My Title

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University of Notre Dame du Lac

[2] Department of Theoretical Philosophy
University of E

Tuesday 21st February, 2017
Occasion

UNIVERSITY OF
NOTRE DAME
College of Science

Outline

1 Structure
    Features
    Processing
    Basics
    Color

2 Lists
    Uncovering Text
    Theorems/Proofs
    Handouts

3 Fancy Bits
    pstricks package
    Movies

Outline

Beamer
Features

This is a template and guide to `beamer` presentations.

- Process with either `pdflatex` or `latex+dvips`

- Standard LaTeX commands still work

- `tableofcontents` works

- Overlays & dynamic effects easily created

- Easy navigation through sections & subsections

- Many templates and examples included in package

- `article` style can be used to produce notes

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Processing

This document was processed with

- `latex` then
- dvips and
- ps2pdf

so as to allow use of the package `pstricks`.

This means that all graphics have to be eps files.

If processing fails, try deleting all aux files.

The alternative is to use pdflatex & pdf or jpg graphics

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Outline

Sample Code

```
\documentclass{beamer}
\usetheme{Frankfurt}
```
Use `\section{..}` and `\subsection{..}` to create items for the
Table of Contents

The code for a frame is ...

```
\subsection{Basics}
\begin{frame}
  \frametitle{Sample Code}
        Frame content
            .
\end{frame}
```

Outline

Coloring Text

This a 2–stage process

- Define the color
  \setbeamercolor{blue}{fg=blue!50}

- Use the colour
  {\usebeamercolor[fg]{blue} Some blue text}
  Some blue text

- or
  \newcommand{\green}[1]{\usebeamercolor[fg]{green}#1}
  \green{some green text}....some green text

alert<4>{Colors predefined in PSTRICKS}

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Structure
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Lists
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Fancy Bits
○○○○○○○

Summary

References

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Outline

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Uncovering Text
Subtitle: A Short Example

- Use `itemize` a lot–with `\pause`

- Use very short sentences or short phrases.

```
\begin{itemize}
\item
  Use \texttt{itemize} a lot--with \pause
\item
  Use very short sentences or short phrases.
\end{itemize}
```

Structure	Lists	Fancy Bits	Summary	References
00000000	0●00000000000000000	0000000		

Uncovering Text

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\item
  Use very short sentences or short phrases.
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Uncovering Text

Subtitle: A Longer Example

You can create overlays. . .

- using the \pause command:
  - First item. (\pause)
  - Second item.
- using overlay specifications:
  - First item. (\item<3->)
  - Second item.(\item<4>)
- using the general \uncover command:
  (\uncover<5->{\item First item...})
  - First item.
  - Second item.

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  - First item.
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Uncover & alert

- **Apple**
- Peach
- Plum
- Orange

```
\begin{itemize}[<+-| alert@+>]
    \item Apple
    \item Peach
    \item Plum
    \item Orange
\end{itemize}
```

Uncover & alert

- Apple
- Peach
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```
\begin{itemize}[<+-| alert@+>]
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Uncover & alert

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Structure
○○○○○○○○

Lists
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Fancy Bits
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Summary

References

Uncovering Text

Uncover & alert

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```
\begin{itemize}[<+-| alert@+>]
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    \item Peach
    \item Plum
    \item Orange
\end{itemize}
```

Uncovering Equations

$$A = B$$
$$= C$$
$$= D$$

```
\begin{align*}
A &=  \uncover<2->{B}\\
\uncover<2->{&=C\\}
\uncover<3->{&=D\\}
\end{align*}
```

Structure	Lists	Fancy Bits	Summary	References
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Uncovering Text

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\begin{align*}
A &=  \uncover<2->{B}\\
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\end{align*}
```

An example of replacement

This uses five overlays, each separate equations. . .

$$\frac{\mathrm{d}}{\mathrm{d}x}\frac{x+3}{(x-1)^2} =$$

alt is used to replace the first line and then visible, as opposed to uncover.

Alignment not ideal.

An example of replacement

This uses five overlays, each separate equations. . .

$$\frac{\mathrm{d}}{\mathrm{d}x}\frac{x+3}{(x-1)^2} = \frac{(x-1)^2 - 2(x+3)(x-1)}{(x-1)^4}$$

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$$= \frac{(x-1)((x-1) - 2(x+3))}{(x-1)^4}$$

$$= \frac{((x-1) - 2(x+3))}{(x-1)^3} = -\frac{x+7}{(x-1)^3}$$

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Alignment not ideal.

An example of `align` with replacement

Three overlays, . . .

$$left = \text{rhs } 1$$

```
\begin{align*}
   left&=\alt<1>{rhs1}{\text{alternate rhs}}\\
  \visible<3->{&=rhs3}
\end{align*}
```

Uses alt and visible, as opposed to uncover. Alignment spoiled because alternative is longer than original.

An example of `align` with replacement

Three overlays, ...

$$left = \text{alternate rhs}$$

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An example of `align` with replacement

Three overlays, . . .

$$\begin{aligned}
\textit{left} &= \text{alternate rhs} \\
&= \text{rhs 3}
\end{aligned}$$

```
\begin{align*}
   left&=\alt<1>{rhs1}{\text{alternate rhs}}\\
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An example of `align` with replacement

Use of phantom to add invisible text to 3rd overlay to ensure correct alignment when alt string is longest. . .

$$\text{left} = \text{rhs 1}$$

```
\begin{align*}
   \text{left}&=
        \alt<1>{\text{rhs 1}}{\text{alternate rhs 2}}\\
   \visible<3->
        {&=\text{rhs 3}\phantom{extra appended}}\\
\end{align*}
```

An example of `align` with replacement

Use of phantom to add invisible text to 3rd overlay to ensure correct alignment when alt string is longest...

$$\text{left} = \text{alternate rhs 2}$$

```
\begin{align*}
   \text{left}&=
        \alt<1>{\text{rhs 1}}{\text{alternate rhs 2}}\\
   \visible<3->
        {&=\text{rhs 3}\phantom{extra appended}}\\
\end{align*}
```

Structure	Lists	Fancy Bits	Summary	References
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Uncovering Text

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```

The `align` environment with replacement

$$\frac{\mathrm{d}}{\mathrm{d}x}\frac{x+3}{(x-1)^2} =$$

alt replaces the first line and then visible, as opposed to uncover. Alignment is fixed.

The align environment with replacement

$$\frac{\mathrm{d}}{\mathrm{d}x}\frac{x+3}{(x-1)^2} = \frac{(x-1)^2 - 2(x+3)(x-1)}{(x-1)^4}$$

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Structure
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Lists
00000000000000000000

Fancy Bits
00000000

Summary

References

Uncovering Text

Uncovering Rows

Class	A	B	C	D
X	1	2	3	4
Y	3	4	5	6
Z	5	6	7	8

```
\usepackage{colortbl}

\rowcolors[]{1}{blue!20}{red!10}
\begin{tabular}{l|{\vrule}cccc}\hline
Class & A &  B &  C &  D\\\hline
X & 1 &  2 &  3 &  4 \\\pause
Y & 3 &  4 &  5 &  6 \\\pause
Z &    5 &  6 & 7 &  8
\end{tabular}
```

Structure
○○○○○○○○

Lists
○○○○○○○○○○●○○○○○○○○

Fancy Bits
○○○○○○○

Summary

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X & 1 &  2 &  3 &  4 \\\pause
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Z &     5 &  6 &  7 &  8
\end{tabular}
```

Structure	Lists	Fancy Bits	Summary	References
○○○○○○○○	○○○○○○○○○○●○○○○○○○○	○○○○○○○		

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\end{tabular}
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Class & A &  B &  C &  D\\\hline
X & 1 &  2 &  3 &  4 \\\pause
Y & 3 &  4 &  5 &  6 \\\pause
Z &      5 &   6 &  7 &  8
\end{tabular}
```

Uncovering Columns

Class	A	B	C	D
X	1	2	3	4
Y	3	4	5	6
Z	5	6	7	8

```
\begin{tabular}%
  {l!{\vrule}c<{\onslide<2->}%
    c<{\onslide<3>}
    c<{\onslide<4->}c}
    ....
\end{tabular}
```

`c<{decl.}` inserts decl. right after the entry for the column.

Uncovering Columns

Class	A	B	C	D
X	1	2	3	4
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Z	5	6	7	8

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\begin{tabular}%
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\begin{tabular}%
  {l!{\vrule}c<{\onslide<2->}%
     c<{\onslide<3>}
     c<{\onslide<4->}c}
     ....
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```
\begin{tabular}%
  {l!{\vrule}c<{\onslide<2->}%
     c<{\onslide<3>}
     c<{\onslide<4->}c}
     ....
 \end{tabular}
```

`c<{decl.}` inserts decl. right after the entry for the column.

Uncovering Columns

Class	A	B	C	D
X	1	2	3	4
Y	3	4	5	6
Z	5	6	7	8

```
\begin{tabular}%
  {l!{\vrule}c<{\onslide<2->}%
     c<{\onslide<3>}
     c<{\onslide<4->}c}
     ....
 \end{tabular}
```

`c<{decl.}` inserts decl. right after the entry for the column.

Outline

1 Structure

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Movies

Theorem and Proof

Theorem

There is no largest prime number

Proof.

- Suppose p ... the largest prime

- Let q be the product of the first p numbers

- Then $q + 1$ is not divisible by any of them

- Thus $q + 1$ is a prime number larger than p.

Theorem and Proof

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Theorem and Proof

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□

Theorem and Proof-Code

```
\begin{theorem}
    There is no largest prime number
\end{theorem}

\begin{proof}
\begin{itemize}
\item Suppose $p$ were the largest prime\pause
\item Let $q$ be ... first $p$ numbers\pause
\item Then $q+1$ is not divisible ...\pause
\item Thus $q+1$ is a prime ... $p$.\pause
\end{itemize}
\end{proof}
```

Cantor's Theorem

Theorem

$\alpha < 2^{\alpha}$ *for all ordinals* α.

▶ Proof details

Outline

Printing slides for handouts

With the header
documentclass[t,handout]{beamer}

(i) the t option specifies vertically aligned top frames

(ii) all piecewise defined slides are aggregated into one.

(iii) \usepackage{enumerate}

```
...
\begin{enumerate}[<+->][(i)]
  \item the \texttt{\blue{t}} option specifies ....
  \item all piecewise defined ....
\end{enumerate}
```

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documentclass[t,handout]{beamer}

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Printing slides for handouts

With the header
documentclass[t,handout]{beamer}

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  \item the \texttt{\blue{t}} option specifies ....
  \item all piecewise defined ....
\end{enumerate}
```

Printing as article class

The header
documentclass{article}
and package
usepackage{beamerarticle}
cause the material to be typeset as a "normal" article—all frame references
are ignored.

Outline

1 **Structure**

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   Theorems/Proofs

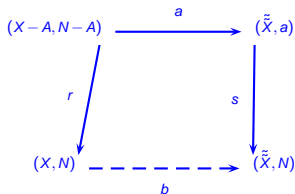   Handouts

3 **Fancy Bits**

   pstricks package

   Movies

Diagrams

A small diagram with a few lines of LaTeX. At the 2nd overlay we can add a link from one to another using PSTRICKS


```
\blue \rnode{START}{\textsc{PSTricks}}
...
  \visible<2>{\nccurve%
      [linecolor=red,angleA=270,angleB=300]{START}{c}}
```

Diagrams

A small diagram with a few lines of LaTeX. At the 2nd overlay we can add a link from one to another using PSTRICKS


```
\blue \rnode{START}{\textsc{PSTricks}}
...
  \visible<2>{\nccurve%
      [linecolor=red,angleA=270,angleB=300]{START}{c}}
```
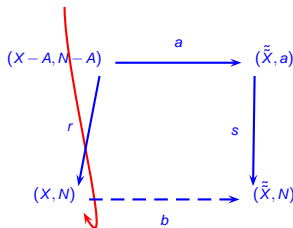
Householder formula

The Householder formula below lets one compute $f(x_*) = 0$ for an arbitrary f.

$$x_{k+1} \mapsto \Phi_n(x_k) = x_k + (n-1)\frac{\left(\frac{1}{f(x_k)}\right)^{n-2}}{\left(\frac{1}{f(x_k)}\right)^{n-1}} + f(x_k)^{n+1} \ \psi \tag{1}$$

Structure	Lists	Fancy Bits	Summary	References
○○○○○○○○	○○○○○○○○○○○○○○○○○○○	○○●○○○○		

pstricks package

Householder formula

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where $n \geq 2$ and ψ is an arbitrary function.

Structure
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Lists
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Fancy Bits
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Summary

References

pstricks package

Householder formula

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$$x_{k+1} \mapsto \Phi_n(x_k) = x_k + (n-1)\frac{\left(\frac{1}{f(x_k)}\right)^{n-2}}{\left(\frac{1}{f(x_k)}\right)^{n-1}} + f(x_k)^{n+1}\,\psi \qquad (1)$$

where $n \geq 2$ and ψ is an arbitrary function.

Formula (1) gives an iteration of order n converging towards x_* such that: $f(x_*) = 0$.

Structure
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Lists
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Fancy Bits
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Summary

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pstricks package

Some PSTRICKS

Any practical use for this?

Structure
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Lists
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Fancy Bits
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Summary

References

pstricks package

Some more PSTRICKS

or this ...


```
\pstextpath{\psccurve[linestyle=none]%
(.5,0)(3.5,1)(3.5,0)(.5,1)}%
{\blue ICMS--ICMS--ICMS--ICMS--ICMS--ICMS--%
ICMS--ICMS--ICMS--ICMS--ICM}
```

Outline

ND

1 **Structure**

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Structure	Lists	Fancy Bits	Summary	References
00000000	00000000000000000	0000000●		

Movies

Including Movies

ND

```
*in preamble -> \usepackage{movie9}
\includemedia[width=2.5in,height=1.75in,showcontrols,p
           {}{sample.mp4}
```

Link to movie

You can try to "embed" the movie with the example text above (Note: The
.mp4 file must still reside in the same folder as the pdf file), but referencing it
for the OS to play outside of the pdf reader will give the greatest compatibility.

Structure
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Lists
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Fancy Bits
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Summary

References

Summary

- The first main message of your talk in one or two lines.
- The second main message of your talk in one or two lines.
- Perhaps a third message, but not more than that.

- Outlook
  - Something you haven't solved[4].
  - Something else you haven't solved[5].

Summary

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Fancy Bits
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Summary

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Structure
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Lists
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Fancy Bits
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Summary

References

Thank you!

Questions?

Cantor's Theorem

Theorem

$\alpha < 2^\alpha$ *for all ordinals* α.

Proof.

As shown by Cantor... □