Figures & Tables

Insert Images

- LaTeX cannot manage images by itself
- Need to include the `graphicx` package in the preamble
- \usepackage{graphicx}
- When the document uses multiple images, it is desirable to put them in a separate folder
- \graphicspath{ {./image-folder/} } tells which folder the images are kept
- The path is relative to the current working directory
- To include the image use command
  \includegraphics{image-name}

Size & Angle

- Scale the image based on its defined size:
  \includegraphics[width=3cm, height=4cm]{image-name}
- The aspect ratio of the image may be changed
- Scale the image relative to some elements in the document:
  \includegraphics[width=\columnwidth, height=4cm]{image-name}
- Rotate the image:
  \includegraphics[angle=45]{image-name}

Units for Length

<table>
<thead>
<tr>
<th>Unit Abbreviation</th>
<th>Definition</th>
<th>Elements, in Environments</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>pt</td>
<td>A point, is the default length unit.</td>
<td>Volumetex: distance between columns</td>
<td>Volumewidth: width of the column</td>
</tr>
<tr>
<td>mm</td>
<td>A millimetre</td>
<td>Vlinewidth: width of the line in the current environment</td>
<td>Vspacewidth: width of the line</td>
</tr>
<tr>
<td>cm</td>
<td>A centimetre</td>
<td>Vspaceheight: height of the page</td>
<td>Vw: width of the text</td>
</tr>
<tr>
<td>in</td>
<td>An inch</td>
<td>Vw: width of the text</td>
<td>Unith: height of the text</td>
</tr>
<tr>
<td>ex</td>
<td>The height of an in the current font</td>
<td>Vw: width of the text</td>
<td>Unith: height of the text</td>
</tr>
<tr>
<td>em</td>
<td>The width of an em in the current font</td>
<td>Vw: width of the text</td>
<td>Unith: height of the text</td>
</tr>
</tbody>
</table>

Position Figure

- The "figure" environment shows images as floating elements
- Images included inside the figure environment will be positioned to fit the flow of the document
- Additional parameter can be passed to control the figure positioning
  \begin{figure}[h]
  \centering
  \includegraphics{image-name}
  \caption{Caption}
  \end{figure}
- Position of the images inside the figure can be specified:
  \begin{figure}[h]
  \centering
  \includegraphics{image-name}
  \caption{Caption}
  \begin{tabular}{|c|c|}
  \hline
  Parameter & Position \\
  \hline
  h & Place the float here, i.e., approximately at the same point it occurs in the source text (however, not exactly at the spot) \\
  b & Position at the top of the page \\
  t & Position at the bottom of the page \\
  p & Put on a special page for floats only \\
  \hline
  \end{tabular}
  \end{figure}
**Wrap Text around a Figure**

- To wrap the text around a figure, "wrapfigure" environment can be used
  - The results look better for small images
  - Need to include package "wrapfig"
    - \usepackage{wrapfig}
  - To use the command, specify the width and position of the floating figure region:
    - \begin{wrapfigure}{r}{.5\linewidth}
    - \end{wrapfigure}

**Captions**

- Captions can be added inside the "figure" environment
  - \caption{Some caption}
- The placement of caption depends on the location of the command:
  - If above the \includegraphics then the caption will be on top of it
  - If below then the caption will also be set below the figure

**Subfigures**

- Multiple images can be inserted in the same figure
  - Each image has its own label
  - Needs to add "subfigure" package
    - \usepackage{subfigure}
  - The optional parameter specifies the caption for each subfigure
    - \begin{figure}
      \subfigure[one]{\includegraphics[width=0.3\textwidth]{image-name}}
      \subfigure[two]{\includegraphics[width=0.3\textwidth]{image-name}}
      \end{figure}

**Tables**

- The "tabular" environment is the default method to create tables
  - \begin{tabular}{c|c c}
    \hline
    Col1 & Col2 & Col3  \\
    \hline
    cell1 & cell2 & cell3  \\
    cell4 & cell5 & cell6  \\
    cell7 & cell8 & cell9  \\
    \hline
  \end{tabular}
- Horizontal line is added by \hline

**Merge Rows/Columns**

- To merge cells in multiple columns of the same row, use "\multicolumn":
  - \begin{tabular}{||c c c c||}
    \hline
    \multicolumn{3}{|c|}{Multi-Column}  \\
    \hline
  \end{tabular}
- Merging cells in multiple row requires "\multicolumn" package
  - \begin{tabular}{|c|c|c|}
    \hline
    cell1 & cell2 & cell3  \\
    \hline
  \end{tabular}
- \begin{tabular}{|c c|}
    \hline
    cell1 & cell2  \\
    \hline
  \end{tabular}

**Position Tables**

- Table can be positioned inside a float "table" environment
  - Work the same way as "figure" environment
  - \begin{table}[h!]
    \centering
    \begin{tabular}{|l|l|l|}
      \hline
      \textbf{Table} & 1 & 2 \\\n      \hline
      Row1 & 1 & 2 \\\n      Row2 & 3 & 4 \\\n      \hline
    \end{tabular}
    \caption{Some caption}
    \end{table}
**COLOR ALTERNATING ROWS**

- Coloring alternating rows differently improves readability
- This can be done using "xcolor" package
  
  ```latex
  \usepackage{xcolor}
  \rowcolors{2}{green!64!yellow!32}{green!32!yellow!16}
  ```
  
  1st parameter: the row to start.
  2nd & 3rd parameters: the colors for odd & even rows.

**CHANGE TABLE APPEARANCE**

- \setlength{\arrayrulewidth}{1mm} Set the thickness of the borders of the table to 1mm
- \setlength{\tabcolsep}{18pt} Set the space between the text and its left/right border to 18pt
- \renewcommand{\arraystretch}{2} The height of each row is set to 2 relative to its default height
- \arrayrulecolor{blue} Set the color of border
- \cellcolor[HTML]{AA0044} Set background color of a given cell
- \rowcolor{lightgray} Change background color of a row
- \newcolumntype{s}{>{\columncolor{gray}} p{3cm}} Define a new column type for color

**MULTI-PAGE TABLES**

- For tables 2 or more pages long, use the longtable package
  
  ```latex
  \usepackage{longtable}
  \begin{longtable}{|c|c|}
  \hline
  \end{longtable}
  ```

  Need to specify table heads on the 1st page & following pages

**LIST OF FIGURES/TABLES**

- A list for indexing figures/tables can be easily created in LaTeX
  
  ```latex
  \listoffigures or \listoftables
  ```
  
  Related commands:
  - \thispagestyle{empty} Removes the page numbering
  - \pagenumbering{arabic} Restart the page numbering with arabic style
  - \renewcommand{\listfigurename}{List of plots}
  - \renewcommand{\listtablename}{Tables}

**Command** | **When** | **Notes**
--- | --- | ---
\longtablehead | Displayed at the beginning of the table, in the first page.
\longtablehead | Displayed at the top of the table in every page except the first one.
\longtablehead | Displayed at the bottom of the table in every page except the last one.
\longtablehead | Displayed at the bottom of the table if only in the last page where the table appears.