

# Using the Source of “Introduction to Methods of Applied Mathematics”

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## 1 Open Source Text

My applied math text is *open source*. All of the source used in the creation of the text is available for download. The  $\text{\LaTeX}$  source which comprises the text, the *Mathematica* notebooks and *xfig* files used to make the graphics, etc. are all available. I hope this will save instructors time, as they will be able to cut and paste portions of the text to make problem sets, handouts and slides.

## 2 Downloading

You can obtain the source (as well as the compiled *PDF* and *postscript* files) from my homepage: <http://www.its.caltech.edu/~sean>. Follow the *Publications* link, then the *Applied Math Textbook* link and finally the *Unabridged version* link. Save either the zip archive or the gzip archive to your computer. On linux systems, you can unpack the zip archive with:

```
unzip applied_math_source.zip
```

or unpack the gzip archive with:

```
gunzip applied_math_source.tar.gz  
tar xvf applied_math_source.tar
```

This will create the directory `applied_math`.

## 3 Operating Systems

One can install  $\text{\TeX}$  and  $\text{\LaTeX}$  on almost any operating system. However, I only have experience with using  $\text{\LaTeX}$  on Linux systems and some of the advise in this article is specific to Linux (or Unix) systems.

## 4 Layout

Each part of the text has a top-level directory.

`preface` Preface  
`algebra` Algebra  
`calculus` Calculus  
`fcv` Functions of a Complex Variable  
`ode` Ordinary Differential Equations  
`pde` Partial Differential Equations  
`cv` Calculus of Variations  
`nde` Nonlinear Differential Equations  
`appendix` Appendices

These directories have subdirectories for each chapter. Each chapter directory has a file with a `.tex` extension which contains the  $\text{\LaTeX}$  source for that chapter.  $\text{\LaTeX}$  files in the root directory include the sources in the chapters to make the various versions of the text. Each chapter directory also contains the graphics for that chapter. Each graphic is supplied in PDF format (with a `.pdf` extension) and in encapsulated postscript format<sup>1</sup> (with a `.eps` extension). This allows one to compile the source into either PDF or DVI formats. (The DVI format can be converted to postscript with the `dvips` program.) The files used to make the graphics are included as well. Most of the graphics are made with Mathematica (`.nb`) or `xfig` (`.fig`).

In the root directory `header.tex` contains includes, macros and definitions that are used throughout the source. (I have tried to use few custom definitions in order to make cutting and pasting easier.) Have a look at this file if you cut and past the source to make new documents. You will probably want to include this file (or a modified version of it) in your source.

## 5 Compiling

In the top level directory there is the make file `Makefile`. Executing

`make`

will build the postscript, the PDF letter and the PDF screen versions of the text. If you only want to build one of these choose from the following commands:

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<sup>1</sup>You can convert encapsulated postscript files to PDF format with `epstopdf`.

```
make ps
make pdf
make online
```

Use `make users_guide` to make this document.

The text may exceed the default capacities of the `latex` and/or `pdflatex`. Prior to compiling, you will probably have to change the `pool_size` and `max_strings` environment variables. If you use `bash` or something similar, execute:<sup>2</sup>

```
make setup
```

which executes the shell commands:

```
export pool_size=500000
export max_strings=40000
```

If you use `csh`, `tsh` or something similar, execute:

```
make setup_csh
```

## 6 Making Handouts

If you cut and paste the source to make handouts, you will probably have to include a few packages in the header of your document. In particular, you will need to put

```
\usepackage{amsmath}
\usepackage{amssymb}
```

in your header. If you use graphics, you will need either

```
\usepackage[pdfTeX]{graphicx}
```

for PDF output from `pdflatex` or

```
\usepackage{graphicx}
```

for DVI output from `latex`.

In the root directory `header.tex` contains includes, macros and definitions that are used throughout the source. You may want to include this file instead of including individual packages. Check out the file `applied_math.tex` (which makes the PDF screen version of the text) to see an example of how to do this.

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<sup>2</sup>You can put these commands in a shell initialization file like `.cshrc` or `.bashrc`.

## 7 Making Slides

You can make slides using L<sup>A</sup>T<sub>E</sub>X. See the file `fcv/number/number_slides.tex` for an example. Go to the `fcv/number/` directory and compile the slides with

```
pdflatex number_slides.tex
```

to make a PDF file. To make a postscript file, change the `pdf` variable to `false` in the source and then execute

```
latex number_slides.tex
```