Generating PDF Files with Mathematical Content

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PDF Documents

- **P**ortable **D**ocument **F**ormat
- Portability across platforms
- Free `Acrobat Reader`
- Web standard

Generating PDF Files

- Acrobat Distiller
- National Library of Medicine's `DocMorph`
- pdfLaTeX and associated tools

Mathematical Content

- Equation Editor
- TEX and LATEX
- Geometer's Sketchpad, Maple, Mathematica, etc.

Goals and Experience

- Platform independent
  - HTML
  - PDF
  - No reliance on proprietary document formats
- Convert 200+ existing pages of LaTeX documents
- Create new documents with hyperlinks
- Create documents for overhead presentations
- Package C++ source code

Creating web-enabled documents

- We wanted a TEX-based approach
  - Fine control of typesetting
  - Utilize existing TEX documents
  - Use in other courses
- We wanted to spend little or no money
- Utilize public domain resources

xfig	Gimp	
FoilTEX	PPower4	hyperref
pdfLATEX	TEX4ht	

Desired Computing Environment

- Portable
- Economical
- Consistent
- Highly available
- Up-to-date

Computing Environment

- Linux server—OM 3041 closet
- Linux workstations—OM 3041 lab
- Student accounts/files on server
- Remote access via Lumpkin, SSB, dorms (via Xvnc)
- Total software costs: $< \$1$/workstation

Mathematical Examples

Superscripts and Subscripts

x^{2y}, x_{2y}, x^{y^2}, x_a^y, and $2^{2^{2^n}}$

```
\begin{center}
$x^{2y}$,
$x_{2y}$,
$x^{^2y}$,
$x^{y}_{a}$, and
$2^{2^{2^n}}$
\end{center}
```

Limits and Special Symbols

l'Hôpital's rule: if f and g are differentiable, $\lim_{x\rightarrow\infty} f(x) = \infty$, and $\lim_{x\rightarrow\infty} g(x) = \infty$, then $\lim_{x\rightarrow\infty} \frac{f(x)}{g(x)} = \lim_{x\rightarrow\infty} \frac{f'(x)}{g'(x)}$.

```
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$\lim_{x \rightarrow \infty}g(x) = \infty$, then
$\lim_{x \rightarrow \infty}\frac{f(x)}{g(x)} =
 \lim_{x \rightarrow \infty}\frac{f'(x)}{g'(x)}$.
\end{center}
```

Summations

This summation can be imbedded $\forall x \ne 1, \sum_{i=0}^{n} x^i = \frac{x^{n+1}-1}{x-1}$ in text.
The following summation will be centered on its own line:

$$\forall x \ne 1, \sum_{i=0}^{n} x^i = \frac{x^{n+1} - 1}{x - 1}.$$

```
This summation can be imbedded
$\forall x \ne 1, \sum_{i=0}^{n} x^i
  = \frac{x^{n+1} - 1}{x-1}$ in text.\\
The following summation will be centered on its own line:
\[ \forall x \ne 1, \sum_{i=0}^{n} x^i
  = \frac{x^{n+1} - 1}{x-1}. \]
```

Radicals

This radical can be imbedded $rx^2 + sx + t = 0 \Longrightarrow x = \frac{-2 \pm \sqrt{s^2-4rt}}{2r}$ in text.

The following radical will be centered on its own line:

$$rx^2 + sx + t = 0 \Longrightarrow x = \frac{-2 \pm \sqrt{s^2 - 4rt}}{2r}$$

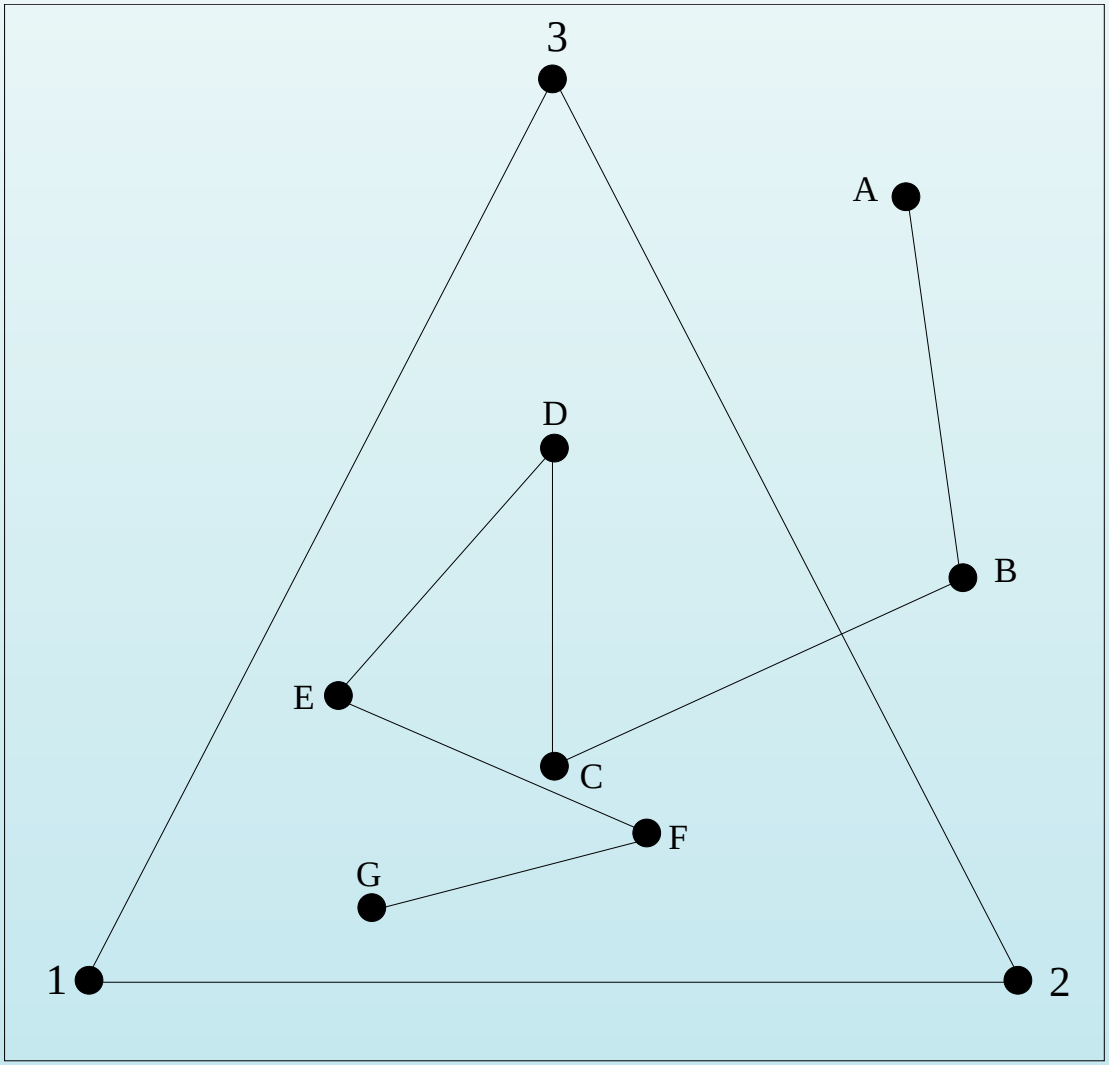
```
This radical can be imbedded
$rx^2 + sx + t = 0 \Longrightarrow
x = \frac{-2 \pm \sqrt{s^2-4rt}}{2r}$ in text.\\
The following radical will be centered on its own line:
\[ rx^2 + sx + t = 0 \Longrightarrow
   x = \frac{-2 \pm \sqrt{s^2-4rt}}{2r} \]
```

Aligned Formulas

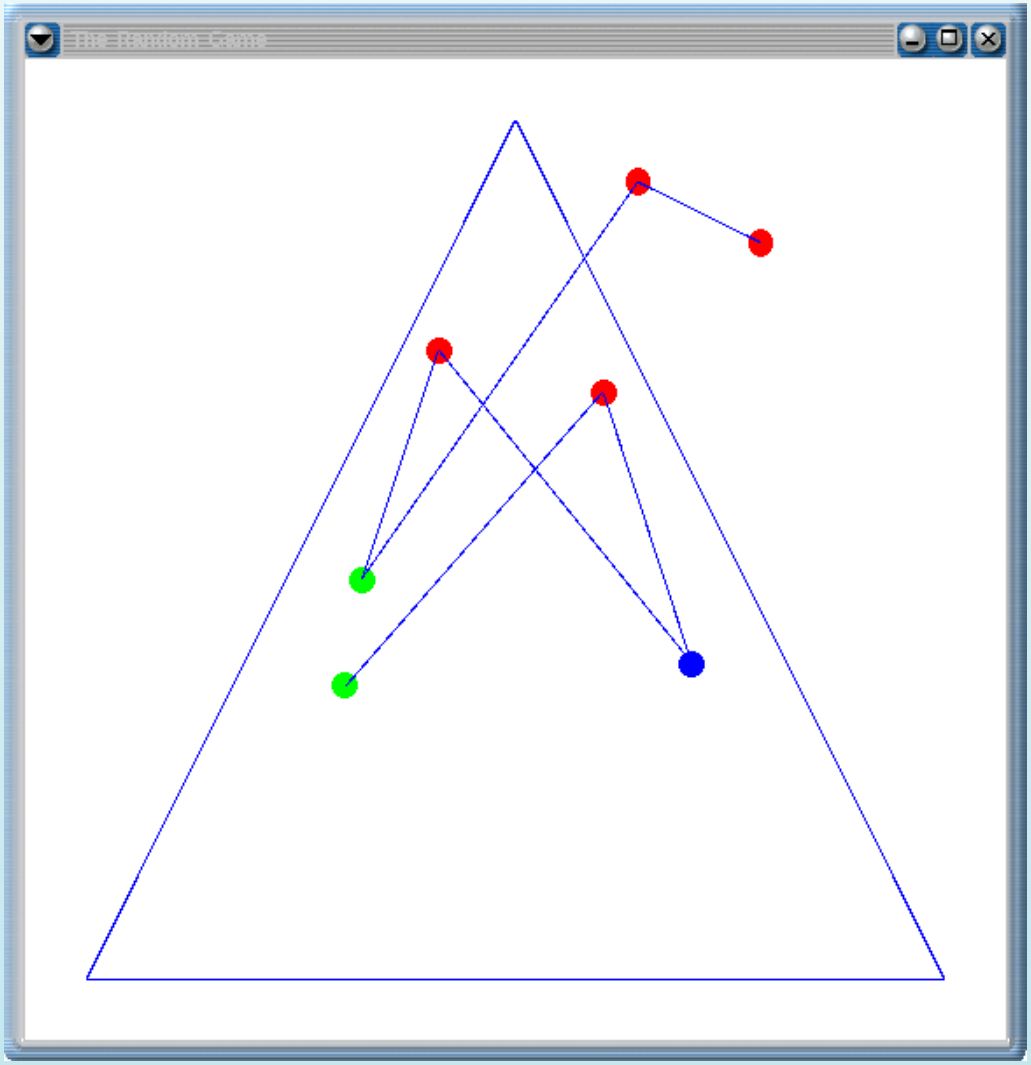
$$x = \begin{cases} y & \text{if } y > 0 \\ z + y & \text{otherwise} \end{cases}$$

```
\[ x = \left\{ \begin{array}{ll}
                y   & \mbox{if $y>0$} \\
                z+y & \mbox{otherwise}
                \end{array}
       \right.   \]
```

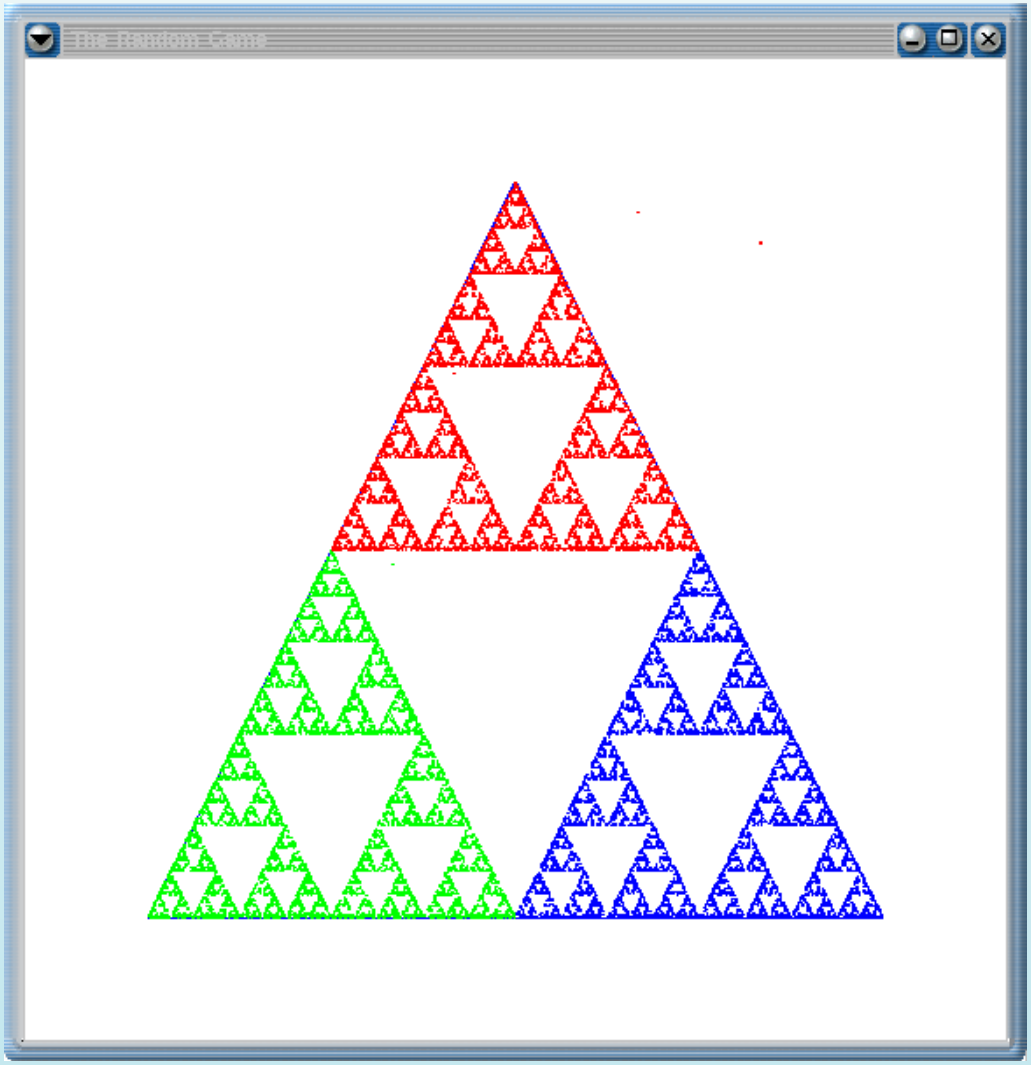
Chaos Game – Drawn with xfig



Chaos Game – Screenshot with gimp



Chaos Game – Another screenshot



Helpful URLs

- TEX Users Group: `www.tug.org`
- TEXLive: `www.tug.org/tex-live.html`
- MikTEX: `www.miktex.org`
- OzTEX: `www.trevorrow.com/oztex`
- Editor: `www.winedt.com`
- `DocMorph: DocMorph.nlm.nih.gov/docmorph`