int_0^{\infty} f(x) dx $
```

Output for solution 1

$$\mu = \int_0^{\infty} f(x) dx$$

Exercise in Math mode

Solution 2

```
\begin{equation}
\xi(r) \equiv \langle \text{langle } \delta(\vec{r}')
\delta(\vec{r}' + \vec{r}) \rangle.
\label{eqn:xi}
\end{equation}
```

Output for solution 2

$$\xi(r) \equiv \langle \delta(\vec{r}') \delta(\vec{r}' + \vec{r}) \rangle.$$

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Tables

\LaTeX code for a table

```
\begin{tabular}[t]{|l|ccc|c|}
\hline
\bf{Name} & \bf{\#1} & & \bf{\#2} & \bf{\#3} & \bf{Total} & \\
\hline
John Doe & 5 & & 5 & 3 & 13 & \\
Jane Doe & 5 & & 5 & 5 & 15 & \\
\hline
\end{tabular}
```

table and tabular are the \LaTeX table environments

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\begin{tabular}[t]{|l|ccc|c|}
\hline
\bf{Name} & \bf{\#1} & & \bf{\#2} & \bf{\#3} & \bf{Total} & \\
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Jane Doe & 5 & & 5 & 5 & 15 & \\
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Tables

\LaTeX code for a table

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\hline
\bf{Name}           & \bf{\#1} & & \bf{\#2} & \bf{\#3} & \bf{Total} & \\
\hline
John Doe            & 5        & & 5        & 3        & 13        & \\
Jane Doe            & 5        & & 5        & 5        & 15        & \\
\hline
\end{tabular}
```

Output

Name	#1	#2	#3	Total
John Doe	5	5	3	13
Jane Doe	5	5	5	15

Exercise in Tables

Exercise 3: Tables with captions

Create a caption for the previous table (copy-paste the existing table code from the presentation). In the caption, refer to the equation you wrote as part of Exercise 2.

Exercise in Tables

Solution 3

```

\begin{table}
\caption{This is a caption for the table and it uses Eqn.~\ref{eqn:xi}.}
\centering
\begin{tabular}[t]{l|ccc|c|}
\hline
\bf{Name} & & & & & \\
\hline
& \bf{\#1} & & \bf{\#2} & & \bf{\#3} & & \bf{Total} & \\
\hline
John Doe & & 5 & & 5 & & 3 & & 13 & \\
Jane Doe & & 5 & & 5 & & 5 & & 15 & \\
\hline
\end{tabular}
\end{table}

```

Exercise in Tables

Output for solution 3

Table 1: This is a caption for the table and it uses Eqn. 4.

Name	#1	#2	#3	Total
John Doe	5	5	3	13
Jane Doe	5	5	5	15

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Figures

Using the includegraphics directive

```
\begin{figure}  
\includegraphics[width=0.6\linewidth]{fig1}  
\caption{This is the first figure and follows  
\citet{WBPkd02}.}  
\label{fig:fig1}  
\end{figure}
```

**(Note there is no file extension in the includegraphics command.
Any guesses as to why?)**

Figures

Output

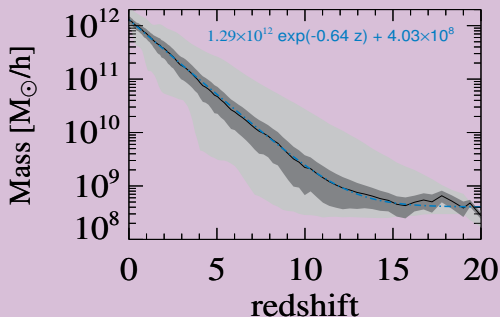


Figure 1: This is the first figure and follows Wechsler et al. (2002).

Multiple figures

With the `includegraphics`, `minipage`, and `tabular` directive

```
\begin{figure}
\centering
\includegraphics[width=0.4\linewidth]{fig2a.eps}%
\includegraphics[width=0.4\linewidth]{fig2b.eps}%
\\
\includegraphics[width=0.4\linewidth]{fig2c.eps}%
\includegraphics[width=0.4\linewidth]{fig2d.eps}%
\\
\caption{This is the caption for the four figures.
This is similar to Fig.~\ref{fig:fig1}}
\label{fig:fig2}
\end{figure}
```

Multiple figures

Output

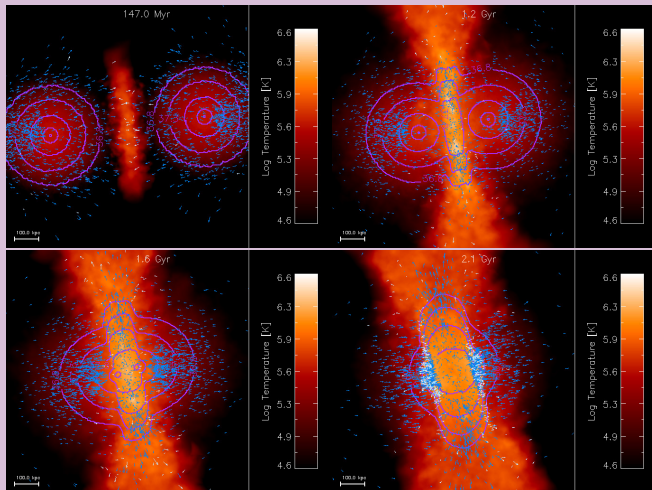


Figure 2: This is the caption for the four figures. This is similar to Fig. 1

Exercise in Figures

Exercise 4: Rotating figures

Include the figure "fig1.eps" in second.tex, make it half the size and rotate it counter-clockwise by 90° .

Exercise in Figures

Solution 4

```
\begin{figure}  
\includegraphics[width=0.3\linewidth,angle=90]{fig1}  
\caption{This is the third figure and follows \citet{WBPkd02}.  
Figure has been rotated by 90$^\circ$ counter-clockwise.}  
\label{fig:fig1_rotated}  
\end{figure}
```

Exercise in Figures

Output for solution 4

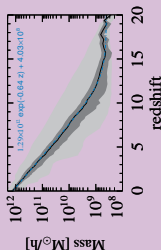


Figure 3: This is the third figure and follows Wechsler et al. (2002). Figure has been rotated by 90° counter-clockwise.

Exercise in Figures

Exercise 5: Two figures side-by-side

Create a new figure, containing "fig1.eps" and a "fig2a.eps" side-by-side. There should be only one caption and figure number.

Exercise in Figures

Solution 5

```
\begin{figure}  
\includegraphics[width=0.5\linewidth]{fig1}%  
\includegraphics[width=0.5\linewidth]{fig2a}\  
\caption{This is the fourth figure.}  
\label{fig:fig1_and_fig2}  
\end{figure}
```


Exercise in Figures

Output for solution 5

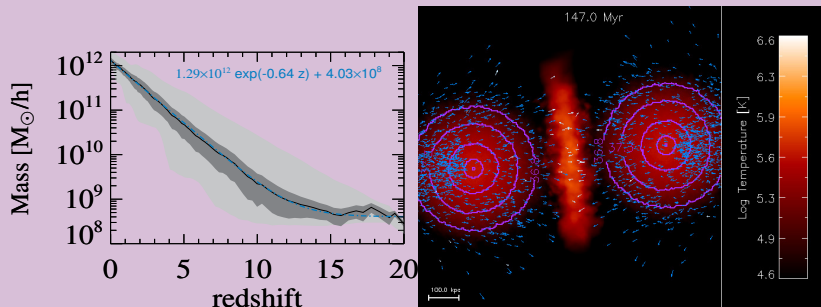


Figure 4: This is the fourth figure.

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Exercise in Citations

Exercise 6: Creating a Master .bib file

The second.tex file you have does not use bibtex. Create a Master database file with **at least three** references and then refer to **two** them in the text. Compile and make sure the correct citations are present.

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 - ❸ templates for Vanderbilt Masters/PhD thesis
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- ❹ I am putting up a series of L^AT_EX templates (including the source for this presentation) on the Vanderbilt AstroWiki page. The templates will be for –
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 - ❸ templates for Vanderbilt Masters/PhD thesis
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L^AT_EX resources

- ❶ The definitive guide is at [CTAN - Comprehensive T_EX Archive Network](#)
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- 9 References

Master TeX file

The Master TeX file

```
\documentclass[] {vuthesis}  
\usepackage{graphicx}  
  
:  
:  
  
\title{Thesis Title}  
\author{Your name}
```

Links for relevant Vanderbilt L^AT_EX files

[Vanderbilt thesis Class file](#)

[Vanderbilt thesis master tex file](#)

Chapters in different files

Using the include directive

```
\include{Chapter1/Chapter1.tex}  
\include{Chapter2/Chapter2.tex}
```

Table of contents

- 1 `\tableofcontents` will automatically generate a table of contents

Chapters in different files

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References

Wechsler, R. H., Bullock, J. S., Primack, J. R., Kravtsov, A. V., & Dekel, A. 2002, *ApJ*, 568, 52