Beamer By Example

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Conferenceþ onþ Tastefulþ Presentations,þ 2008þ

Test de listing

Testþ deþ codeþ Pythonþ

```
1  #!/usr/bin/env python
2  import socket
3  import subprocess
4  import sys
5  from datetime import datetime

7  # Clear the screen
8  subprocess.call('clear', shell=True)

10 # Ask for input
11 remoteServer    = raw_input("Enter a remote host to scan
12 remoteServerIP  = socket.gethostbyname(remoteServer)

14 # Print a nice banner with information on which host we
15 print "-" * 60
16 print "Please wait, scanning remote host", remoteServerI
17 print "-" * 60
```

Outline

Outline

Outline

Beamer

Featuresþ

Writtenþ byþ Tillþ Tantauþ whileþ completingþ hisþ PhD.þ

- Processþ withþ eitherþ `pdflatex` orþ `latex+dvips`

Beamer

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- `tableofcontents` works
- Overlays & dynamic effects easily created

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- `tableofcontents` works
- Overlays & dynamic effects easily created
- Easy navigation through sections & subsections

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- Standard LaTeX commands still work
- `tableofcontents` works
- Overlays & dynamic effects easily created
- Easy navigation through sections & subsections
- Many templates and examples included in package

Beamer

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- 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

Processing

This document was processed with

- `latex`

Processing

This document was processed with

- `latex` then
- dvips

Processing

This document was processed with

- `latex` then
- dvips and
- ps2pdf

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

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This means that all graphics have to be `eps` files.

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- dvips and
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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.

Processing

Thisþ documentþ wasþ processedþ withþ

- `latex` thenþ
- dvipsþ andþ
- ps2pdfþ

soþ asþ toþ allowþ useþ ofþ theþ packageþ `pstricks`.þ
Thisþ meansþ thatþ allþ graphicsþ haveþ toþ beþ `eps` files.þ
Ifþ processingþ fails,þ tryþ deletingþ allþ auxþ files.þ
Theþ alternativeþ isþ toþ useþ pdflatexþ &þ pdfþ orþ jpgþ graphicsþ

Colouring Text

Thisþ aþ 2-stageþ processþ

- Defineþ theþ colourþ
  `\setbeamercolor{blue}{fg=blue!50}`

Colouring Text

This a 2-stage process

- Define the colour

```
\setbeamercolor{blue}{fg=blue!50}
```

- Use the colour

```
{\usebeamercolor[fg]{blue} Some blue text}
```

Some blue text

Colouring Text

Thisþ aþ 2-stageþ processþ

- Defineþ theþ colourþ
  `\setbeamercolor{blue}{fg=blue!50}`
- Useþ theþ colourþ
  `{\usebeamercolor[fg]{blue} Some blue text}`
  Someþ blueþ textþ
- orþ `\newcommand{\green}[1]{\usebeamercolor[fg]{green}#1}`
  `\green{some green text}`....someþ greenþ textþ

`\alert<4>{Colours predefined in pstricks}`

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Uncovering Text

Subtitle: A Short Example

- Use `itemize` a lot with `\pause`

Uncovering Text

Subtitle:þ Aþ Shortþ Exampleþ

- Useþ `itemize` aþ lot–withþ `\pause`
- Useþ veryþ shortþ sentencesþ orþ shortþ phrases.þ

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

Uncovering Text

Subtitle:þ Aþ Longerþ Exampleþ

Youþ canþ createþ overlays.þ.þ.þ

- usingþ theþ \pause command:þ
  - Firstþ item.þ (þ\pause)þ

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  - Secondþ item.þ
- usingþ overlayþ specifications:þ

- usingþ theþ generalþ `\uncover` command:þ (þ`\uncover<5->{\item First item...}`)þ

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- usingþ overlayþ specifications:þ
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  - Secondþ item.(þ`\item<4>`)þ
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  - Firstþ item.þ
  - Secondþ item.þ

Uncover & alert

- Apple
- Peach
- Plum
- Orange

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

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\end{itemize}
```

Uncovering Equations

$$\mathrm{A} =$$

Uncovering Equations

$$A = B$$

Uncovering Equations

$$\begin{aligned} \mathrm{A} &= \mathrm{B} \\ &= \mathrm{C} \end{aligned}$$

Uncovering Equations

$$\begin{aligned} A &= B \\ &= C \\ &= D \end{aligned}$$

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

An example of replacement

Thisþ usesþ fiveþ overlays,þ eachþ separateþ equations.þ.þ.þ

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

Alignmentþ notþ ideal.þ

An example of replacement

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

\altþ isþ usedþ toþ replaceþ theþ firstþ lineþ

Alignmentþ notþ

ideal.þ

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This uses five overlays, each separate equations...

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

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

and then \visible, as opposed to \uncover. Alignment not ideal.

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This uses five overlays, each separate equations. . .

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

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

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

Alignment not ideal.

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

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Alignment not ideal.

An example of align with replacement

Threeþ overlays,þ .þ.þ.þ

$$left = \text{rhs}\text{þ } \texttt{l}\text{þ}$$

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

An example of align with replacement

Threeþ overlays,þ .þ.þ.þ

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

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Threeþ overlays,þ .þ.þ.þ

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

```
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Usesþ \altþ andþ \visible,þ asþ opposedþ toþ \uncover.þ

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```

Usesþ \altþ andþ \visible,þ asþ opposedþ toþ \uncover.þ Alignmentþ spoiledþ becauseþ alternativeþ isþ longerþ thanþ original.þ

An example of align with replacement

Useþ ofþ \phantomþ toþ addþ invisibleþ textþ toþ 3rdþ overlayþ toþ ensureþ correctþ alignmentþ whenþ \altþ stringþ isþ longest.þ.þ.þ

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

```
\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

Useþ ofþ \phantomþ toþ addþ invisibleþ textþ toþ 3rdþ overlayþ toþ ensureþ correctþ alignmentþ whenþ \altþ stringþ isþ longest.þ.þ.þ

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

```
\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

Useþ ofþ \phantomþ toþ addþ invisibleþ textþ toþ 3rdþ overlayþ toþ ensureþ correctþ alignmentþ whenþ \altþ stringþ isþ longest.þ.þ.þ

$$\begin{aligned} \text{left} &= \text{alternate rhs 2} \\ &= \text{rhs 3} \end{aligned}$$

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

The align environment with replacement

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

.þ

The align environment with replacement

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

\altþ replacesþ theþ firstþ lineþ
.þ

The align environment with replacement

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

\alt␣ replaces␣ the␣ first␣ line␣ and␣ then␣ \visible,␣ as␣ opposed␣ to␣ \uncover␣.␣

The align environment with replacement

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

\alt␣ replaces␣ the␣ first␣ line␣ and␣ then␣ \visible,␣ as␣ opposed␣ to␣ \uncover␣.␣

The align environment with replacement

$$\begin{aligned}
\frac{\mathrm{d}}{\mathrm{d}x}\frac{x+3}{(x-1)^2} &= \frac{(x-1)^2-2(x+3)(x-1)}{(x-1)^4} \\
&= \frac{(x-1)^2-2(x+3)(x-1)}{(x-1)^4} \\
&= \frac{(x-1)((x-1)-2(x+3))}{(x-1)^4} \\
&= \frac{((x-1)-2(x+3))}{(x-1)^3} = -\frac{x+7}{(x-1)^3}
\end{aligned}$$

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

Uncovering Rows

[]1blue!20red!10þ

Classþ	Aþ	Bþ	Cþ	Dþ
Xþ	1þ	2þ	3þ	4þ

Uncovering Rows

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Classþ	Aþ	Bþ	Cþ	Dþ
Xþ	1þ	2þ	3þ	4þ
Yþ	3þ	4þ	5þ	6þ

Uncovering Rows

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Classþ	Aþ	Bþ	Cþ	Dþ
Xþ	1þ	2þ	3þ	4þ
Yþ	3þ	4þ	5þ	6þ
Zþ	5þ	6þ	7þ	8þ

Uncovering Rows

```
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```

Classþ	Aþ	Bþ	Cþ	Dþ
Xþ	1þ	2þ	3þ	4þ
Yþ	3þ	4þ	5þ	6þ
Zþ	5þ	6þ	7þ	8þ

```
\usepackage{colortbl}
```

Uncovering Rows

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Classþ	Aþ	Bþ	Cþ	Dþ
Xþ	1þ	2þ	3þ	4þ
Yþ	3þ	4þ	5þ	6þ
Zþ	5þ	6þ	7þ	8þ

```
\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}
```

Uncovering Columns

Class | A

[]1blue!20red!10

Uncovering Columns

[]1blue!20red!10þ

Classþ	Aþ	Bþ
		2þ
		4þ
		6þ

Uncovering Columns

[]1blue!20red!10þ

Classþ	Aþ	Bþ	Cþ
		2þ	3þ
		4þ	5þ
		6þ	7þ

Uncovering Columns

[]1blue!20red!10þ

Classþ	Aþ	Bþ	Dþ
		2þ	4þ
		4þ	6þ
		6þ	8þ

Uncovering Columns

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Xþ	1þ	2þ	4þ
Yþ	3þ	4þ	6þ
Zþ	5þ	6þ	8þ

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

c<{decl.} insertsþ decl.þ rightþ afterþ theþ entryþ forþ theþ column.þ

Theorem and Proof

Theoremþ

Thereþ isþ noþ largestþ primeþ numberþ

Démonstration.þ

- Supposeþ p ...þ theþ largestþ primeþ

Theorem and Proof

Theoremþ

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- Supposeþ p ...þ theþ largestþ primeþ
- Letþ q beþ theþ productþ ofþ theþ firstþ p numbersþ

Theorem and Proof

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Thereþ isþ noþ largestþ primeþ numberþ

Démonstration.þ

- Supposeþ p ...þ theþ largestþ primeþ
- Letþ q beþ theþ productþ ofþ theþ firstþ p numbersþ
- Thenþ $q + 1$ isþ notþ divisibleþ byþ anyþ ofþ themþ

Theorem and Proof

Theorem

There is no largest prime number

Démonstration.

- 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

Theorem

There is no largest prime number

Démonstration.

- 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-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

Printing slides for handouts

Withþ theþ headerþ
\documentclass[t,handout]{beamer}þ

(i)þ theþ t optionþ specifiesþ verticallyþ alignedþ topþ framesþ

Printing slides for handouts

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\documentclass[t,handout]{beamer}þ

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(ii)þ allþ piecewiseþ definedþ slidesþ areþ aggregatedþ intoþ one.þ

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\documentclass[t,handout]{beamer}þ

(i)þ theþ t optionþ specifiesþ verticallyþ alignedþ topþ framesþ

(ii)þ allþ piecewiseþ definedþ slidesþ areþ aggregatedþ intoþ one.þ

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

Printing as article class

Theþ headerþ
\documentclass{article}þ
andþ packageþ
\usepackage{beamerarticle}þ
causeþ theþ materialþ toþ beþ typesetþ asþ aþ “normal”þ
article—allþ frameþ referencesþ areþ ignored.þ

Graphics & Text Side by Side

```
\begin{columns}[b]
 \begin{column}{.25\textwidth}
      \includegraphics[width=1.3in]%
           {FILE.epsc}
 \end{column}
  \begin{column}{.75\textwidth}
      text column
  \end{column}
\end{columns}
```

Graphics & Text Side by Side

```
\begin{columns}[b]
 \begin{column}{.25\textwidth}
      \includegraphics[width=1.3in]%
           {FILE.epsc}
 \end{column}
  \begin{column}{.75\textwidth}
       text column
  \end{column}
\end{columns}
```

Graphics & Text Side by Side

```
\begin{columns}[b]
 \begin{column}{.25\textwidth}
      \includegraphics[width=1.3in]%
           {FILE.epsc}
 \end{column}
  \begin{column}{.75\textwidth}
       text column
  \end{column}
\end{columns}
```

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[We actually use semiverbatim & incremental alerts.]

Householder formula

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

$$x_{k+1} \mapsto \Phi_n(x_k) = x_k + (n-1) \frac{\left(\frac{1}{f(x_k)}\right)^{n-2}}{\left(\frac{1}{f(x_k)}\right)^{n-1}} + f(x_k)^{n+1} \mathrm{NA}[linecolor = red$$

(1)

Householder formula

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(1þ)þ

whereþ $n \geqslant 2$ andþ NBþψ isþ anþ arbitraryþ function.þ [linecolor=red,angleA=90,angleB=270]->NBNAþ

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(1)

where $n \geqslant 2$ and NBψ is an arbitrary function.
[linecolor=red,angleA=90,angleB=270]->NBNA
Formula (1) gives an iteration of order n converging towards x_* such that: $f(x_*) = 0$.

Summary

- Theþ firstþ mainþ messageþ ofþ yourþ talkþ inþ oneþ orþ twoþ lines.þ

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- Outlookþ
  - Somethingþ youþ haven'tþ solved.þ
  - Somethingþ elseþ youþ haven'tþ solved.þ

Cantor's Theorem

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

Démonstration. As shown by Cantor...

Return

For Further Reading I

Dþ Fþ Griffithsþ &þ Dþ Jþ Higham.þ
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