

References in L^AT_EX

Workshop #5

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References in \LaTeX

In Lecture #4 we did some referencing of equations in the \LaTeX environment. In this activity we will see that there are a number of things that can be labeled in a \LaTeX document. You can label and reference:

- ☞ Section, and subsection headings (and chapter, subsubsection, and other headings.)
- ☞ Items in lists.
- ☞ Theorems, corollaries, propositions, definitions, etc.
- ☞ Equations.
- ☞ Tables and Figures.
- ☞ Pages.
- ☞ Items in external documents (using `xr.sty`).

Referencing Headings

Simply place a label immediately after a chapter, section, or subsection heading for reference later in your document. Compile the following example.

```
\documentclass{article}
\begin{document}
\section{Introductory Remarks}
\label{sec:1}
```

Usually, a reference to a section would occur in another section of your document, but we reference Section~\ref{sec:1} in this silly manner only for demonstration purposes.

```
\end{document}
```

- ① Remember that you must compile at least two times to set up cross references.
- ② The ~ is an *unbreakable* space. It provides a space in the usual manner, but disallows any line or page break. This is good style as you don't want the word "Section" occurring at the end of a line and the section number occurring at the beginning of the next line.

Referencing a List Item

It is a simple task to reference an item in a list. Simply place your label immediately after the `\item` tag and reference it in the usual manner. Compile (twice) the following example.

```
\documentclass{article}
\begin{document}
\section{Introductory Remarks}
Employees must check off each item on the
following list before departing the building.
\begin{enumerate}
\item\label{lockup:1} Engage alarm.
\item\label{lockup:2} Engage deadbolt.
\end{enumerate}
Pay close attention to Item~\ref{lockup:1}
when leaving.
\end{document}
```

After you have previewed the output from the above example, switch these lines

```
\item\label{lockup:2} Engage deadbolt.
\item\label{lockup:1} Engage alarm.
```

and recompile. Explain the different outcome!

Referencing in WinEdt

WinEdt's Gather Tool aids you in making references. Try the following experiment.

- ❶ Type `\ref{}`. Be sure to include both the left and right curly braces.
- ❷ Note that this opens WinEdt's Gather dialog box, with the `label` tab selected.
- ❸ Right click the `label` dialog and another popup menu will appear. Select Update from this dialog. This will update the list so that it contains *all* `\label`'s in your document.
- ❹ Single-clicking a label in this list takes you to the label. Double-clicking a label in this list inserts it between the curly braces in your `\ref{}` statement. Try it!
- ❺ Single-clicking several labels will take you sequentially to each one clicked, but double-clicking still inserts the label double-clicked between the curly braces of your `\ref{}` command. Try it!
- ❻ Hitting the escape key (ESC) on the keyboard closes the gather environment dialog and returns you to your original cursor position. Try it!



Referencing Theorems

Referencing theorems, corollaries, etc. is easy. Simply place your label immediately after your theorem tag. Compile (twice) the following example.

```
\documentclass{article}
\newtheorem{thm}{Theorem}
\begin{document}
\begin{thm}\label{theorem:1}
If I pull the trigger, then the gun will fire.
\end{thm}
```

```
To prove Theorem~\ref{theorem:1}, we first
assume that the hypothesis is true.
\end{document}
```

The reference always adopts the same numbering scheme as the label in the thing being referenced. The next example uses $\mathcal{A}\mathcal{M}\mathcal{S}\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$'s `\newtheorem` command to change the theorem label format (and consequently the reference number format) .

Compile (twice) the following example and note the difference in the label and reference number format.

```
\documentclass{article}
\usepackage{amsmath}
\usepackage{amsthm}
\newtheorem{thm}{Theorem}[section]
\begin{document}
\section{Introduction}
\begin{thm}\label{theorem:1}
If I pull the trigger, then the gun will fire.
\end{thm}
```

```
Here is the converse of Theorem~\ref{theorem:1}.
\begin{thm}\label{theorem:2}
If the gun fires, then I pulled the trigger.
\end{thm}
```

```
Is Theorem~\ref{theorem:2} a necessary
consequence of Theorem~\ref{theorem:1}?
\end{document}
```

Referencing Equations

We spent some time referencing equations in Lecture #4,¹ so we'll minimize examples of equation referencing in this activity. Again, an equation reference adopts the format of the equation label that it references. Compile (twice) the following example.

```
\documentclass{article}
\usepackage{amsmath}
\numberwithin{equation}{section}
\begin{document}
\section{Introduction}
Some inane text.
\section{One}
More inane text.
\begin{equation}\label{eq:1}
f(x)=\int_0^x \frac{t}{1+t^2}\,dt
\end{equation}
\eqref{eq:1} refers to equation one of
section two.
\end{document}
```

¹Note what can happen if you don't use an unbreakable space (~).

Referencing Figures

It is the `\caption` command that produces the numerical label in \LaTeX 's figure environment. Therefore, the `\label` command must immediately follow the caption command.

```
\documentclass{article}
\usepackage{graphicx}
\begin{document}
\begin{figure}
  \centering
  \includegraphics{clown}
  \caption{A jolly-sad clown.}\label{fig:1}
\end{figure}
```

You will need the file `\texttt{clown.eps}` to include Figure~\ref{fig:1} in your document.

```
\end{document}
```

If you are working in $\mathcal{A}\mathcal{M}\mathcal{S}\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$, then you can use the `\numberwithin` command to change the figure label's numerical format.

Compile (twice) the following example and note the difference in the format of the figure label and its reference number format.

```
\documentclass{article}
\usepackage{amsmath}
\usepackage{graphicx}
\numberwithin{figure}{section}
\begin{document}
\section{Introduction}
```

```
\begin{figure}
  \centering
  \includegraphics{clown}
  \caption{A jolly-sad clown.}\label{fig:1}
\end{figure}
```

You will need the file `\texttt{clown.eps}` to include Figure~\ref{fig:1} in your document.

```
\end{document}
```

If you are working in pure \LaTeX without the \mathcal{AMS} macros, then investigate the `caption2` package. It has a carload of nice features that enable custom formatting of captions in the figure environment.

<ftp://ctan.tug.org/tex-archive/macros/latex/contrib/supported/caption/>

Referencing Tables

Reference a floating table in exactly the same manner as you reference a floating figure.

```
\documentclass{article}
\usepackage{graphicx}
\begin{document}
\begin{table}
  \centering
  \begin{tabular}{cc}
    \textbf{Name} & \textbf{Score} \\ \hline
    David & 92 \\
    Don & 106 \\
    Jim & 123 \\
    Todd & 256 \\ \hline
  \end{tabular}
  \caption{CR Invitational scores..}\label{tbl:1}
\end{table}
In Table~\ref{tbl:1}, we've recorded the scores of
certain individuals at the recent CR Invitational.
\end{document}
```

If you are working in $\mathcal{A}\mathcal{M}\mathcal{S}\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$ you can change the format with `\numberwithin{table}{section}`. In $\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$, use the `caption2` package to achieve similar results.

Page References

This example is pretty silly because one usually uses `\pageref` to reference pages prior to, or sometime after, the current page.

```
\documentclass{article}
\usepackage{graphicx}
\begin{document}
\begin{figure}
  \centering
  \includegraphics{clown}
  \caption{A jolly-sad clown.}\label{fig:1}
\end{figure}
You will need the file \texttt{clown.eps} to
include Figure~\ref{fig:1} on page~\pageref{fig:1}
in your document.
\end{document}
```

To see the true power of a page reference, I suggest that you put about 50 paragraphs of inane text between the figure environment and the sentence referencing the figure.