LaTeX Exercises

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Sectioning

Useful Commands

```
\title{Your title here}
\author{Names separated with \and}
\date{a date or \today}
\maketitle
\section{your text here}
\subsection{your text here}
\subsubsection{your text here}
\section*{your text here}
\subsection*{your text here}
\subsubsection*{your text here}
```

Exercise

Typset the following text:

<div align="center">

Exercises

Authors   Coauthors   Others.

June 28, 2017

</div>

1   Introduction

Hello galaxy.

1.1   Subheadings

Hello solar system.

1.1.1   Subsubheadings

Hello world.

1.2   Next Subsection

More text.

A section without section number

Star.

2   The section after that

Planet. Type this text on a line of its own.
Type this text after two newlines.

Solution

```
\documentclass{article}
\title{Exercises}
\author{Authors \and Coauthors \and Others.}
\date{\today}
\begin{document}
\maketitle

\section{Introduction}

Hello galaxy.

\subsection{Subheadings}\label{s:subheadings}

Hello solar system.

\subsubsection{Subsubheadings}

Hello world.

\subsection{Next Subsection}

More text.

\section*{A section without section number}

Star.

\section{The section after that}

Planet.
Type this text on a line of its own.

Type this text after two newlines.
\end{document}
```

Emphasis and Lists

Now that you have successfully completed the task for creating sections, subsections, and subsubsections, it is time to explore typographical emphasis and lists.

Similar to the previous task, you will use the command list below – as well as the commands you have just learnt – to recreate the page.

Useful Commands

```
\textbf{your text here}
\textit{your text here}
\underline{your text here}
\emph{your text here}

\begin{itemize}
  \item your text here
  \item ...
\end{itemize}

\begin{enumerate}
  \item your text here
  \item ...
\end{enumerate}

\usepackage{enumerate}  %% put this in the preamble

\begin{enumerate}[(i)]  %% this requires the enumerate package
  \item your text here
  \item ...
\end{enumerate}
```

Exercise

Typeset the framed text.

3 Typographical Emphasis

Three of the most commonly used emphases are **bold**, *italics*, and <u>underline</u>. *Emphasis* is a bit different and it looks like the italics command is being used, however, it is actually considering the surrounding context. *If I type this sentence in italics but want to* emphasize *something, I can without having to do something like this*:
\textit{*italicised text*} not italicised text \textit{*italicised text*}

4 Making Lists

There are more ways to style a list than will be covered in this document.

4.1 Unordered lists

- This list is simple

- There are only two items in this list

4.2 Numbered lists

1. This list is also **simple**

2. It *counts* the number of items in the list

3. There are <u>three</u> items in the list

4.3 Roman numerals lists

I This list uses ***<u>roman numerals</u>***

II This can be achieved with the usepackage "enumerate" and typing it after documentclass

III It also has a nested unordered list

- Any ideas how you would do this?

IV Ask one of the volunteers if you are unsure

Extra

See https://www.sharelatex.com/learn/Lists for some more examples.

Solution

```
\documentclass{article}
\usepackage{enumerate}
\begin{document}
\section{Typographical Emphasis}\label{s:emphlist}
Three of the most commonly used emphases are \textbf{bold},
\textit{italics}, and \underline{underline}. \emph{Emphasis} is a bit
different and it looks like the italics command is being used,
however, it is actually considering the surrounding context.
\textit{If I type this sentence in italics but want to
  \emph{emphasize} something, I can without having to do
something like this}:

\texttt{\textbackslash textit\{}\textit{italicised text}\texttt{\}}
not italicised text
\texttt{\textbackslash  textit\{}\textit{italicised text}\texttt{\}}

\section{Making Lists}

There are more ways to style a list than will be covered in this document.

\subsection{Unordered lists}
\begin{itemize}
  \item This list is simple
  \item There are only two items in this list
\end{itemize}

\subsection{Numbered lists}
\begin{enumerate}
  \item This list is also \textbf{simple}
  \item It \textit{counts} the number of items in the list
  \item There are \underline{three} items in the list
\end{enumerate}

\subsection{Roman numerals lists}
\begin{enumerate}[I]
  \item This list uses \textbf{\textit{\underline{roman numerals}}}
  \item This can be achieved with the usepackage ``enumerate'' and
    typing it after documentclass
  \item It also has a nested unordered list
  \begin{itemize}
    \item Any ideas how you would do this?
  \end{itemize}
  \item Ask one of the volunteers if you are unsure
\end{enumerate}
\end{document}
```

Quotes & Dialogue

Quotation Marks

Single quotation marks are produced in LaTeX using:

` ' and '

Double quotation marks are produced by typing

` '' and ''

This is because the 'undirected double quote character' " produces double right quotation marks: it should never be used where left quotation marks are required.

Dashes

LaTeX allows you to produce dashes of various length, known as 'hyphens', 'en-dashes' and 'em-dashes'.

```
Hyphens are obtained in LaTeX by typing  -.

En-dashes by typing --.

And em-dashes by typing ---.
```

You would normally uses en-dashes when specifying a range of numbers. For example, to specify a range of page numbers, you would type:

`'on pages 155--219.'`

Which produces: 'on pages 155–219.'

Dashes used for punctuating are often typeset as em-dashes, especially in older books. These are obtained by typing —.

Exercise 1

Typeset the following dialogue taken from *Alice through the Looking Glass*, by Lewis Carroll.

> "You *were* a little grave," said Alice.
> "Well just then I was inventing a new way of getting over a gate—would you like to hear it?"
> "Very much indeed," Alice said politely.
> "I'll tell you how I came to think of it," said the Knight. "You see, I said to myself 'The only difficulty is with the feet: the *head* is high enough already.' Now, first I put my head on the top of the gate—then the head's high enough—then I stand on my head—then the feet are high enough, you see—then I'm over, you see."

Exercise 2

Sometimes you need single quotes immediately following double quotes, or vica versa, as in

> "I regard computer typesetting as being reasonably 'straightforward'" he said.

The way to typeset this correctly in LaTeX is to use the control sequence \, between the quotation marks, so as to obtain the necessary amount of separation. Typeset the above example!

Solution

``You \emph{were} a little grave,'' said Alice.

``Well just then I was inventing a new way of
getting over a gate---would you like to hear it?''

``Very much indeed,'' Alice said politely.

``I'll tell you how I came to think of it,'' said
the Knight.
``You see, I said to myself 'The only
difficulty is with the feet: the \emph{head} is
high enough already.' Now, first I put my head on
the top of the gate---then the head's high
enough---then I stand on my head---then the feet
are high enough, you see---then I'm over, you see.''

\begin{quote}
``I regard computer typesetting as being reasonably
'straightforward'\,'' he said.
\end{quote}

Importing external graphics

You can import external graphics using package graphicx. The most important command is:

`\includegraphics`

LaTeX itself treats the image like normal text, i.e. as a box of certain height and width.


```
\documentclass{article}
\usepackage{graphicx}
\begin{document}
The following image is of the Brooklyn Bridge.

\includegraphics[height=3cm]{dumbo.jpg}
\end{document}
```

The package documentation list the options width and height, as well as others. Using pdflatex several graphics formats are supported: pdf, png and jpg. Modern installations of LaTeX can use eps files as well, but indirectly.

Useful Commands

```
\includegraphics[option1=value1,...,optionN=valueN]{filename}
\centerline{your line of things to be centered here}
\begin{center}One or more lines to be centered here\end{center}
```

Exercise

Download a picture from the internet and typeset the framed text with it.

---

5   Graphics

The following picture is centered and has a width of 2cm.

Extra

Go to http://tex.stackexchange.com to find answers to all sorts of questions related to TeX and LaTeX.

Solution

\section{Graphics}

The following picture is centered and has a width of 2cm.\\

\centerline{\includegraphics[width=2cm]{dumbo.jpg}}

Figures

The previous section introduced importing graphics. However, just having a picture stuck in between paragraphs does not look professional. To start with, we want a way of adding captions, and to be able to cross-reference. What we need is a way of defining figures. It would also be good if LaTeX could apply principles similar to when it arranges text to look its best to arranging pictures as well. This is where figures and floats come into play.

Like tables, figures cannot be split across pages; the best placement for them is typically the top or the bottom of the page nearest their initial cite. To ensure this proper "floating" placement of figures, use the environment **figure** to enclose the figure and its caption.

This sample document contains examples of **.eps** files to be displayable with LaTeX. If you work with pdfLaTeX, use files in the **.pdf** format. Note that most modern TeX system will convert **.eps** to **.pdf** for you on the fly.

Figure 1: A sample black and white graphic.

```
\begin{figure}
\centering
\includegraphics{fly}
\caption{A sample black and white graphic.}
\end{figure}

\begin{figure}
\centering
\includegraphics[height=1in, width=1in]{fly}
\caption{A sample black and white graphic
that has been resized with the includegraphics command.}
\end{figure}
```

Floats

Floats are containers for things in a document that cannot be broken over a page. LaTeX by default recognizes "table" and "figure" floats, but you can define new ones of your own (see Custom floats below). Floats are there to deal with the problem of the object that won't fit on the present page, and to help when you really don't want the object here just now.

Floats are not part of the normal stream of text, but separate entities, positioned in a part of the page to themselves (top, middle, bottom, left, right, or wherever the designer specifies). They always have a caption describing them and they are always numbered so they can be referred to from elsewhere in the text. LaTeX automatically floats Tables and Figures, depending on how much space is left on the page at the point that they are processed. If there is not enough room on the current page, the float is moved to the top of the next page. This can be changed by moving the Table or Figure definition to an earlier or later point in the text, or by adjusting some of the parameters which control automatic floating.

To create a figure that floats, use the figure environment.

Figure 2: A sample black and white graphic that has been resized with the `includegraphics` command.

Table 1: My caption

Specifier	Permission
h	Place the float here, i.e., approximately at the same point it occurs in the source text (however, not exactly at, the spot)
t	Position at the top of the page.
b	Position at the bottom of the page.
p	Put on a special page for floats only.
!	Override internal parameters LaTeX uses for determining "good" float positions.
H	Places the float at precisely the location in the LaTeX code. Requires the float package, i.e., the command \usepackage{float} in the preamble.

```
\begin{figure}[b]
\centering
\includegraphics[height=1in, width=1in]{fly}
\caption{This sample graphic has been positioned at the bottom using the float specifier.}
\end{figure}
```

However, there may be times when you disagree, and a typical example is with its positioning of figures. The placement specifier parameter exists as a compromise, and its purpose is to give the author a greater degree of control over where certain floats are placed.

Captions

It is always good practice to add a caption to any figure or table. Fortunately, this is very simple in LaTeX. All you need to do is use the

```
\caption{text}
```

command within the float environment. LaTeX will automatically keep track of the numbering of figures, so you do not need to include this within the caption text.

The location of the caption is traditionally underneath the float. However, it is up to you to therefore insert the caption command after the actual contents of the float (but still within the environment). If you place it before, then the caption will appear above the float. Try out the following example to demonstrate this effect:

Labels and cross-referencing

If you want to label a figure so that you can reference it later (see next section), you have to add the label after the caption (inside seems to work in LaTeX 2e) but inside the floating environment. If it is declared outside, it will give the section number instead.

```
\label{labelname}
```

You can then refer to the figure using the

```
\ref{labelname}
```


Figure 3: This sample graphic has been positioned at the bottom using the float specifier.

Figure 4: A photograph of an NYPD cruiser at Times Square, NYC.

Exercise

For instance Figure 4 is given a label "NYPD", so we can refer to it with that label and LaTeX will insert the Figure number automatically. For best results, put a tilde (˜) between the word "Figure" and the \ref command.

Solution

For instance Figure~\ref{NYPD} is given a label ``NYPD'', so we can
refer to it with that label and \LaTeX{} will insert the Figure number
automatically. For best results, put a tilde (\texttt{\textasciitilde}) between the word
``Figure'' and the \verb+\ref+ command.

```
\begin{figure}
\centering
\includegraphics[height=5in, width=5in]{times_square}
\caption{A photograph of an NYPD cruiser at Times Square, NYC.}
\label{NYPD}
\end{figure}
```

Labels and References

You can label sections, (subsections, sub-subsection, etc.), items in environments, figures, tables, and maths equations with the `\label{name}` command. You can refer to the respective environment's label (i.e., section, figure, table, ... number) with the `\ref{name}` command. You can refer to the page number where the label occurs with the `\pageref{name}` command.

Task 1: Add labels to the sections, tables, and figures you have typeset in the previous exercises and refer to them!

Example

```
\section{Introduction}\label{s:intro}

\subsection{Contributions}\label{s:contrib}

\begin{figure}[!h]
...
\caption{Three dots.}\label{f:dots}
\end{figure}

Figure~\ref{f:dots} is shown on page~\pageref{f:dots} in Section~\ref{s:contrib}.
```

Exercise

Typeset the text shown on the following page.

Useful Commands

```
\label{your-label-here}
\ref{your-label-here}

$           % start/end inline math mode
$$          % start/end display math mode

%%%% The following commands only work in math mode
term^{superscript}_{subscript}
\int        % an integral sign
\sum        % a summation sign
\alpha      % greek letter alpha
\frac{numerator}{denominator}  % fractions

\usepackage{amsmath}
```

6 Math Mode

Mathematical symbols, terms, and formulas are typeset by switching to math mode. This can be done inline by enclosing a maths expression with dollar symbols ($). Here's a maths expression: x_1^2. Display style equations are typeset using the `equation` environment. Equations that span multiple lines and need to be aligned are typeset using the `eqnarray` environment. The following figures show these two types of equations. These environments produce labeled equations. To avoid the labeling, add a star to the environment name, e.g., `eqnarray*`.

$$\int_0^1 x \, dx = \frac{1}{2}$$

Figure 5: An equation typeset in the `equation*` environment. (This requires the `amsmath` package.)

$$\int_0^1 x \, dx = \frac{1}{2} \tag{1}$$

$$\sum_{i=1}^{\infty} \frac{1}{i!} = \frac{\pi^2}{6} \tag{2}$$

Figure 6: Two equations typeset in the `eqnarray` environment.

6.1 More Equations

1. Albert Einstein:
$$E = mc^2 \tag{3}$$

2. Leonhard Euler:

   (a) Let a and n be co-prime numbers. Then
   $$a^{\phi(n)} \equiv 1 \pmod{n}. \tag{4}$$

   (b)
   $$e^{\pi i} = -1 \tag{5}$$

Section 6 starts on page 16 and this is Section 6.1. Figure 5 is shown on page 16. Equation (5), shown in item 2b, is known as *Euler's identity*, while the statement in item 2a is known as *Euler's Theorem*.

Solution

```
\section{Math Mode}\label{s:equations}

Mathematical symbols, terms, and formulas are typeset by switching to
math mode. This can be done inline by enclosing a maths expression
with dollar symbols (\$). Here's a maths expression: $x^2_1$.
Display style equations are typeset using the \texttt{equation} environment.
Equations that span multiple lines and need to be aligned
are typeset using the \texttt{eqnarray} environment. The following
figures show these two types of equations. These environments produce
labeled equations. To avoid the labeling, add a star to the
environment name, e.g., \texttt{eqnarray*}.

\begin{figure}[!h]
\centering
\begin{equation*}
\int_0^1 x\, dx= \frac{1}{2}
\end{equation*}
\caption{An equation typeset in the \texttt{equation*}
  environment. (This requires the \texttt{amsmath} package.)}\label{f:equation}
\end{figure}

\begin{figure}[!h]
\centering
\begin{eqnarray}
\int_0^1 x\, dx &=& \frac{1}{2}\\
\sum_{i=1}^\infty \frac{1}{i!} &=& \frac{\pi^2}{6}
\end{eqnarray}
\caption{Two equations typeset in the \texttt{eqnarray} environment.}\label{f:two_equations}
\end{figure}

\subsection{More Equations}\label{s:spec}

\begin{enumerate}
\item Albert Einstein:
\begin{equation}\label{eq:Einstein}
E = mc^2
\end{equation}
\item\label{item:Euler} Leonhard Euler:
\begin{enumerate}
\item\label{item:EulerThm} Let $a$ and $n$ be co-prime numbers. Then
\begin{equation}\label{eq:EulerThm}
a^{\phi(n)} \equiv 1\quad(\mathrm{mod}\ n)\textrm{.}
\end{equation}
\item\label{item:EulerId}
\begin{equation}\label{eq:EulerId}
e^{\pi i} = -1
\end{equation}
\end{enumerate}
\end{enumerate}

Section~\ref{s:equations} starts on page~\pageref{s:equations} and
this is Section~\ref{s:spec}.  Figure~\ref{f:equation} is shown on
page~\pageref{f:equation}.  Equation~(\ref{eq:EulerId}), shown in
item~\ref{item:EulerId}, is known as \emph{Euler's identity}, while
the statement in item~\ref{item:EulerThm} is known as \emph{Euler's
  Theorem}.
```

Citations with Bibtex

Citations, i.e., references to publications, are done with the `\cite{}` command.

To typeset documents with bibliographies using bibtex, you must first run pdflatex, then bibtex, then pdflatex twice.

Useful Commands

```
\cite{citation-label}

\bibliographystyle{plain}  % there are other styles: alpha,unsrt,acm,ieeetr,siam,...
\bibliography{filename}
```

A *bibliography.bib* file could look like this:

```
@article{D59,
 author  = "Dijkstra, Edsger W.",
 title   = "A note on two problems in connexion with graphs",
 journal = "Numerische Mathematik",
 year    = 1959,
 volume  = 1,
 number  = 1,
 pages   = "269--271",
 doi     = "10.1007/BF01386390",
}

@inproceedings{Blakley1979,
  author = {G. R. Blakley},
  pages = {313--317},
  title = {Safeguarding cryptographic keys},
  year = {1979},
  booktitle = {1979 National Computer Conference: June 4--7, 1979, New York, New York},
  editor = {Richard E. Merwin and Jacqueline T. Zanca and Merlin. Smith},
}

@article{DH76,
 author  = {Diffie, W. and Hellman, M.},
 title   = {New Directions in Cryptography},
 journal = {IEEE Trans. Inf. Theor.},
 volume  = 22,
 number  = 6,
 month   = sep,
 year    = 1976,
 pages   = {644--654},
 doi     = {10.1109/TIT.1976.1055638},
 publisher = {IEEE Press},
 address = {Piscataway, NJ, USA},
}
```

Exercise

Typeset the following text:

7   Literature Study

Dijkstra's algorithm [2] was published 17 years before the first paper on public key cryptography [1].

References

[1] W. Diffie and M. Hellman. New directions in cryptography. *IEEE Trans. Inf. Theor.*, 22(6):644–654, September 1976.

[2] Edsger W. Dijkstra. A note on two problems in connexion with graphs. *Numerische Mathematik*, 1(1):269–271, 1959.

Solution

```
\section{Literature Study}\label{s:study}

Dijkstra's algorithm~\cite{D59} was published 17 years before
the first paper on public key cryptography~\cite{DH76}.

\bibliographystyle{plain}
\bibliography{bibliography.bib}
```

Citations without Bibtex

Bibtex is not necessary to typeset bibliographies. Look at the .bbl file generated during the previous exercise above. This file can be directly included into your LaTeX source file. The resulting file can be typeset without bibtex and without the .bib file.

Useful Commands

```
\cite{citation-label}
\bibliographystyle{plain}

\begin{bibliography}{widestlabel}
\bibitem[display-label]{citation-label}
Authors
\newblock Title.
\newblock Journal etc.
\end{bibliography}
```

Exercise

Typeset the following text without bibtex:

---

8 Two Citations

Dijkstra's algorithm [1] was published 17 years before the first paper on public key cryptography [DH76].

References

[DH76] W. Diffie and M. Hellman. New directions in cryptography. *IEEE Trans. Inf. Theor.*, 22(6):644–654, September 1976.

[1] Edsger W. Dijkstra. A note on two problems in connexion with graphs. *Numerische Mathematik*, 1(1):269–271, 1959.

Solution

```
\section{Two Citations}\label{s:citations}

Dijkstra's algorithm~\cite{Dijkstra1959} was published 17 years before
the first paper on public key cryptography~\cite{DiffieH76}.

\begin{thebibliography}{DH76}
\bibitem[DH76]{DiffieH76}
W.~Diffie and M.~Hellman.
\newblock New directions in cryptography.
\newblock {\em IEEE Trans. Inf. Theor.}, 22(6):644--654, September 1976.

\bibitem{Dijkstra1959}
Edsger~W. Dijkstra.
\newblock A note on two problems in connexion with graphs.
\newblock {\em Numerische Mathematik}, 1(1):269--271, 1959.
\end{thebibliography}
```

Hyperlinks

You can also typeset hyperlinks, useful in PDF output as it automatically creates hyperlinks from citations to references, from table of contents elements to section/subsection headings, and from any internal reference to its label. In addition, the relevant package also provides typesetting of URLs.

To access this functionality, you need to include the `hyperref` package using: `\usepackage{hyperref}`

From https://en.wikibooks.org/wiki/LaTeX/Hyperlinks:

Including the hyperref package will automatically turn all your internal references into hyperlinks. It will not affect the way you write your documents: just keep on using the standard `\label`-`\ref` system (discussed earlier); with hyperref those "connections" will become links and you will be able to click on them to be redirected to the right page.

Useful Commands

```
\usepackage{hyperref} % add this before \begin{document}
\hypersetup{colorlinks=true} % used to turn on coloured text for links
\url{}
\href{}{}
```

Exercise

1. Include the `hyperref` package and see how your previous labels and citations are now hyperlinks.

2. Typset the text in the framed box below.

   (a) Use the `\url` command to include a URL.

   (b) Use the `\href` command to include a prettier URL (with different text).

   (c) Add and remove the colorlinks option.

---

9 ACE

You can access ACE here: http://daprlab.com/ace/
Feel free to make donations here.

Solution

```
\documentclass{article}
\usepackage{hyperref}
\hypersetup{colorlinks=true}
\begin{document}
\section{ACE}

You can access ACE here: \url{http://daprlab.com/ace/}

Feel free to make donations \href{https://www.latex-project.org/}{here}.
\end{document}
```
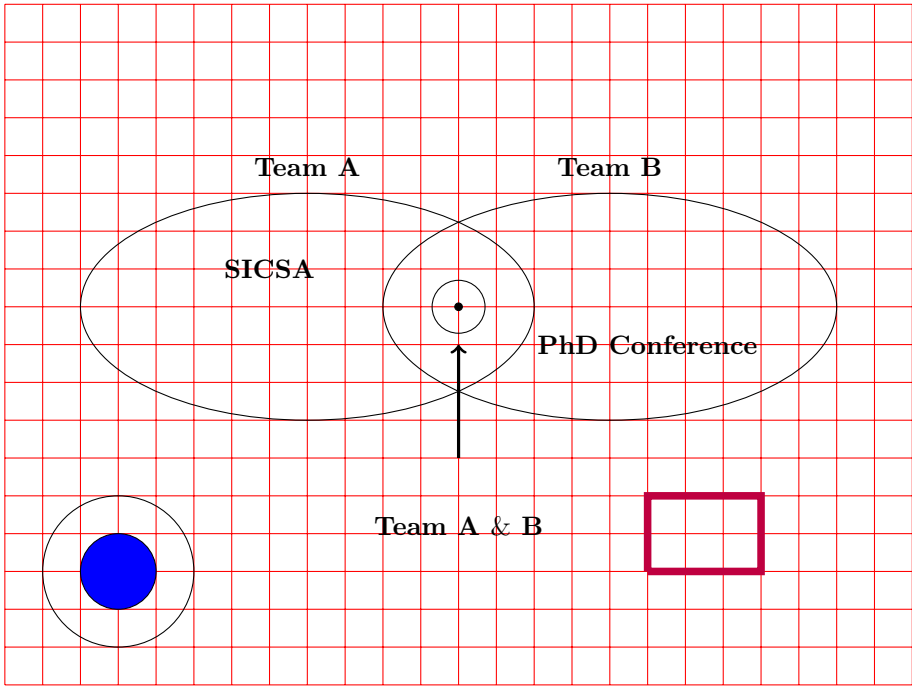
Drawing, Figures, Tables,...
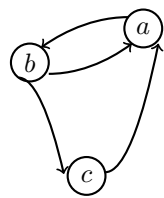

Figure 7: Latex Workshop

Figure 8: Network of three nodes.

This network (see Fig. 8) has three nodes.

T1	T2	T3	T4	T5
a	b	c	$$\prod_{i=1}^{n} x = x^n$$	No
ab	cd	oo	Optional	And
α	β	γ	Yes	No
$$\int_a^b x^2 dx$$	$$\sum_{n=1}^{\infty} 2^{-n} = 1$$	$$\prod_{i=a}^{b} f(i)$$	$$\lim_{x \to \infty} f(x)$$	$\oint$

Table 2: Table

Solution

```
\documentclass[10pt,a4paper]{article}

%\usepackage[utf8]{inputenc}
\usepackage{tikz}  % for drawing in latex
\usepackage{float} % fix figures, tables,.. in the desire place.
\usetikzlibrary{arrows} % Draw arrow
\usepackage{color} % Color

\begin{document}
\section*{Drawing, Figures, Tables,...}
\begin{figure}[H]
% h here, t = top, b= bottom
\centering
\begin{tikzpicture}[scale= .5]
\draw [step=1cm, color=red](-12,-10) grid (12,8);
 \draw [fill = black] (0,0) circle (.1cm);
%-------------------------------------------------
\draw (0,0) circle [radius=0.7];
\draw (-9,-7) circle [radius=2];
\draw [fill = blue] (-9,-7) circle [radius=1];
%-------------------------------------------------
%\draw [dashed, color=green] (5,-7)--(5,-5)--(8,-5)--(8,-7)--(5,-7);
%\draw [very thick, color= cyan] (5,-7)--(5,-5)--(8,-5)--(8,-7)--(5,-7);
\draw [thick, line width=1mm, color=purple] (5,-7)--(5,-5)--(8,-5)--(8,-7)--(5,-7);
%-------------------------------------------------
\draw (-4,0) ellipse (6cm and 3cm);
\draw (4,0) ellipse (6cm and 3cm);
\draw [->,very thick, color=black] (0, -4) -- (0,-1);
%-------------------------------------------------
\node at (-4,3.7) {\textbf{Team A}};
\node at (4,3.7) {\textbf{Team B}};
\node at (0,-5.8) {\textbf{Team A $\&$ B}};
%-------------------------------
\node at (-5,1) {\textbf{SICSA}};
\node at (5,-1) {\textbf{PhD Conference}};
%-------------------------------------------------
\end{tikzpicture}
\caption{Latex Workshop }
\label{fig:LatexWorkshop}
\end{figure}

%---------------- figure and label -------------------------
\begin{figure}[H]
% h here, t = top, b= bottom, p= page
\centering
\begin{tikzpicture}[scale= 0.5]
% \draw [step=1cm, color=gray](-10,-4) grid (10,4);
%       \draw [fill = black] (0,0) circle (.1cm);
%========================================
\draw  [thick](-1.5,1.5) circle (.5cm);
\draw  [thick] (1.5,2.4) circle (.5cm);
\draw [thick] (0,-1.5) circle (.5cm);
%==============================
\node at (-1.5,1.5) {\textbf{$b$}};
\node at (1.5,2.4) {\textbf{$a$}};
\node at (0,-1.5) {\textbf{$c$}};
```

```latex
%=================================================
\draw[->, thick] (-1,1.2) parabola (1.2,2.0);
\draw[->, thick] (1.1,2.7) parabola (-1.2,1.9);
%=================================================
\draw[->, thick] (0.5,-1.4) parabola (1.9, 2);
%=================================================
\draw[->, thick] (-1.8, 1.1) parabola (-0.6,-1.45);
\end{tikzpicture}
\caption{Network of three nodes.}
\label{fig:Network}
\end{figure}
%-------------------- Reference -------------------------
This network (see Fig.~\ref{fig:Network}) has three nodes.


%---------------- Table -------------------------
\begin{table}[H]
\begin{tabular}{ |p{2.2cm}|p{2.5cm}|p{2.5cm}|p{2.2cm}|p{2.2cm}| }
  \hline
  T1 & T2 & T3 & T4 &T5 \\
  \hline
 a  & b  & c  &$$ \prod\limits_{i=1}^n x = x^n$$ & No \\
  \hline
 ab  & cd & oo&  Optional & And  \\
  \hline
$\alpha$  & $\beta$ & $\gamma$ & Yes & No   \\
  \hline
 $$\int_{a}^{b} x^2 dx$$  & $$\sum_{n=1}^{\infty} 2^{-n} = 1$$  &
 $$\prod_{i=a}^{b} f(i)$$ & $$\lim_{x\to\infty} f(x)$$ & $\oint$ \\
  \hline
\end{tabular}
\caption{Table}
\label{table:table1}
\end{table}

\end{document}
```

Next steps

1. Download a latex template file for your favourite conference or journal (see the author guidelines at the conference or journal website) and typeset the above exercises using the new style file. You can do this by changing `\documentclass{article}` to `\documentclass{llncs}` (LNCS style) or `\documentclass[10pt,conference]{IEEEtran}` (for the IEEE Computer Society conference style), . . .

2. Browse a LaTeX manual:

   - https://www.cs.usask.ca/support/index.php — scroll to the bottom of the page for "LATEX RESOURCES" and "LATEX SHORT COURSE"

   - https://tobi.oetiker.ch/lshort/lshort.pdf — The not so short introduction to LaTeX.