Latex Template

Test

A demonstration

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Contents

Chapter 1

Introduction

1.1 Background

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

1.1.1 History

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Chapter 2

Main Content

2.1 Definitions

> **Definition 2.1.1**
>
> Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.
>
> Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.
>
> Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.
>
> Quisque ullamcorper placerat ipsum. Cras nibh. Morbi vel justo vitae lacus tincidunt ultrices. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. In hac habitasse platea dictumst. Integer tempus convallis augue. Etiam facilisis. Nunc elementum fermentum wisi. Aenean placerat. Ut imperdiet, enim sed gravida sollicitudin, felis odio placerat quam, ac pulvinar elit purus eget enim. Nunc vitae tortor. Proin tempus nibh sit amet nisl. Vivamus quis tortor vitae risus porta vehicula.
>
> Fusce mauris. Vestibulum luctus nibh at lectus. Sed bibendum, nulla a faucibus semper, leo velit ultricies tellus, ac venenatis arcu wisi vel nisl. Vestibulum diam. Aliquam pellentesque, augue quis sagittis posuere, turpis lacus congue quam, in hendrerit risus eros eget felis. Maecenas eget erat in sapien mattis porttitor. Vestibulum porttitor. Nulla facilisi. Sed a turpis eu lacus commodo facilisis. Morbi fringilla, wisi in dignissim interdum, justo lectus sagittis dui, et vehicula libero dui cursus dui. Mauris tempor ligula sed lacus. Duis cursus enim ut augue. Cras ac magna.

Cras nulla. Nulla egestas. Curabitur a leo. Quisque egestas wisi eget nunc. Nam feugiat lacus vel est. Curabitur consectetuer.

Suspendisse vel felis. Ut lorem lorem, interdum eu, tincidunt sit amet, laoreet vitae, arcu. Aenean faucibus pede eu ante. Praesent enim elit, rutrum at, molestie non, nonummy vel, nisl. Ut lectus eros, malesuada sit amet, fermentum eu, sodales cursus, magna. Donec eu purus. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus. Curabitur et nunc. Aliquam dolor odio, commodo pretium, ultricies non, pharetra in, velit. Integer arcu est, nonummy in, fermentum faucibus, egestas vel, odio.

2.2 Identities

Identity 2.2.1

This is a custom identity box.

1. Here is a floor function: $\lfloor x \rfloor$

2. Here is a ceiling function: $\lceil x \rceil$

3. Here is an integral: $\int_a^b f(x)\,dx$

4. Here is a sum: $\sum_{n=1}^{\infty} a_n$

5. Here is a differential: $\frac{dy}{dx}$

6. Here is a partial differential: $\frac{\partial u}{\partial x}$

7. Here is a limit: $\lim_{n \to \infty} a_n$

8. Here is an infinite series: $\sum_{n=1}^{\infty} a_n$

9. Here is a matrix: $\begin{matrix} a & b \\ c & d \end{matrix}$

10. Here is a parentheses matrix: $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$

11. Here is a bracket matrix: $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$

12. Here are some cases:
$$\left\{ \begin{array}{ll} x(n), & \text{for } 0 \leq n \leq 1 \\ x(n-1), & \text{for } 0 \leq n \leq 1 \\ x(n-1), & \text{for } 0 \leq n \leq 1 \end{array} \right\}$$

13. Here is an absolute value: $|x|$

14. Here is a norm: $\|x\|$

15. Here is a set: $\{x \mid x \geq 0\}$

16. Here is an angle: $\langle x \rangle$

17. Here is an equation:
$$E = mc^2 \tag{2.1}$$

18. Here is an equation array:
$$\begin{aligned} a &= b + c \\ d &= e + f \end{aligned}$$

19. Here is a double integral: $\iint 3x + 4y\,dx\,dy$

20. Here is a triple integral: $\iiint 3x + 4y + 5z\,dx\,dy\,dz$

21. Here are some more commands: $\mathbb{R}, \mathbb{Q}, \mathbb{Z}, \mathbb{N}, \forall x \in \mathbb{R}, \exists x \in \mathbb{R}$

2.3   Proofs

Proof 2.3.1

This is a custom proof box.

2.4   Notes

Note 2.4.1

This is a custom note box.

2.5   Code Blocks

2.5.1   Custom Code block

```
code-2.5.1.0
1   import math
2   import numpy
3   from PIL import Image
4
5
6   def ascii_color_encode():
7       ascii_colors = {}
8
9       # Generating unique RGB values for ASCII characters
10      for i in range(128):
11          red = (i * 17) % 256   # Unique red component
12          green = (i * 37) % 256   # Unique green component
13          blue = (i * 23) % 256   # Unique blue component
14
15          # Storing RGB values in a dictionary with ASCII value as key
16          ascii_colors[i] = [red, green, blue]
17
18      # Displaying the dictionary
19      return ascii_colors
20
21
22  def text_to_picture(path, ascii_colours, save_as):
23      file = open(path, 'r')
24      data = file.read()
25      ascii_values = []
26      for i in data:
27          if ord(i) < 128:   # Check if character falls within ASCII range
28              ascii_values.append(ord(i))
29          else:
30              ascii_values.append(ord(' '))   # Replace non-ASCII characters with a space ' '
31      square = int(math.ceil(math.sqrt(len(ascii_values))))
32      print(square)   # Adjusted square size
33      total_elements = square * square
34      for i in range(total_elements - len(ascii_values)):
```

```python
35          ascii_values.append(ord(' '))  # Fill remaining spaces with ' '
36      pixel_array = []
37      for i in range(0, len(ascii_values)):
38          pixel_array.append(ascii_colours[ascii_values[i]])
39
40      array = numpy.array(pixel_array, dtype=numpy.uint8).reshape(square, square, 3)
41
42      image = Image.fromarray(array)
43      image.resize((1000, 1000))
44      image.save(f'{save_as}.png')
45
46
47  def picture_to_text(picture_path, ascii_colours, output_name):
48      image = Image.open(picture_path)
49      pixels = image.load()
50      width, height = image.size
51      data = []
52      for i in range(width):
53          for j in range(height):
54              data.append(pixels[j, i])
55      text = ''
56      for k in data:
57          for j in ascii_colours:
58              if ascii_colours[j] == list(k):
59                  text += chr(j)
60
61      with open(f'{output_name}.txt', 'w') as file:
62          file.write(text)
63  text_to_picture(path='sample.txt', ascii_colours=ascii_color_encode(), save_as='image')}
```

2.5.2   Source code for template

```latex
                                    code-2.5.2.0
1  \usepackage[a4paper, margin=1in]{geometry}
2  \usepackage[margin=0pt, noheadfoot]{geometry}
3  \usepackage{minted}
4  \setminted{breaklines, % Break lines automatically
5      breakanywhere, % Allow breaks anywhere
6      fontsize=\small, % Font size for the code
7      frame=single, % Border style for the code block
8      bgcolor=darkbackground, % Background color for the code block
9      linenos, % Display line numbers
10     numbersep=5pt, % Space between line numbers and code
11     highlightlines=1,% Highlight specific lines (if any)
12     label=code-\thecodeblock}
13 \usepackage{caption}
14 \usepackage{tcolorbox}
15 \tcbuselibrary{breakable, skins, theorems, listings}
16 \usepackage{titlesec}
17 \usepackage{fancyhdr}
18 \usepackage{hyperref}
19 \usepackage{lipsum}
20 \usepackage{amsmath}
21 \usepackage{amsthm}
22 \usepackage{amssymb}
23 \usepackage{enumitem}
24 \usepackage{tikz}
25 \usepackage{tocloft}
26
27 % Colors
28 \usepackage{xcolor}
```

```latex
29  \definecolor{darkbackground}{HTML}{121212}
30  \definecolor{whitetext}{HTML}{FFFFFF}
31  \definecolor{cyanaccent}{HTML}{00FFFF}
32  \definecolor{lightcyan}{HTML}{E0FFFF}
33  \definecolor{lightgray}{HTML}{D3D3D3}
34  \definecolor{accent1}{HTML}{0047AB}
35  \definecolor{accent2}{HTML}{6495ED}
36  \definecolor{accent3}{HTML}{3F00FF}
37  \definecolor{myorange}{HTML}{FFA500}
38  \definecolor{mylightblue}{HTML}{ADD8E6}
39  \definecolor{mygreen}{HTML}{90EE90}
40
41  \pagecolor{darkbackground}
42  \color{whitetext}
43
44  \newenvironment{longlisting}{\captionsetup{type=listing}}{}
45
46  % Custom Counters
47  \newcounter{mydefinition}[subsection]
48  \renewcommand{\themydefinition}{\thesubsection.\arabic{mydefinition}}
49  \newcounter{myidentity}[subsection]
50  \renewcommand{\themyidentity}{\thesubsection.\arabic{myidentity}}
51  \newcounter{myproof}[subsection]
52  \renewcommand{\themyproof}{\thesubsection.\arabic{myproof}}
53  \newcounter{mynote}[subsection]
54  \renewcommand{\themynote}{\thesubsection.\arabic{mynote}}
55  \newcounter{mycodeblock}[subsection]
56  \renewcommand{\themycodeblock}{\thesubsection.\arabic{mycodeblock}}
57  \newcounter{myexercise}[subsection]
58  \renewcommand{\themyexercise}{\thesubsection.\arabic{myexercise}}
59  \newcounter{codeblock}[section]
60  \renewcommand{\thecodeblock}{\thesubsection.\arabic{codeblock}}
61
62
63  \setminted{breaklines, % Break lines automatically
64      breakanywhere, % Allow breaks anywhere
65      fontsize=\small, % Font size for the code
66      frame=single, % Border style for the code block
67      bgcolor=darkbackground, % Background color for the code block
68      linenos, % Display line numbers
69      numbersep=5pt, % Space between line numbers and code
70      label=code-\thecodeblock}
71
72  % Custom Environments
73  \tcbuselibrary{listingsutf8}
74  \newtcolorbox[use counter=mydefinition, number
    ↪   within=section]{mydefinition}[1][]{colback=white, colframe=cyanaccent,
    ↪   fonttitle=\bfseries, breakable=true, enhanced, parbox=false,
    ↪   title=Definition~\themydefinition, #1}
75  \newtcolorbox[use counter=myidentity, number within=section]{myidentity}[1][]{colback=white,
    ↪   colframe=myorange, fonttitle=\bfseries, breakable=true, enhanced jigsaw, before
    ↪   skip=10pt, after skip=10pt, parbox=false, title=Identity~\themyidentity, #1}
76  \newtcolorbox[use counter=myproof, number within=section]{myproof}[1][]{colback=white,
    ↪   colframe=mygreen, fonttitle=\bfseries, breakable=true, enhanced jigsaw, before
    ↪   skip=10pt, after skip=10pt, parbox=false, title=Proof~\themyproof, #1}
77  \newtcolorbox[use counter=mynote, number within=section]{mynote}[1][]{colback=white,
    ↪   colframe=accent3, fonttitle=\bfseries, breakable=true, enhanced jigsaw, before
    ↪   skip=10pt, after skip=10pt, parbox=false, title=Note~\themynote, #1}
78  \newtcolorbox[use counter=mycodeblock, number
    ↪   within=section]{mycodeblock}[1][]{colback=darkbackground, colframe=accent2,
    ↪   fonttitle=\bfseries, breakable=unlimited, enhanced jigsaw, before skip=10pt, after
    ↪   skip=10pt, parbox=false, title=Code~\themycodeblock, #1}
79  \newtcolorbox[use counter=myexercise, number within=section]{myexercise}[1][]{colback=white,
    ↪   colframe=accent1, fonttitle=\bfseries, breakable=true, enhanced jigsaw, before
    ↪   skip=10pt, after skip=10pt, parbox=false, title=Exercise~\themyexercise, #1}
```

```latex
80
81  % Custom Theorem-like Environments
82  \newtheorem{mytheorem}{Theorem}[subsection]
83  \newtheorem{mydefinitiontheorem}{Definition}[subsection]
84  \newtheorem{myexercisetheorem}{Exercise}[subsection]
85
86  % Syntax Highlighting
87  \usemintedstyle{monokai}
88  \setminted{
89      bgcolor=darkbackground,
90      style=monokai,
91      linenos,
92      breaklines,
93      fontsize=\small
94  }
95
96  % Custom Title Page with TikZ Decorations and Logo
97  \newcommand{\customtitle}[6]{
98      \begin{titlepage}
99          \noindent
100         \begin{tikzpicture}[remember picture,overlay]
101             \begin{scope}[blend mode=soft light]
102                 \fill[accent1] (current page.south west) rectangle (current page.north east);
103                 \fill[accent2] (0.2*\paperwidth,0.2*\paperheight) -- (current page.north
                    ↪  east) -- (current page.north west) -- cycle;
104                 \fill[accent3] (current page.south west) -- (current page.north west) --
                    ↪  (0.8*\paperwidth,0.8*\paperheight) -- cycle;
105                 \draw[line width=1mm, cyanaccent, opacity=0.5] (current page.south west) --
                    ↪  (current page.north east);
106                 \draw[line width=1mm, cyanaccent, opacity=0.5] (current page.south east) --
                    ↪  (current page.north west);
107             \end{scope}
108             % Logo
109             \node [anchor=north, yshift=-8.2cm] at (current page.north) {
110                 \includegraphics[width=0.5\textwidth]{#6}
111             };
112             % Title and Subtitle in cyan box
113             \node [fill=cyanaccent, fill opacity=0.8, text opacity=1, inner sep=1cm,
                ↪  anchor=north, text width=\paperwidth, minimum height=0.15\paperheight,
                ↪  align=center] at ([yshift=-2cm]current page.center) {
114                 \Huge\textbf{\textit{#1}}\\[0.5cm]
115                 \Large\textbf{\textit{#5}}
116             };
117             % Author, Subject, and Date in royal blue box
118             \node [fill=accent3, fill opacity=0.8, text opacity=1, inner sep=0.5cm,
                ↪  anchor=north, text width=\textwidth-8cm, align=center] at
                ↪  ([yshift=-6.45cm]current page.center) {
119                 \Large\textbf{\textit{#2}}\\[0.5cm]
120                 \normalsize\textbf{#3}\\[0.5cm]
121                 \normalsize\textbf{#4}
122             };
123         \end{tikzpicture}
124     \end{titlepage}
125  }
126
127  % Custom Chapter Page with TikZ Decorations
128  \newcommand{\chapterpage}{
129      \begin{tikzpicture}[remember picture,overlay]
130          \begin{scope}[blend mode=soft light]
131              \fill[accent1] (0,0) rectangle (\paperwidth,\paperheight);
132              \fill[accent2] (0.2*\paperwidth,0.2*\paperheight) --
                 ↪  (\paperwidth,0.8*\paperheight) -- (\paperwidth,0) -- cycle;
133              \fill[accent3] (0,0) -- (\paperwidth,0) -- (0.8*\paperwidth,0.8*\paperheight) --
                 ↪  cycle;
```

```latex
134            \end{scope}
135        \end{tikzpicture}
136  }
137
138  %Custom math commands
139  \newcommand{\intg}[3]{\int_{#1}^{#2} #3 \, dx}
140  \newcommand{\sumg}[3]{\sum_{#1}^{#2} #3}
141  \newcommand{\diff}[2]{\frac{d #1}{d #2}}
142  \newcommand{\pdiff}[2]{\frac{\partial #1}{\partial #2}} % Partial differential
143  \newcommand{\limit}[3]{\lim_{#1 \to #2} #3} % Limit
144  \newcommand{\infseries}[2]{\sum_{#1}^{\infty} #2} % Infinite series
145  \newcommand{\mat}[1]{\begin{matrix} #1 \end{matrix}} % Matrix
146  \newcommand{\pmat}[1]{\begin{pmatrix} #1 \end{pmatrix}} % Parentheses matrix
147  \newcommand{\bmat}[1]{\begin{bmatrix} #1 \end{bmatrix}} % Bracket matrix
148  \newcommand{\mycases}[1]{\left\{\begin{array}{lr}
149          x(n), & \text{for } 0\leq n\leq 1\\
150          x(n-1), & \text{for } 0\leq n\leq 1\\
151          x(n-1), & \text{for } 0\leq n\leq 1
152          \end{array}\right\}}
153  \newcommand{\floor}[1]{\left\lfloor #1 \right\rfloor} % Floor function
154  \newcommand{\ceil}[1]{\left\lceil #1 \right\rceil} % Ceiling function
155  \newcommand{\abs}[1]{\left| #1 \right|} % Absolute value
156  \newcommand{\norm}[1]{\left\| #1 \right\|} % Norm
157  \newcommand{\set}[1]{\left\{ #1 \right\}} % Set
158  \newcommand{\ang}[1]{\left\langle #1 \right\rangle} % Angle
159  \newcommand{\eqn}[1]{\begin{equation} #1 \end{equation}} % Equation
160  \newcommand{\eqnarrayx}[1]{\begin{eqnarray} #1 \end{eqnarray}} % Equation array
161  \newcommand{\R}{\mathbb{R}}
162  \newcommand{\Z}{\mathbb{Z}}
163  \newcommand{\N}{\mathbb{N}}
164  \newcommand{\Q}{\mathbb{Q}}
165  \newcommand{\forallx}{\forall x \in \mathbb{R}}
166  \newcommand{\existsx}{\exists x \in \mathbb{R}}
167  \newcommand{\iintd}[1]{\iint\!#1\,dx\,dy}
168  \newcommand{\iiintd}[1]{\iiint\!#1\,dx\,dy\,dz}
169  \newcommand{\nint}[3]{\int_{#1}^{#2}\!#3\,dx}
170
171  % Custom Headers and Footers
172  \pagestyle{fancy}
173  \fancyhf{}
174  \fancyhead[LE,RO]{\thepage}
175  \fancyhead[RE]{\leftmark}
176  \fancyhead[LO]{\rightmark}
177
178  % Section Formatting
179  \titleformat{\section}
180    {\normalfont\Large\bfseries\color{cyanaccent}}
181    {\thesection}{1em}{}
182  \titleformat{\subsection}
183    {\normalfont\large\bfseries\color{cyanaccent}}
184    {\thesubsection}{1em}{}
185  \titleformat{\subsubsection}
186    {\normalfont\normalsize\bfseries\color{cyanaccent}}
187    {\thesubsubsection}{1em}{}
188
189  \newcommand{\settitle}[1]{
190  \hypersetup{
191      colorlinks=true,
192      linkcolor=cyanaccent,
193      filecolor=cyanaccent,
194      urlcolor=cyanaccent,
195      citecolor=cyanaccent,
196      pdftitle={#1},
```

```
197        pdfpagemode=FullScreen
198  }}
```

2.6   Exercises

> **Exercise 2.6.1**
>
> This is a custom exercise box.

> **Exercise 2.6.2**
>
> Another exercise box.

Chapter 3

Test

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

Quisque ullamcorper placerat ipsum. Cras nibh. Morbi vel justo vitae lacus tincidunt ultrices. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. In hac habitasse platea dictumst. Integer tempus convallis augue. Etiam facilisis. Nunc elementum fermentum wisi. Aenean placerat. Ut imperdiet, enim sed gravida sollicitudin, felis odio placerat quam, ac pulvinar elit purus eget enim. Nunc vitae tortor. Proin tempus nibh sit amet nisl. Vivamus quis tortor vitae risus porta vehicula.