

CS3101

Lecture 3: Latex environments and packages

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Latex Environments

- ▶ General blueprints of \LaTeX markup is an **environment**.
- ▶ A \LaTeX environment has the following basic structure:

```
\begin{<environment>}      % Explicit start
%
% Content
%
\end{<environment>}        % Explicit end
```

- ▶ We have already seen examples with document:

```
\begin{document}
%
% Body
%
\end{document}
```

Now for many many examples

The equation Environment

- Displayed lines of math can be viewed as an environment.

The following

```
\begin{equation}
\sum_{n=1}^{\infty} \frac{1}{n^s}
= \prod_{p \text{ prime}} \frac{1}{1 - p^{-s}}
\end{equation}
```

produces

$$\sum_{n=1}^{\infty} \frac{1}{n^s} = \prod_{p \text{ prime}} \frac{1}{1 - p^{-s}} \quad (1)$$

Now for a slight distraction



Cross-referencing (detour)

$$\sum_{n=1}^{\infty} \frac{1}{n^s} = \prod_{p \text{ prime}} \frac{1}{1 - p^{-s}} \quad (2)$$

- ▶ Notice the number at the right side (It ChAnGeD!)
- ▶ Created with the equation environment.
- ▶ Like with citations and references, we can use that number to reference that equation elsewhere.

Labels and Refs (down the rabbit hole)

- ▶ We need to add a tag to our equation environment.
- ▶ Look for `\label{<tag>}`

Updated code:

```
\begin{equation}\label{Euler}
\sum_{n=1}^{\infty} \frac{1}{n^s}
= \prod_{p \text{ prime}} \frac{1}{1 - p^{-s}}
\end{equation}
```

Equation `\eqref{Euler}` is the Euler decomposition.

$$\sum_{n=1}^{\infty} \frac{1}{n^s} = \prod_{p \text{ prime}} \frac{1}{1 - p^{-s}} \quad (3)$$

Equation (3) is the Euler decomposition.

Refs and Erefs (almost out)

- ▶ We used `\eqref{<tag>}` which is special for equations.

This is an eqref `\eqref{Euler}`.

This is a ref `\ref{Euler}`.

This is an eqref (3). This is a ref 3.

- ▶ With the exception of equation-like environments, use `\ref{<tag>}`.
- ▶ We will see more examples!

The align environment

This uses the `amsmath` package we haven't discussed yet.

```
\begin{align}
&\sum_{n=1}^{\infty} \frac{1}{n^2} \\
&= 1 + \frac{1}{4} + \frac{1}{9} + \cdots \\
&= \frac{\pi^2}{6} .
\end{align}
```

$$\sum_{n=1}^{\infty} \frac{1}{n^2} = 1 + \frac{1}{4} + \frac{1}{9} + \cdots \quad (4)$$

$$= \frac{\pi^2}{6}. \quad (5)$$

- Lots to discuss. First, each line has a number.

```

\begin{align}
&\sum_{n=1}^{\infty} \frac{1}{n^2} \\
&= 1 + \frac{1}{4} + \frac{1}{9} + \cdots \\
&= \frac{\pi^2}{6} .
\end{align}

```

$$\sum_{n=1}^{\infty} \frac{1}{n^2} = 1 + \frac{1}{4} + \frac{1}{9} + \cdots \quad (6)$$

$$= \frac{\pi^2}{6}. \quad (7)$$

- ▶ Latex **aligns** based on the & symbol.
- ▶ New lines are created using \\
- ▶ To reference a specific line, put \label{<tag>} on that line.

- ▶ We can remove the numbers from the equation and align environments.
- ▶ Use environments `equation*` and `align*`.
- ▶ Often `*` is used to remove numbering.

```
\begin{align*}
&\sum_{n=1}^{\infty} \frac{1}{n^2} \\
&= 1 + \frac{1}{4} + \frac{1}{9} + \cdots \\
&= \frac{\pi^2}{6} .
\end{align*}
```

$$\sum_{n=1}^{\infty} \frac{1}{n^2} = 1 + \frac{1}{4} + \frac{1}{9} + \cdots$$

$$= \frac{\pi^2}{6}.$$