

1. Develop a LaTeX script to create a simple document that consists of 2 sections [Section1, Section2], and a paragraph with dummy text in each section. And also include header [title of document] and footer [institute name, page number] in the document.

Certainly! Below is a LaTeX script that creates a simple document with the specified sections, paragraphs of dummy text, a header with the title of the document, and a footer with the institute name and page number.

```
\documentclass{article}

\usepackage{fancyhdr}

\usepackage{lipsum} % for dummy text


% Set up the header and footer

\pagestyle{fancy}

\fancyhf{}

\fancyhead[C]{Title of Document} % Header in the center

\fancyfoot[L]{Institute Name} % Footer on the left

\fancyfoot[R]{\thepage} % Footer on the right with page number


\begin{document}


\title{Title of Document}

\author{}

\date{}

\maketitle


\section{Section 1}

\lipsum[1] % Dummy text


\section{Section 2}

\lipsum[2] % Dummy text


\end{document}
```

Here's a brief explanation of the key components:

- `\documentclass{article}`: This specifies the document class. Here, we use the standard `article` class.
- `\usepackage{fancyhdr}`: This package is used to create custom headers and footers.
- `\usepackage{lipsum}`: This package provides dummy text.
- `\pagestyle{fancy}`: This command applies the `fancy` page style to the document.
- `\fancyhf{}`: This clears any default header and footer settings.
- `\fancyhead[C]{Title of Document}`: This sets the center of the header to "Title of Document".
- `\fancyfoot[L]{Institute Name}`: This sets the left side of the footer to "Institute Name".
- `\fancyfoot[R]{\thepage}`: This sets the right side of the footer to the page number.
- `\title{Title of Document}`: This sets the title of the document.
- `\maketitle`: This command generates the title.
- `\section{Section 1}` and `\section{Section 2}`: These create sections in the document.
- `\lipsum[1]` and `\lipsum[2]`: These generate paragraphs of dummy text from the `lipsum` package.

Compile this LaTeX script with a LaTeX editor or command-line tool to generate the document.

OR

```
\documentclass{article}

\usepackage[a4paper,margin=1in]{geometry}

\usepackage{fancyhdr}

\pagestyle{fancy}

\lhead{Lecture 1}

\rhead{Handout 1}

\lfoot{Lecture 1}

\rfoot{Handout 1}

% \def\changemargin#1#2{\list{}{\rightmargin#2\leftmargin#1}\item[]}

%\let\endchangemargin=\endlist

\title{Proper positioning of headers and footers}

\usepackage{lipsum}
```

```
\begin{document}

    \maketitle

    \thispagestyle{fancy}

    \lipsum[4-57]

\end{document}
```

2. Develop a LaTeX script to create a document that displays the sample Abstract/Summary.

Certainly! Below is a LaTeX script that creates a document with a title, author, date, and a sample abstract/summary section.

```
\documentclass{article}

\usepackage{lipsum} % for dummy text


\title{Sample Document Title}

\author{Author Name}

\date{\today}


\begin{document}


\maketitle


\begin{abstract}

\lipsum[1] % Sample abstract text

\end{abstract}


\section{Introduction}

\lipsum[2] % Dummy text for introduction


\section{Main Content}

\lipsum[3] % Dummy text for main content


\section{Conclusion}
```

```
\lipsum[4] % Dummy text for conclusion
```

```
\end{document}
```

Here's a brief explanation of the key components:

- `\documentclass{article}`: This specifies the document class. Here, we use the standard `article` class.
- `\usepackage{lipsum}`: This package provides dummy text.
- `\title{Sample Document Title}`: This sets the title of the document.
- `\author{Author Name}`: This sets the author of the document.
- `\date{\today}`: This sets the date of the document to the current date.
- `\maketitle`: This command generates the title, author, and date at the beginning of the document.
- `\begin{abstract} ... \end{abstract}`: This environment is used to create the abstract section.
- `\section{Introduction}`, `\section{Main Content}`, and `\section{Conclusion}`: These create sections in the document.
- `\lipsum[1]`, `\lipsum[2]`, `\lipsum[3]`, and `\lipsum[4]`: These generate paragraphs of dummy text from the `lipsum` package.

Compile this LaTeX script with a LaTeX editor or command-line tool to generate the document with the abstract/summary section.

3. Develop a LaTeX script to create a simple title page of the VTU project Report [Use suitable Logos and text formatting]

To create a simple title page for a VTU project report with appropriate logos and text formatting, you can use the following LaTeX script. Make sure you have the VTU logo image (for example, `vtu_logo.png`) saved in the same directory as your LaTeX file.

```
\documentclass[a4paper,12pt]{report}
```

```
\usepackage{graphicx}
```

```
\usepackage{geometry}
```

```
\geometry{left=1in, right=1in, top=1in, bottom=1in}
```

```
\begin{document}
```

`\begin{titlepage}`

`\begin{center}`

`\includegraphics[width=0.3\textwidth]{vtu_logo.png}\[1cm]`

`\textbf{\LARGE{Visvesvaraya Technological University}}\[0.5cm]`

`\textbf{\Large{Belagavi, Karnataka, India}}\[2cm]`

`\textbf{\Huge{Project Report}}\[0.5cm]`

`\textbf{\Large{on}}\[0.5cm]`

`\textbf{\Huge{Title of the Project}}\[2cm]`

`\textbf{\large{Submitted in partial fulfillment of the requirements for the award of the degree of}}\[0.5cm]`

`\textbf{\Large{Bachelor of Engineering}}\[0.5cm]`

`\textbf{\large{in}}\[0.5cm]`

`\textbf{\Large{Computer Science and Engineering}}\[2cm]`

`\begin{minipage}{0.4\textwidth}`

`\begin{flushleft} \large`

`\textbf{Submitted by:}\[`

`\vspace{0.2cm}`

`Student Name\]`

`USN: 1XX00XX000`

`\end{flushleft}`

`\end{minipage}`

`\hfill`

`\begin{minipage}{0.4\textwidth}`

`\begin{flushright} \large`

`\textbf{Guided by:}\[`

`\vspace{0.2cm}`

`Guide Name\]`

```

Assistant Professor

\end{flushright}

\end{minipage}


\fill


\textbf{\Large{Department of Computer Science and Engineering}}\[0.3cm]
\textbf{\Large{[College Name]}}\[0.3cm]
\textbf{\Large{[College Location]}}\[0.3cm]
\textbf{\Large{[Month, Year]}}\

\end{center}
\end{titlepage}


\end{document}

```

Here's a brief explanation of the key components:

- `\documentclass[a4paper,12pt]{report}` : This specifies the document class and paper size.
- `\usepackage{graphicx}` : This package is used to include images.
- `\usepackage{geometry}` : This package allows you to customize the page layout.
- `\geometry{left=1in, right=1in, top=1in, bottom=1in}` : This sets the margins of the document.
- `\begin{titlepage} ... \end{titlepage}` : This environment is used to create a title page.
- `\includegraphics[width=0.3\textwidth]{vtu_logo.png}` : This command includes the VTU logo image. Adjust the `width` as needed.
- `\textbf{\LARGE{...}}`, `\textbf{\Large{...}}`, and `\textbf{\Huge{...}}` : These commands set the text size and make it bold.
- `\begin{minipage} ... \end{minipage}` : These environments are used to create side-by-side sections for student and guide information.

Make sure to replace placeholders like `Title of the Project`, `Student Name`, `USN`, `Guide Name`, `[College Name]`, `[College Location]`, and `[Month, Year]` with the actual information. Save the VTU logo image as `vtu_logo.png` in the same directory as your LaTeX file.

Compile this LaTeX script with a LaTeX editor or command-line tool to generate the title page for the VTU project report.

4. Develop a LaTeX script to create the Certificate Page of the Report [Use suitable commands to leave the blank spaces for user entry]

Certainly! Below is a LaTeX script to create a certificate page for a report. It includes placeholders for user entries such as the student name, project title, and guide name, with suitable blank spaces.

```
\documentclass[a4paper,12pt]{report}

\usepackage{geometry}

\usepackage{setspace} % For setting line spacing

\usepackage{graphicx}


\geometry{left=1in, right=1in, top=1in, bottom=1in}


\begin{document}


\begin{titlepage}

\begin{center}

\vspace*{1cm}


\textbf{\LARGE{[College Name]}}\\[0.5cm]

\textbf{\Large{Affiliated to Visvesvaraya Technological University}}\\[0.5cm]

\textbf{\Large{Belagavi, Karnataka, India}}\\[2cm]


\textbf{\Huge{Certificate}}\\[2cm]


\setstretch{1.5} % Set line spacing
```

\large

This is to certify that the project report entitled \textbf{\underline{\hspace{7cm}}},\n
submitted by \textbf{\underline{\hspace{5cm}}}, bearing USN
\textbf{\underline{\hspace{4cm}}},\n
in partial fulfillment of the requirements for the award of the degree of\n
\textbf{Bachelor of Engineering} in \textbf{Computer Science and Engineering},\n
has been carried out under my supervision and guidance.

\vspace{4cm}

\begin{minipage}{0.4\textwidth}

\begin{flushleft} \large

\textbf{Signature of Guide:}\n

\vspace{1cm}

\underline{\hspace{5cm}}\n

(Guide Name)\n

Assistant Professor\n

Department of Computer Science and Engineering

\end{flushleft}

\end{minipage}

\hfill

\begin{minipage}{0.4\textwidth}

\begin{flushright} \large

\textbf{Signature of HOD:}\n

\vspace{1cm}

\underline{\hspace{5cm}}\n

(HOD Name)\n

Head of Department\n

Department of Computer Science and Engineering

\end{flushright}

\end{minipage}

`\vfill`

`\textbf{External Examiner:} \underline{\hspace{5cm}}\hspace{1cm}`

`\textbf{Date:} \underline{\hspace{3cm}}`

`\end{center}`

`\end{titlepage}`

`\end{document}`

Explanation of key components:

- `\documentclass[a4paper,12pt]{report}` : Specifies the document class and paper size.
- `\usepackage{geometry}` : Allows customization of page margins.
- `\usepackage{setspace}` : Used to set line spacing.
- `\usepackage{graphicx}` : Included for completeness, in case you need to add logos or other images later.
- `\geometry{left=1in, right=1in, top=1in, bottom=1in}` : Sets the document margins.
- `\vspace*{1cm}` : Adds vertical space at the top of the page.
- `\textbf{\LARGE{...}}`, `\textbf{\Large{...}}`, and `\textbf{\Huge{...}}` : Set text sizes and make them bold.
- `\setstretch{1.5}` : Sets the line spacing to 1.5.
- `\underline{\hspace{7cm}}` : Creates an underlined blank space of a specific length for user entries.
- `\begin{minipage} ... \end{minipage}` : Creates side-by-side sections for guide and HOD signatures.

Replace placeholders such as `[College Name]`, `(Guide Name)`, and `(HOD Name)` with actual information. Compile this LaTeX script using a LaTeX editor or command-line tool to generate the certificate page for the report.

6. Develop a LaTeX script to include the side-by-side graphics/pictures/figures in the document by using the subgraph concept.

To include side-by-side graphics/pictures/figures in a LaTeX document using the subfigure environment, you can use the subcaption package. Below is an example LaTeX script demonstrating how to place two figures side by side using subfigures.

```
\documentclass[a4paper,12pt]{article}
```

```
\usepackage{graphicx}
```

```
\usepackage{subcaption}
```

```
\usepackage{caption}
```

```
\begin{document}
```

```
\title{Side-by-Side Figures Example}
```

```
\author{Author Name}
```

```
\date{\today}
```

```
\maketitle
```

```
\begin{abstract}
```

This document demonstrates how to place side-by-side graphics using the subfigure environment in LaTeX.

```
\end{abstract}
```

```
\section{Introduction}
```

This section introduces the concept of placing figures side by side in a LaTeX document using the ``subfigure`` environment from the ``subcaption`` package.

```
\section{Side-by-Side Figures}
```

```
\begin{figure}[htbp]
```

```
\centering
```

```
\begin{subfigure}[b]{0.45\textwidth}
```

```
\centering
```

```
\includegraphics[width=\textwidth]{figure1.png}
```

```

\caption{Caption for Figure 1}

\label{fig:figure1}

\end{subfigure}

\hfill

\begin{subfigure}[b]{0.45\textwidth}

\centering

\includegraphics[width=\textwidth]{figure2.png}

\caption{Caption for Figure 2}

\label{fig:figure2}

\end{subfigure}

\caption{Main caption for the side-by-side figures}

\label{fig:sidebyside}

\end{figure}

```

```
\section{Conclusion}
```

The subfigure environment provided by the `subcaption` package allows for the inclusion of multiple figures side by side in a LaTeX document.

```
\end{document}
```

Explanation of key components:

- `\documentclass[a4paper,12pt]{article}` : Specifies the document class and paper size.
- `\usepackage{graphicx}` : Allows for the inclusion of images.
- `\usepackage{subcaption}` : Provides the subfigure environment for placing figures side by side.
- `\usepackage{caption}` : Enhances caption formatting capabilities.
- `\begin{figure}[htbp] ... \end{figure}` : Creates a floating figure environment.
- `\begin{subfigure}[b]{0.45\textwidth} ... \end{subfigure}` : Creates a subfigure environment. The `[b]` option aligns the subfigures at the bottom, and `{0.45\textwidth}` sets the width of the subfigure to 45% of the text width.
- `\centering` : Centers the subfigures.
- `\includegraphics[width=\textwidth]{figure1.png}` : Includes an image, scaled to the width of the subfigure.

- `\caption{...}` : Adds a caption to the subfigure.
- `\label{fig:figure1}` : Provides a label for referencing the subfigure.
- `\hfill` : Adds horizontal space between the subfigures.
- `\caption{...}` : Adds a main caption to the figure environment.
- `\label{fig:sidebyside}` : Provides a label for referencing the entire figure environment.

Make sure to replace `figure1.png` and `figure2.png` with the actual filenames of your images. Save the images in the same directory as your LaTeX file. Compile this LaTeX script with a LaTeX editor or command-line tool to generate the document with side-by-side figures.

4. Develop a LaTeX script to create the Certificate Page of the Report [Use suitable commands to leave the blank spaces for user entry]

```
\documentclass{article}

\usepackage{graphicx}
\usepackage{geometry}

\geometry{a4paper, margin=2cm}

\begin{document}

\begin{center}
\includegraphics[width=0.3\textwidth]{VTU_Logo.png} % Replace with your organization's logo
\vspace{1cm}

\textbf{\LARGE Certificate of Completion}

\vspace{0.5cm}

This is to certify that

\vspace{0.5cm}

\textbf{[Your Name]}

\vspace{0.5cm}

has successfully completed the course on

\vspace{0.5cm}

\textbf{[Course Title]}

\vspace{0.5cm}
```

```

Date: [\today]

\vspace{1cm}

\begin{minipage}{0.5\textwidth}
  \centering
  \rule{0.8\linewidth}{0.5pt}

  [JNNCE]

  [Shimoga]

\end{minipage}

\end{center}

\end{document}

```

8. Develop a LaTeX script to demonstrate the presentation of Numbered theorems, definitions, corollaries, and lemmas in the document.

```

\documentclass{article}
\usepackage{amsmath}
\usepackage{amsthm}

% Define theorem-like environments
\newtheorem{theorem}{Theorem}[section]
\newtheorem{definition}[theorem]{Definition}
\newtheorem{corollary}[theorem]{Corollary}
\newtheorem{lemma}[theorem]{Lemma}

\begin{document}

\title{Numbered Theorems, Definitions, Corollaries, and Lemmas}
\author{Your Name}
\date{\today}
\maketitle

\section{Introduction}
This document demonstrates how to present numbered theorems, definitions, corollaries, and lemmas in LaTeX.

\section{Main Results}

\begin{theorem}
\label{thm:sample}
This is a sample theorem. It is numbered according to the section.
\end{theorem}

```

```

\begin{proof}
This is a proof of Theorem \ref{thm:sample}. The proof environment automatically formats the
proof text. \qedhere
\end{proof}

\begin{definition}
\label{def:sample}
This is a sample definition. Definitions are numbered in the same sequence as theorems.
\end{definition}

\begin{corollary}
\label{cor:sample}
This is a sample corollary. Corollaries follow from theorems and are numbered accordingly.
\end{corollary}

\begin{lemma}
\label{lem:sample}
This is a sample lemma. Lemmas are also numbered in the same sequence as theorems.
\end{lemma}

\section{Conclusion}
In this document, we have demonstrated how to use LaTeX to present numbered theorems,
definitions, corollaries, and lemmas using the \texttt{amsthm} package.

\end{document}

```

Explanation:

1. **Document Class:**
 - `\documentclass{article}` specifies the type of document.
2. **Packages:**
 - `\usepackage{amsmath}` is used for advanced mathematical formatting.
 - `\usepackage{amsthm}` is used to create theorem-like environments.
3. **Theorem-like Environments:**
 - `\newtheorem{theorem}{Theorem}[section]` defines a new theorem environment with numbering dependent on the section.
 - `\newtheorem{definition}[theorem]{Definition}` defines a definition environment, numbered in the same sequence as theorems.
 - `\newtheorem{corollary}[theorem]{Corollary}` defines a corollary environment, numbered in the same sequence as theorems.
 - `\newtheorem{lemma}[theorem]{Lemma}` defines a lemma environment, numbered in the same sequence as theorems.
4. **Document Body:**
 - `\title{...}`, `\author{...}`, and `\date{...}` define the title, author, and date of the document.
 - `\maketitle` creates the title section.
 - Theorems, definitions, corollaries, and lemmas are presented within their respective environments.

5. Proof Environment:

- `\begin{proof} ... \end{proof}` creates a proof environment. The `\qedhere` command can be used to place the end-of-proof symbol at the end of the proof.

Compile this code using a LaTeX editor like Overleaf, TeXShop, or any other LaTeX tool you prefer. This will create a document with numbered theorems, definitions, corollaries, and lemmas.

Here's the LaTeX program for displaying the quadratic formula:

```
\begin{equation}
x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}
\end{equation}
```

Explanation:

- `\begin{equation}`: This line starts the equation environment.
- `x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}`: This line defines the content of the equation.
 - `x`: Represents the unknown variable.
 - `-b \pm \sqrt{b^2 - 4ac}`: The numerator of the formula with `b` and `c` as coefficients and `a` as the leading coefficient.
 - `-b`: The coefficient of the `x` term.
 - `\pm`: Plus or minus sign.
 - `\sqrt{b^2 - 4ac}`: Square root of the discriminant (`b^2 - 4ac`).
 - `{2a}`: The denominator of the formula with `a` as the leading coefficient.
- `\end{equation}`: This line ends the equation environment.

Additional Notes:

- You can add numbering to the equation using `\begin{equation} \label{eq:quadratic}` before the formula and `\ref{eq:quadratic}` where you want to refer to the equation later in your document.
- To display the quadratic formula along with explanatory text, you can use an `align` environment or other environments provided by LaTeX.

9. Develop a LaTeX script to create a document that consists of two paragraphs with a minimum of 10 citations in it and display the reference in the section.

```
\documentclass[12pt]{article} % Document class and font size
```

```
\begin{document}
```

```
\title{Sample Document with Citations} % Document title
```

```
\author{Your Name} % Author
```

```
\date{\today} % Today's date
```

```
\maketitle % Creates title, author, and date
```

```
\begin{abstract}
```

This is a sample document to demonstrate including citations within paragraphs and displaying references.

```
\end{abstract}
```

```
\section{Introduction} % Optional section heading
```

The first paragraph discusses a general topic. Here, we can introduce some relevant ideas and cite a few sources `\cite{Author1, Author2, Author3}`. It's important to cite the work of others to support your claims and provide context `\cite{Author4}`.

In the second paragraph, we can delve deeper into a specific aspect of the topic. Here, we can add more citations to strengthen our arguments `\cite{Author5, Author6}`. Depending on the citation style you're using, in-text citations can be formatted differently (e.g., author year `\cite{Author7}` or author-number `\cite{Author8}`).

```
\section{References} % References section heading
```

Here, we list all the sources cited in the document. Use the appropriate bibliography style for your field (e.g., BibTeX, natbib).

```
\begin{thebibliography}{9} % Adjust the number based on your references
```

```
\bibitem{Author1} Author A, Author B. Title of the first source. Journal Name. Year;  
Vol:Page-Page.
```

```
\bibitem{Author2} Author C. Title of the second source. Book Publisher. Year.
```

```
\bibitem{Author3} Author D, Author E, Author F. Title of the third source. Conference  
Proceedings. Year; Page-Page.
```

```
% Add additional references for Author4 to Author8
```

```
\bibitem{Author9} Author I, Author J. Title of the ninth source. Another Journal Name.  
Year; Vol:Page-Page.
```

```
\bibitem{Author10} Author K. Title of the tenth source. Another Book Publisher. Year.
```

```
\end{thebibliography}
```

```
\end{document}
```

Note:

the command `\documentclass[12pt]{article}` tells LaTeX to prepare the document as an article with a 12-point font size.

10. Develop a LaTeX script to design a simple tree diagram or hierarchical structure in the document with appropriate labels using the Tikz library.

The TikZ library is a powerful tool in LaTeX for creating graphics, including tree diagrams and hierarchical structures. Below is a LaTeX script that demonstrates how to design a simple tree diagram using TikZ.

```
\documentclass[12pt]{article}
\usepackage{tikz}
\usetikzlibrary{trees}

\begin{document}

\title{Simple Tree Diagram}
\author{Author Name}
\date{\today}
\maketitle

\section{Introduction}
This document demonstrates a simple tree diagram using the TikZ library.

\section{Tree Diagram}

\begin{tikzpicture}[
  grow=east,
  sibling distance=10em,
  level distance=8em,
  edge from parent/.style={draw, -latex},
  every node/.style={text centered, rounded corners, fill=blue!20}
]
  \node {Root}
    child { node {Child 1}
      child { node {Grandchild 1.1} }
      child { node {Grandchild 1.2} }
    }
    child { node {Child 2}
      child { node {Grandchild 2.1} }
      child { node {Grandchild 2.2} }
    };
\end{tikzpicture}

\end{document}
```

Here's a breakdown of the script:

- Document Class and Packages:** The `article` class is specified with a 12pt font size. The `tikz` package is imported to enable drawing.
- TikZ Setup:**
 - The `grow=east` option specifies that the tree grows to the right (east direction).
 - `sibling distance` and `level distance` set the distances between siblings and levels, respectively.
 - `edge from parent/.style={draw, -latex}` defines the style of the edges (lines) connecting the nodes.
 - `every node/.style={text centered, rounded corners, fill=blue!20}` sets the style for all nodes, including centered text, rounded corners, and a light blue fill color.
- Tree Structure:**

- The root node is labeled "Root".
- The root node has two children, "Child 1" and "Child 2".
- Each child node has two children of its own, labeled "Grandchild 1.1", "Grandchild 1.2", "Grandchild 2.1", and "Grandchild 2.2".

When you compile this script using a LaTeX editor that supports TikZ (such as Overleaf, TeXShop, or TeXworks), it will produce a simple hierarchical tree diagram with the specified labels and styles.

You can customize the labels, distances, and styles to fit your specific needs.

11. Develop a LaTeX script to present an algorithm in the document using algorithm/algorithmic/algorithm2e library

```
\documentclass{article}
\usepackage[ruled,vlined]{algorithm2e}

\begin{document}

\title{Sample Algorithm}
\author{}
\date{}
\maketitle

\section*{Algorithm Example}

\begin{algorithm}[H]
\SetAlgoLined
\KwResult{Find the maximum element in an array}
\SetKwInOut{Input}{Input}
\SetKwInOut{Output}{Output}

\Input{An array of integers  $A$  of size  $n$ }
\Output{The maximum element in  $A$ }

\BlankLine

$max \leftarrow A[0];
\For{$i \leftarrow 1$ \KwTo $n-1$}{
  \If{$A[i] > max$}{
    $max \leftarrow A[i];
  }
}
\Return $max$;
\caption{Find Maximum Element}
\end{algorithm}

\end{document}
```

Explanation:

1. Document Class and Packages:

- The document uses the `article` class.
- The `algorithm2e` package is imported with options `ruled` and `vlined` for a specific style.

2. Title and Section:

- The document has a title "Sample Algorithm".
- The algorithm is presented under the section "Algorithm Example".

3. Algorithm Environment:

- The `algorithm` environment is used to define the algorithm.
- `\SetAlgoLined` provides a lined layout for the algorithm.
- `\KwResult`, `\SetKwInOut`, `\Input`, and `\Output` are used to define the result, input, and output of the algorithm.
- `\BlankLine` adds a blank line for better readability.
- The algorithm logic includes initialization, a loop, a conditional statement, and a return statement.

5. Develop a LaTeX script to create a document that contains the following table with proper labels.

```
\documentclass{article}

\usepackage{array}

\usepackage{caption}

\begin{document}

\title{Student Marks Report}
\author{}
\date{}
\maketitle

\section*{Student Marks Table}

\begin{table}[h!]

\centering
\caption{Marks obtained by students in three subjects}
\begin{tabular}{|c|c|c|c|c|c|}
\hline
\textbf{S.No} & \textbf{USN} & \textbf{Student Name} & \textbf{Subject1} & \textbf{Subject2} & \textbf{Subject3} \\
\hline
1 & 4XX22XX001 & Name 1 & 89 & 60 & 90 \\
\hline
\end{tabular}
\end{table}
```

```

\hline
2 & 4XX22XX002 & Name 2 & 78 & 45 & 98 \\
\hline
3 & 4XX22XX003 & Name 3 & 67 & 55 & 59 \\
\hline
\end{tabular}
\end{table}

\end{document}

```

7. Develop a LaTeX script to create a document that consists of the following two mathematical equations

```

\documentclass{article}
\usepackage{amsmath}

\begin{document}

\begin{align*}
x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad \ll[10pt] \\
&= \frac{-2 \pm \sqrt{2^2 - 4 \cdot 1 \cdot (-8)}}{2 \cdot 1} \quad \ll[10pt] \\
&= \frac{-2 \pm \sqrt{4 + 32}}{2} \\
\end{align*}

\begin{align*}
\varphi_{\sigma}^{\lambda} A_t &= \sum_{\pi \in C_t} \text{sgn}(\pi) \\
&= \sum_{\tau \in C_{\sigma t}} \text{sgn}(\sigma^{-1} \tau \sigma) \\
&= A_{\sigma t} \varphi_{\sigma}^{\lambda}
\end{align*}

\end{document}

```

This script uses the `align*` environment from the `amsmath` package to properly align the equations and includes additional spacing (`\ll[10pt]`) between the steps for better readability. You can compile this script using a LaTeX editor to produce the desired output.

8. Develop a LaTeX script to demonstrate the presentation of Numbered theorems, definitions, corollaries, and lemmas in the document.

```

\documentclass{article}
\usepackage{amsmath} %for methematical symbols and environment
\usepackage{amsthm} %for the proof environment

```

```

% Define theorem-like environments
\newtheorem{theorem}{Theorem}[section]
\newtheorem{definition}[theorem]{Definition}
\newtheorem{corollary}[theorem]{Corollary}
\newtheorem{lemma}[theorem]{Lemma}

\begin{document}

\title{Numbered Theorems, Definitions, Corollaries, and Lemmas}
\author{Your Name}
\date{\today}
\maketitle %displays the title, author, and date.

\section{Introduction}
This document demonstrates how to present numbered theorems, definitions, corollaries, and lemmas in LaTeX.

\section{Main Results}

\begin{theorem}
\label{thm:sample}
This is a sample theorem. It is numbered according to the section.
\end{theorem}

\begin{proof}
This is a proof of Theorem \ref{thm:sample}. The proof environment automatically formats the proof text. \qedhere
\end{proof}

\begin{definition}
\label{def:sample}
This is a sample definition. Definitions are numbered in the same sequence as theorems.
\end{definition}

\begin{corollary}
\label{cor:sample}
This is a sample corollary. Corollaries follow from theorems and are numbered accordingly.
\end{corollary}

\begin{lemma}
\label{lem:sample}
This is a sample lemma. Lemmas are also numbered in the same sequence as theorems.
\end{lemma}

\section{Conclusion}
In this document, we have demonstrated how to use LaTeX to present numbered theorems, definitions, corollaries, and lemmas using the \texttt{amsthm} package.

\end{document}

```

9. Develop a LaTeX script to create a document that consists of two paragraphs with a minimum of 10 citations in it and display the reference in the section.

```
\documentclass[12pt]{article} % Document class and font size
```

```
\begin{document}
```

```
\title{Sample Document with Citations} % Document title
```

```
\author{Your Name} % Author
```

```
\date{\today} % Today's date
```

```
\maketitle % Creates title, author, and date
```

```
\begin{abstract}
```

This is a sample document to demonstrate including citations within paragraphs and displaying references.

```
\end{abstract}
```

```
\section{Introduction} % Optional section heading
```

The first paragraph discusses a general topic. Here, we can introduce some relevant ideas and cite a few sources `\cite{Author1, Author2, Author3}`. It's important to cite the work of others to support your claims and provide context `\cite{Author4}`.

In the second paragraph, we can delve deeper into a specific aspect of the topic. Here, we can add more citations to strengthen our arguments `\cite{Author5, Author6}`. Depending on the citation style you're using, in-text citations can be formatted differently (e.g., author year `\cite{Author7}` or author-number `\cite{Author8}`).

```
\section{References} % References section heading
```

Here, we list all the sources cited in the document. Use the appropriate bibliography style for your field (e.g., BibTeX, natbib).

```
\begin{thebibliography}{9} % Adjust the number based on your references
```

```
\bibitem{Author1} Author A, Author B. Title of the first source. Journal Name. Year; Vol:Page-Page.
```

```
\bibitem{Author2} Author C. Title of the second source. Book Publisher. Year.
```

```
\bibitem{Author3} Author D, Author E, Author F. Title of the third source. Conference Proceedings. Year; Page-Page.
```

```
% Add additional references for Author4 to Author8
```

```
\bibitem{Author9} Author I, Author J. Title of the ninth source. Another Journal Name. Year; Vol:Page-Page.
```

```
\bibitem{Author10} Author K. Title of the tenth source. Another Book Publisher. Year.
```

```
\end{thebibliography}
```

```
\end{document}
```

10. Develop a LaTeX script to design a simple tree diagram or hierarchical structure in the document with appropriate labels using the Tikz library.

```
\documentclass[12pt]{article}
```

```
\usepackage{tikz}
```

```
\usetikzlibrary{trees}
```

```
\begin{document}
```

```
\title{Simple Tree Diagram}
```

```
\author{Author Name}
```

```
\date{\today}
```

```
\maketitle
```

```
\section{Introduction}
```

This document demonstrates a simple tree diagram using the TikZ library.

```
\section{Tree Diagram}
```

```
\begin{tikzpicture}[
```

```
grow=east,
```

```
sibling distance=10em,
```

```
level distance=8em,
```

```
edge from parent/.style={draw, -latex},
```

```
every node/.style={text centered, rounded corners, fill=blue!20}
```

```
]
```

```
\node {Root}
```

```
child { node {Child 1}
```

```
child { node {Grandchild 1.1} }
```

```
child { node {Grandchild 1.2} }
```

```
}
```

```
child { node {Child 2}
```

```
child { node {Grandchild 2.1} }
```

```
child { node {Grandchild 2.2} }
```

```
};
```

```
\end{tikzpicture}
```

```
\end{document}
```

11. Develop a LaTeX script to present an algorithm in the document using algorithm/algorithmic/algorithm2e library.

```

\documentclass{ article}
\usepackage[ruled,vlined]{ algorithm2e}

\begin{ document}
\title{ Sample Algorithm}
\author{ }
\date{ }
\maketitle
\section*{ Algorithm Example}
\begin{ algorithm}[H]
\SetAlgoLined
\KwResult{ Find the maximum element in an array }% In LaTeX, particularly in the algorithm2e
package, the prefix Kw stands for "keyword."
\SetKwInOut{ Input }{ Input}
\SetKwInOut{ Output }{ Output}
\Input{ An array of integers  $A$  of size  $n$ }
\Output{ The maximum element in  $A$ }
\BlankLine
 $\max \leftarrow A[0]$ ;
\For{  $i \leftarrow 1$  \KwTo  $n-1$  }{
\If{  $A[i] > \max$  }{
 $\max \leftarrow A[i]$ ;
}
}
\Return  $\max$ ;
\caption{ Find Maximum Element}
\end{ algorithm}
\end{ document}

```

12. Develop a LaTeX script to create a simple report and article by using suitable commands and formats of user choice.

```

\documentclass[a4paper,12pt]{ report}
\usepackage{ graphicx}
\usepackage{ amsmath}
\usepackage{ hyperref}

\title{ A Simple Report}
\author{ Author Name}
\date{ \today}

\begin{ document}
\maketitle
\tableofcontents
\listoffigures
\listoftables
\chapter{ Introduction}
This is the introduction to the simple report. Here, you can provide an overview of the topics
covered in the report.
\chapter{ Background}

```



```

\section{Historical Context}
Discuss the historical context of the topic.
\section{Current State of Research}
Describe the current state of research in the field.
\chapter{Methodology}
\section{Data Collection}
Explain the methods used for data collection.
\section{Data Analysis}
Describe the techniques used to analyze the data.
\chapter{Results}
\section{Findings}
Present the findings of the study.
\begin{table}[h!]
\centering
\caption{Sample Table}
\begin{tabular}{|c|c|c|}
\hline
Column1 & Column2 & Column3 \\
\hline
Data1 & Data2 & Data3 \\
\hline
Data4 & Data5 & Data6 \\
\hline
\end{tabular}
\end{table}
\section{Visual Data}
Include figures to illustrate the data.
\begin{figure}[h!]
\centering
\includegraphics[width=0.5\textwidth]{example-image}
\caption{Sample Figure}
\end{figure}
\chapter{Conclusion}
Summarize the main findings and implications of the study.
\appendix
\chapter{Appendix A}
Additional information can be included here.
\chapter{Appendix B}
More supplementary information can be included here.
\end{document}

```

12. Develop a LaTeX script to create a simple report and article by using suitable commands and formats of user choice.

```

\documentclass[a4paper,12pt]{article}
\usepackage{graphicx}
\usepackage{amsmath}
\usepackage{hyperref}

\title{A Simple Article}

```

`\author{ Author Name }`

`\date{\today }`

`\begin{ document }`

`\maketitle`

`\begin{ abstract }`

This is a brief abstract of the article. It provides a summary of the main points covered in the document.

`\end{ abstract }`

`\section{ Introduction }`

This section introduces the topic of the article. Here, you can provide an overview and state the objectives of the article.

`\section{ Related Work }`

Discuss related work in the field. This includes citing relevant studies and how they relate to the current work.

`\section{ Methodology }`

`\subsection{ Data Collection }`

Explain the methods used for data collection.

`\subsection{ Data Analysis }`

Describe the techniques used to analyze the data.

`\section{ Results }`

Present the results of the study. This section can include both text and visual data.

`\begin{ table } [h!]`

`\centering`

`\caption{ Sample Table }`

`\begin{ tabular } { | c | c | c | }`

`\hline`

Column1 & Column2 & Column3 \\

`\hline`

Data1 & Data2 & Data3 \\

`\hline`

Data4 & Data5 & Data6 \\

`\hline`

`\end{ tabular }`

`\end{ table }`

`\begin{ figure } [h!]`

`\centering`

`\includegraphics[width = 0.5 \textwidth] { example-image }`

`\caption{ Sample Figure }`

`\end{ figure }`

`\section{ Discussion }`

Interpret the results and discuss their implications. Compare the findings with those of previous studies.

`\section{ Conclusion }`

Summarize the main findings and discuss the future direction for research.

`\begin{ thebibliography } { 9 }`

`\bibitem{ example1 } Author, \textit{ Title of the Book }, Publisher, Year.`

`\bibitem{ example2 } Author, \textit{ Title of the Article }, Journal, Year.`

`\end{ thebibliography }`

`\end{ document }`