School of Computer Science and Applied Mathematics
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Advanced Analysis of Algorithms
Assignment - Supplementary material

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3 LaTeX

3.1 Using LaTeX to prepare a document

One of the good features of LaTeX is that you can use any editor to create the file which contains your LaTeX source.

A minimal LaTeX file would contain something like this...

```
\documentclass[11pt]{article}

\title{my document}
\author{me}
\begin{document}
\maketitle
the text goes here
\end{document}
```

Choose your favorite editor (pico, emacs, etc.) and type in the commands as above. Save your file, naming it `test.tex`. Then on the Linux command line type

```
latex test
```

Watch to see what appears on the screen. If you have typed this correctly you should not get any errors.

The result of this step should be the creation of a number of new files. One of these files would be called `test.dvi` which is a *device independent* output file – you can view the contents of this file with various other programs.
Then type

```
dvips test.dvi -o
```

This converts your `.dvi` file into a *postscript* file which can be handled by the printer.

Now type `evince test.ps` on the Linux command line. If you have followed the instructions properly you should be able to view the document you have created using LaTeX. If you have problems with any of this then consult one of the tutors – they should be relatively experienced LaTeX users.

The final step is to convert the postscript file into a PDF (Portable Document Format) file. PDF files are generally smaller than postscript files and can be read on different machines using

a range of different software applications. This makes them a good format for emailing documents to other people.
To do this conversion, type

```
ps2pdf test.ps
```

The commands above are enough for you to meet the minimum requirements for this lab but you should experiment with the LaTeXcommands below as well as they could make your document look more impressive.

```
\textbf{hello}

\emph{hello}

{\LARGE joe}
```

You could also try `\tiny`, `\small`, `\large`, `\huge` etc.

```
\begin{tabular}{|l|l|}
\hline
A & B  \\
\hline
C & D  \\
\hline
\end{tabular}

\begin{itemize}
\item  one thing
\item  another thing
\end{itemize}

\begin{enumerate}
\item  one thing
\item  another thing
\end{enumerate}
```

In addition to the features of LaTeX that you have seen so far there are also commands which you can use to better structure your document[s]. You should already have discovered that blank lines in your LaTeX will be processed as paragraph breaks. If you want to divide your document into sections (or even subsections) to make it more readable then there are commands which enable you to do so.
The commands

```
\section{Introduction}
\subsection{Background}
\subsection{The current situation}
```

will create a section in your document headed **Introduction** which will contain two subsections **Background** and **The current situation**. Note that the section and the subsections will be numbered.

You could also create unnumbered sections (and unnumbered subsections) by using the `\section*` and `\subsection*` commands.

It is also possible to create references (pointers) to other parts of your document. This is accomplished by labelling the section using the `\label` command and then referring to that label using the `\ref` command. See below how this is done.

```
\section{The first section}\label{first}
In the next section (\ref{second}) I discuss other stuff.

\section{The second section}\label{second}
In Section \ref{first} I showed you how to make a pointer to this
section.
```

Note that you will have to run LaTeX twice to get your pointers to reference correctly.

Experiment with these commands by preparing a LaTeX document which makes use of sections and subsections and uses the `\label` and `\ref` commands to link the sections.

3.2 More on LaTeX

Often when you are doing academic writing you will need to *cite* the material (books, journals, etc.) that you got a piece of information from. Remember it is plagiarism to present someone else's idea, theories, etc. as your own. The attached document gives an example of how this done. LaTeX provides utilities to help you do this correctly and easily. You will need to do this for your assignment so now is a good time to start learning how to do it.

You will have to add some extra commands to your LaTeX source file to do this referencing. You will also have to create a **Bibtex** file, in addition to your LaTeX source file, which will contain the information about reference material. These will typically be books and journal articles but might be other things too.

A typical LaTeX source file which includes citations to other books/papers/etc. would look like `mydoc.tex` below.

```
\documentclass[12pt]{article}
\usepackage{natbib}
\bibliographystyle{apalike}
\bibpunct{[}{]}{;}{a}{,}{,}

\begin{document}
\title{Limits of Computation}
\author{Ian Sanders}
\maketitle
\section{Introduction}
\citet[p2]{Baase97} terms computers ``the most significant
technology since the beginning of the Industrial Revolution''
and she likens them to the gift of fire which was, according
to Greek mythology, brought to us by the god Prometheus. Her
book discusses some of the benefits of computers but also warns
us of the problems which they could cause us \citep{Baase97}.
This book is the recommended book for the ethics and social
```

```
responsibility part of the Limits of Computation topic.

\bibliography{myrefs}
\end{document}
```

Don't worry too much about the three lines which appear below the `\documentclass` line. They allow you to do referencing in the School's approved style. One important thing to note is that you must specify the `\bibliographystyle`. A common one to use is `plain` but this is not recommended here. The most important thing to note is the second last line of the file, `\bibliography{refs}`, which tells the LaTeXcompiler that your bibliography file (bibtex file) is called `refs.bib`.

The bibtex file (in this case it would be called `myrefs.bib`) would look like this

```
 @book{Baase97,
   author =    {Baase, S.},
   title =     {A Gift of Fire: Social, Legal, and Ethical Issues
   in Computing},
   publisher = {Prentice-Hall},
   address = {Upper Saddle River, New Jersey, {USA}},
   year =      1997,
}
```

Note here that the link between the Bibtex file and the LaTeX source file is the label which appears after the first `{` in the bib entry for the book.

Other common bib entries are journal articles and conference proceedings. The entries and fields for these are shown below.

```
 @article{,
   author =  {},
   title =   {},
   journal = {},
   pages = {},
   year =    ,
}

@inProceedings{,
   author =    {},
   title =     {},
   booktitle = {},
   year =      ,
  organization = {},
  address =   {},
  month =   {},
  pages =   {},
}
```

To process the source file and produce the correct output we would have to issuse the commands as below.

```
latex mydoc
bibtex mydoc
latex mydoc
```

```
latex mydoc
```

Remember that you needed to run `latex` twice to get the section references correct. You also need to run it twice to get the bibliography material references correct. (Note this presupposes that there are no errors in your LaTeX source file or your Bibtex file.)

Note that there are two ways of citing the reference material – *textually*, i.e. in the body of the text where the author's name gets used as part of the sentence and the date appears in square brackets after the name; and *parenthetically* where the whole citation appears in square brackets. This gives you flexibility in your writing.

3.3 LaTeX resources

1. There are books in the GeoMaths library. The Lamport book is the typical starting point.
2. Download "The Not So Short Introduction to LaTeX" from the web.

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