Introduction to Scientific Typesetting
Lesson 14: Fonts

Ryan Higginbottom

January 24, 2012

An Overview

An Overview
Font Characteristics
Using Fonts in Text
Fonts in Math
Font Support

Font Characteristics

Using Fonts in Text

Fonts in Math

Font Support

An Overview

Font Characteristics

Monospaced and Proportional

Serifed and sans serif fonts

Attributes of Font Families

Font Encoding

Using Fonts in Text

Fonts in Math

Font Support

Font Characteristics

Monospaced and Proportional

An Overview

Font Characteristics

Monospaced and Proportional

Serifed and sans serif fonts

Attributes of Font Families

Font Encoding

Using Fonts in Text

Fonts in Math

Font Support

Fonts can be either monospaced or proportionally spaced. Notice the difference:

`mmmmiiii`	`monospaced`
mmmmiiii	proportionally spaced

- You will use proportionally spaced fonts most of the time.
- Monospace fonts have their uses, such as typing computer code.

Serifed and sans serif fonts

An Overview
Font Characteristics
Monospaced and Proportional
Serifed and sans serif fonts
Attributes of Font Families
Font Encoding
Using Fonts in Text
Fonts in Math
Font Support

Another way to classify fonts: the presence/absence of *serifs*.

serif: tiny strokes at the extremities of character shapes

- Serifed fonts generally used for long texts; thought to be more readable;
- Sans serif fonts occasionally used for titles/presentations.

To see the difference, open the first example file (`.tex`).

Build and view.

Attributes of Font Families

An Overview
Font Characteristics
Monospaced and Proportional
Serifed and sans serif fonts
Attributes of Font Families
Font Encoding
Using Fonts in Text
Fonts in Math
Font Support

Ways to refer to a font family:

- **shape** — upright, *italic*, *slanted*; variant: SMALL CAPS;
- **weight and width**
  - *weight* — light, medium, bold
  - *width* — condensed, medium, extended
- **size** — measured in `pt`, 72.29 per inch
  - familiar LaTeX size commands

Font Encoding

An Overview
Font Characteristics
Monospaced and Proportional
Serifed and sans serif fonts
Attributes of Font Families
Font Encoding
Using Fonts in Text
Fonts in Math
Font Support

Font Encoding often deals with the ability to type in a foreign language. Here are the two most common encodings.

- OT1 — this is the standard, the encoding for the default font in LaTeX
- T1 — more modern encoding, what we will use most frequently

An Overview
Font Characteristics
Using Fonts in Text
Commands and Declarations
Main Font Families
Italics vs Slanted
Fonts in Math
Font Support

Using Fonts in Text

Commands and Declarations

An Overview
Font Characteristics
Using Fonts in Text
Commands and Declarations
Main Font Families
Italics vs Slanted
Fonts in Math
Font Support

There are two main ways to change the *main font* or *normal font* of the document.

- **Commands** — such as `\textbf{}`; good for changing the appearance of small portions of text; cannot have paragraph breaks in this command
- **Declarations** — such as `\bfseries`; changes document from this point forward (until end of current group of braces or environment)
  - also available: `\begin{bfseries}`

We covered the list of commands and declarations earlier in the course.

Main Font Families

An Overview
Font Characteristics
Using Fonts in Text
Commands and Declarations
Main Font Families
Italics vs Slanted
Fonts in Math
Font Support

LaTeX keeps three font families loaded so you can refer to them easily: serifed font, sans serif font, typewriter font.

LaTeX's defaults:

- serifed — Computer Modern Roman
- sans serif — Computer Modern Sans
- typewriter — Computer Modern Typewriter

Italics vs Slanted

An Overview
Font Characteristics
Using Fonts in Text
Commands and Declarations
Main Font Families
Italics vs Slanted
Fonts in Math
Font Support

Two of the shapes available in LaTeX are italics and slanted type, called by `\textit{}` and `\textsl{}`. To see the difference, look at the second section of the first example file. (Uncomment the second section of the `.tex` file; build and view.)

- There are two different shapes for the letters in these two fonts.
  - Slanted letters are usually just upright letters rotated a bit.
  - Italicized letters are different altogether.
- Slanted letters are usually just for sans serif font, but Computer Modern Roman contains both.

An Overview
Font Characteristics
Using Fonts in Text
Fonts in Math
Math Alphabets
Math Versions
Font Support

Fonts in Math

Math Alphabets

An Overview
Font Characteristics
Using Fonts in Text
Fonts in Math
Math Alphabets
Math Versions
Font Support

There are a number of commands to change the look of a small group of letters in math.

Command	Appearance
`\mathcal`	$\mathcal{A}$
`\mathrm`	$\mathrm{f(x)}$
`\mathbf`	$\mathbf{f(x)}$
`\mathsf`	$\mathsf{f(x)}$
`\mathtt`	$\mathtt{f(x)}$
`\mathnormal`	$\mathnormal{f(x)}$
`\mathit`	$\mathit{f(x)}$

Compare to: $f(x)$.

Math Versions

An Overview
Font Characteristics
Using Fonts in Text
Fonts in Math
Math Alphabets
Math Versions
Font Support

There is one other way to change a math formula entirely. Use the command `\mathversion{bold}`. (`\mathversion{normal}` is default.)

Notice the difference:

$$\sum_{i=1}^{n} i = \frac{n(n+1)}{2}$$

$$\sum_{\boldsymbol{i=1}}^{\boldsymbol{n}} \boldsymbol{i} = \frac{\boldsymbol{n(n+1)}}{\boldsymbol{2}}$$

An Overview
Font Characteristics
Using Fonts in Text
Fonts in Math
Font Support
Computer Modern
`fontenc` and `lmodern`
Postscript Fonts
An Example
Changing Fonts
Changing Font Size
Back to the Example
Two Notes
Fonts for Math
More Fonts for Math
Practice

Font Support

Computer Modern

An Overview
Font Characteristics
Using Fonts in Text
Fonts in Math
Font Support
Computer Modern
fontenc and lmodern
Postscript Fonts
An Example
Changing Fonts
Changing Font Size
Back to the Example
Two Notes
Fonts for Math
More Fonts for Math
Practice

Computer Modern fonts were the ones that Donald Knuth originally designed. They are the standard fonts on every LaTeX system.

Included:

Computer Modern

Computer Modern Fibonacci

Computer Modern Funny Roman

Computer Modern Dunhill

Documentation for fonts I posted:

- A short PDF I threw together: `font-doc.pdf`
- Longer PDF documentation which comes with LaTeX: `using-fonts.pdf`

fontenc and lmodern

An Overview
Font Characteristics
Using Fonts in Text
Fonts in Math
Font Support
Computer Modern
fontenc and lmodern
Postscript Fonts
An Example
Changing Fonts
Changing Font Size
Back to the Example
Two Notes
Fonts for Math
More Fonts for Math
Practice

For most of the rest of these fonts, you should have the line

```
\usepackage[T1]{fontenc}
```

in your preamble.

The Latin Modern fonts are an effort to consolidate the Computer Modern fonts into one seamless package. Work is ongoing, but you can use them now by placing this in your preamble:

```
\usepackage{lmodern}
\usepackage[T1]{fontenc}
```

Postscript Fonts

An Overview
Font Characteristics
Using Fonts in Text
Fonts in Math
Font Support
Computer Modern
fontenc and lmodern
Postscript Fonts
An Example
Changing Fonts
Changing Font Size
Back to the Example
Two Notes
Fonts for Math
More Fonts for Math
Practice

There are 10 fonts that are built into Ghostscript (our PS interpreter) and every postscript printer. With all of the variations, this gives about 35 fonts that are available.

See `font-doc.pdf`, Table 1.

The way to use these fonts is (for example): `\usepackage{bookman}` in the preamble.

Notice that only two of these (plus the default) have support for a math language.

There is a fundamental difference between postscript and non-postscript fonts!

An Example

An Overview
Font Characteristics
Using Fonts in Text
Fonts in Math
Font Support
Computer Modern
fontenc and lmodern
Postscript Fonts
An Example
Changing Fonts
Changing Font Size
Back to the Example
Two Notes
Fonts for Math
More Fonts for Math
Practice

Open the second example file (`.tex`); build and view.

There is also a list of sample text for several fonts together on pages 3–4 of `font-doc.pdf`.

Changing Fonts

An Overview
Font Characteristics
Using Fonts in Text
Fonts in Math
Font Support
Computer Modern
fontenc and lmodern
Postscript Fonts
An Example
Changing Fonts
Changing Font Size
Back to the Example
Two Notes
Fonts for Math
More Fonts for Math
Practice

There is a very useful command allowing you to change fonts mid-document:

```
\usefont{enc}{fam}{ser}{shp}
```

- `enc` — the font encoding; usually `T1`;
- `fam` — the font family; see Tables 3 and 4 on `font-doc.pdf`;
- `ser` — the font series;
- `shp` — the font shape;

Go back to the previous example file and uncomment the second section. Build and view.

Changing Font Size

An Overview

Font Characteristics

Using Fonts in Text

Fonts in Math

Font Support

- Computer Modern
- `fontenc` and `lmodern`
- Postscript Fonts
- An Example
- Changing Fonts
- Changing Font Size
- Back to the Example
- Two Notes
- Fonts for Math
- More Fonts for Math
- Practice

For Postscript fonts, you can set the size whenever you wish.

The command is `\fontsize{size}{leading}`. (I think this has to be paired with a `\usefont` command.)

The *leading* is (roughly) the amount of space between lines of text.

Font	Size	Leading
Times	10	12
Palatino	10	11.5
New Cent.	10	12.5
Bookman	10	12
Helvetica	10	13
Avant Garde	9	13
Courier	10	12
Zapf Chanc.	10	12
Utopia	10	12.5
Charter	10	12.4

Suggested size and leading for standard postscript fonts.

Back to the Example

An Overview
Font Characteristics
Using Fonts in Text
Fonts in Math
Font Support
Computer Modern
`fontenc` and `lmodern`
Postscript Fonts
An Example
Changing Fonts
Changing Font Size
Back to the Example
Two Notes
Fonts for Math
More Fonts for Math
Practice

Uncomment the third section of our previous example file.

Build and view.

Two Notes

An Overview
Font Characteristics
Using Fonts in Text
Fonts in Math
Font Support
Computer Modern
fontenc and lmodern
Postscript Fonts
An Example
Changing Fonts
Changing Font Size
Back to the Example
Two Notes
Fonts for Math
More Fonts for Math
Practice

Two things.

1. Packages like `helvet` or `avant` change the default sans serif typeface but do not change the default document font. In order to use this sans serif font as the new default for your document, place this in the preamble:
   `\renewcommand\familydefault{\sfdefault}`

   Take a look at the third example file (`.tex`).

2. Use commands like `\usefont` and `\fontsize` sparingly. One good place to use them is in titles. Changing the font or its size frequently is not visually pleasing.

Fonts for Math

An Overview
Font Characteristics
Using Fonts in Text
Fonts in Math
Font Support
Computer Modern
fontenc and lmodern
Postscript Fonts
An Example
Changing Fonts
Changing Font Size
Back to the Example
Two Notes
Fonts for Math
More Fonts for Math
Practice

Here is a list of the fonts that have math support. All of these are packages that would be loaded in the preamble.

1. `mathptmx` — Times Roman in math and text;
2. `mathpazo` — Palatino in math and text ;
3. `ccfonts` — Concrete fonts in math and text;
   - default size/leading is 10/13;
4. `cmbright` — Computer Modern Bright fonts;
   - recommend use of `T1` option with `fontenc`;

More Fonts for Math

An Overview
Font Characteristics
Using Fonts in Text
Fonts in Math
Font Support
Computer Modern
fontenc and lmodern
Postscript Fonts
An Example
Changing Fonts
Changing Font Size
Back to the Example
Two Notes
Fonts for Math
More Fonts for Math
Practice

5. `txfonts` — version of Times Roman in math and text; more symbols available than in `mathptmx`; rare spacing problems in formulas; recommend use of `T1` option with `fontenc`;

6. `pxfonts` — version of Palatino in math and text; rare spacing problems in formulas; recommend use of `T1` option with `fontenc`;

7. `fourier` — based on Utopia

8. `kpfonts` — not drastically different from Computer Modern; symbols differ more

An Overview
Font Characteristics
Using Fonts in Text
Fonts in Math
Font Support
Computer Modern
`fontenc` and `lmodern`
Postscript Fonts
An Example
Changing Fonts
Changing Font Size
Back to the Example
Two Notes
Fonts for Math
More Fonts for Math
Practice

Let’s practice!

Open the fourth example file (`.pdf`) and reproduce it.