Creating a Report using LaTeX

Lab Work

Note: Read and follow instructions carefully. If you see an error, it must be due to a mistake you made. Computers don't make mistakes.

1. Launch gedit (Applications → Accessories → Text Editor). Type the following text:

   ```
   \documentclass{report}
   \begin{document}
   This is my first \LaTeX\ document.
   \end{document}
   ```

   Save the file as, say, `latexreport.tex`, in a directory (say, `mydir`). Now open a terminal. Change directory to where you have saved the file (type `'cd mydir'` and press Enter). Give the command `'pdflatex myfirstdoc.tex'` and press Enter. Now run the command `'evince myfirstdoc.pdf &'` and see how the file appears. (*Evince* is the default pdf viewer in Gnome. Use another pdf viewer if your platform is different.)

2. Now add the option `[a4paper,12pt]` after `documentclass` and before `{article}`. Add the command
   `\usepackage[hmargin=1in,vmargin=15mm]{geometry}`
   after the first line. Save the file, compile as before and see how the page size and margins of the document has changed.

3. Did you align the title and the author's name at the centre? You could give a title to the document by including the command `\title{The geometry package}` in the preamble. To include the name of the author below the title, add the command `\author{Hideo UMEKI}` in the preamble. Also, add the command `\maketitle` immediately after the command `\begin{document}`. Now compile and see how the document looks. Do you think the title should be in bold font? Insert the command `\bf` within the curly brackets before the title. Do you see a date beneath the author's name? The date of compilation is automatically added. You could add a desired date using the command `\date{`$< date >$`}` in the preamble. Or you can get rid of the date being displayed by including the date command without any date value.

4. There is a jpeg file on the Desktop. Let us include this picture in the earlier document we created. To include the picture, you can use the command
   `\includegraphics{image.jpg}`

   For this to work, you need to include the command

   ```
   \usepackage{graphicx}
   ```

   in the preamble, before the

   ```
   \begin{document}
   ```

   command. Now compile the document and see how it looks.

Does the picture look too big for the page? You can scale it using an option in the includegraphics command. Insert `[scale=0.3]` after `includegraphics` and before the file name, thus: `\includegraphics[scale=0.3]{image.jpg}`. Now compile again and see how it looks. The `scale` option scales the width and height equally. You could scale them differently by specifying the `height` and `width` separated by a comma, as in the next exercise, or even just one of the values.

5. LaTeX will include the picture you inserted exactly at the point where you have given the command, whether there is space there or not. This is not the best way to do it, of course. You could permit LaTeX to place it at a location where there is space by making it a *float*. You do this by creating a float environment such as `figure`. You can do this by including the following commands:

```
\begin{figure}
\centering\includegraphics[width=4in,height=3in]{image.jpg}
\caption{A typical scene from Kerala}
\end{figure}
```

   The `\centering` command, obviously, places the image horizontally centred on the page.

6. Let us now create a table. Here you can use a table environment to make it a float so that LaTeX can place it at a convenient location, just as you created a `figure` environment for the picture. Let us create the following table. Enter the following text:

```
\begin{table}
\caption{Planets in the Solar System}
\begin{tabular}{rlrp{1.5in}}
\hline\hline
{\bf No.} & {\bf Planet} & {\bf Mass} & {\bf Comments} \\
\hline
1. & Mercury & 0.06 & Hardly any atmosphere \\
2. & Venus   & 0.82 & Very hot and dense atmosphere \\
3. & Earth   & 1.00 & Atmosphere conducive for life \\
\hline\hline
\end{tabular}
\end{table}
```

   Compile the document and see. Now change the value 1.5in to 5cm and compile. See how the table changes.

7. We often use bulleted lists and numbered lists in our documents. Let us see how we can create them in LaTeX. Enter the following in your document and see how it looks:

```
 DNA molecules are made up essentially of four nucleotides,
namely,
\begin{itemize}
\item Adinine,
\item Thymine,
\item Guanine, and
\item Cytosine.
\end{itemize}
```

   Numbered lists can be created by using "`enumerate`" instead of "`itemize`".

8. We would often want to put some text in a box. Let us see how we can do it in LaTeX. Try the following code:

```
\framebox{I have been framed!}
```

9. Let us create a simple equation in your document. Open your document in gedit and add the following:

```
The equation representing  a straight line in the Cartesian plane
is of the form $ax+by+c=0$, where $a$, $b$, $c$ are constants.
```

Now compile the document and see what you get.

10. Now type the equation as $$ax+by+c=0$$ (use two $ signs instead of one) and compile and see what happens. This is called a *displayed equation* while the former is called an *inline equation*.

11. Now let us try something a bit more complicated. Add the following text in your document and compile it:

```
Fermat conjectured that there was no integral solution for the
equation $$x^n + y^n = z^n $$ when $n > 2$.
```

Do you get something like this?

Fermat conjectured that there was no integral solution for the equation

$$x^n + y^n = z^n$$

when $n > 2$.

12. Now let us write the following and compile and see what it gives:

```
$$ \sum_{n=1}^\infty\frac{1}{n^2} = \frac{\pi^2}{6} $$
```

You should get something like this:

$$\sum_{n=1}^{\infty} \frac{1}{n^2} = \frac{\pi^2}{6}$$

13. Can you guess what this will give?

```
Thus,
$\mathrm{\lim\limits_{x\to\infty}\int_0^{x}\frac{\sin x}{x}dx
      =\frac{\pi}{2}}$
and so, by definition,
\begin{equation*}
 \mathrm{\int_0^\infty\frac{\sin x}{x}dx=\frac{\pi}{2}}
\end{equation*}
```

You have to add the command `\usepackage{amsmath}` in the preamble for this to compile without errors.

14. Now let us see how to create a report in LaTeX. Create a file containing the following:

```
\documentclass[a4paper,12pt]{report}
\usepackage[margin=1in]{geometry}
\usepackage{graphicx}
\title{\bf This is a dummy report}
\author{My name \\ My institute}

\begin{document}
\maketitle
\tableofcontents
\chapter*{Acknowledgements}
I thank everyone.

\chapter{Introduction}
\section{How it started}

Table below shows some useless data.
\begin{table}
\centering\begin{tabular}{rlp{35mm}}
\hline\hline
{\bf No.} & {\bf This} & {\bf That}\\
\hline
1. & something & something else \\
2. & something & something else \\
3. & something & something else \\
\hline\hline
\end{tabular}
\end{table}

\section{A New Section}
\subsection{This is a sub section}
blah blah blah

\chapter{The Work}
This chapter that describes the work that should have been done.

The figure  \ref{myfigure} below shows something.
\begin{figure}
\includegraphics[scale=0.5]{myfigure.jpg}
\caption{This is a figure}
\label{myfigure}
\end{figure}

\section{Another Section}
And life goes on and on ........

\end{document}
```

(*To learn more about creating a document with LaTeX, refer the* LaTeX Primer *provided as a pdf file.*)