
THE BOOK

L^AT_EX TEMPLATES

EDITED BY

EDITED BY ANDY

The University Name



202X

PUBLISHER

Preface

The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.

The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.

Contents

Preface	i
Chapter 1 The first chapter	1
1.1 The first section	1
1.1.1 A sub section	1
1.2 The second section	3
1.2.1 A sub section	3
1.3 The third section	4
1.4 Algorithm	5
Chapter 2 The second chapter	7
2.1 Table Environment	7
2.2 Figure Environment	8
2.3 Discussion of $\mathbf{Z} = \mathbf{X} \cup \mathbf{Y}$	9
2.3.1 A sub section	10
2.4 The second section	10
2.4.1 A sub section	10
Appendix A This is the first appendix	11
A.1 A sub section	11
A.2 A sub section	13
Appendix B This is the second appendix	14
B.1 A sub section	14
B.2 A sub section	14
References	15
Index	16

Chapter 1

The first chapter

1.1 The first section

LaTeX is a high-quality typesetting system; it includes features designed for the production of technical and scientific documentation. LaTeX is the de facto standard for the communication and publication of scientific documents.

The unnumbered list

- item one
- item two
- item three

The numbered list

1. item one
2. item two
3. item three

1.1.1 A sub section

LaTeX is not a word processor! Instead, LaTeX encourages authors not to worry too much about the appearance of their documents but to concentrate on getting the right content. For example consider this document:

$$\sin^2 \theta + \cos^2 \theta = 1. \tag{1.1}$$

1.2 The second section

LaTeX is a high-quality typesetting system; it includes features designed for the production of technical and scientific documentation. LaTeX is the de facto standard for the communication and publication of scientific documents.

1.2.1 A sub section

LaTeX is not a word processor! Instead, LaTeX encourages authors not to worry too much about the appearance of their documents but to concentrate on getting the right content. LaTeX is a high-quality typesetting system; it includes features designed for the production of technical and scientific documentation. LaTeX is the de facto standard for the communication and publication of scientific documents.

The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.

Definition 1.1. *This is a definition environment.*

Lemma 1.1. *This is a lemma environment.*

Theorem 1.1. *This is a theorem environment.*

Proposition 1.1. *This is a proposition environment.*

Lemma 1.2. *This is a lemma environment*

(i) *item A*

(ii) *item B*

$$\lim_{n \rightarrow \infty} \left(1 + \frac{1}{n}\right)^n = e. \quad (1.11)$$

Theorem 1.2 (Mass–energy). *This is a theorem environment.*

Proof. This is a proof environment. □

Remark 1.1. *This is a remark environment.*

Example 1.1. *This is example environment.*

The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.

The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.

1.3 The third section

LaTeX is a high-quality typesetting system; it includes features designed for the production of technical and scientific documentation. LaTeX is the de facto standard for the communication and publication of scientific documents.

Here we state our main result as 1.3.

Theorem 1.3 (*LDL^T Factorization [2]*). *If $A \in \mathbb{R}^{n \times n}$ is symmetric and the principal submatrix $A(1 : k, 1 : k)$ is nonsingular for $k = 1 : n - 1$, then there exists a unit lower triangular matrix L and a diagonal matrix*

$$D = \text{diag}(d_1, \dots, d_n),$$

such that $A = LDL^T$. The factorization is unique.

LaTeX is a high-quality typesetting system; it includes features designed for the production of technical and scientific documentation. LaTeX is the de facto standard for the communication and publication of scientific documents. LaTeX is based on the idea that it is better to leave document design to document designers, and to let authors get on with writing documents.

Theorem 1.4 (Mean Value Theorem). *Suppose f is a function that is continuous on the closed interval $[a, b]$. and differentiable on the open interval (a, b) . Then there exists a number c such that $a < c < b$ and*

$$f'(c) = \frac{f(b) - f(a)}{b - a}.$$

In other words,

$$f(b) - f(a) = f'(c)(b - a).$$

Remark 1.2. *Observe that 1.3, 1.4 correctly mix references to multiple labels.*

Corollary 1.1. *Let $f(x)$ be continuous and differentiable everywhere. If $f(x)$ has at least two roots, then $f'(x)$ must have at least one root.*

Proof. Let a and b be two distinct roots of f . By 1.4, there exists a number c such that

$$f'(c) = \frac{f(b) - f(a)}{b - a} = \frac{0 - 0}{b - a} = 0.$$

□

Note that it may require two L^AT_EX compilations for the proof marks to show.

Display matrices can be rendered using environments from **amsmath**:

$$S = \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix} \quad \text{and} \quad C = \begin{pmatrix} 1 & 1 & 0 \\ 1 & 1 & 0 \\ 0 & 0 & 0 \end{pmatrix}. \quad (1.12)$$

Equation 1.12 shows some example matrices.

We calculate the Fréchet derivative of F as follows:

$$F'(U, V)(H, K) = \langle R(U, V), H\Sigma V^T + U\Sigma K^T - P(H\Sigma V^T + U\Sigma K^T) \rangle \quad (1.13a)$$

$$\begin{aligned} &= \langle R(U, V), H\Sigma V^T + U\Sigma K^T \rangle \\ &= \langle R(U, V)V\Sigma^T, H \rangle + \langle \Sigma^T U^T R(U, V), K^T \rangle. \end{aligned} \quad (1.13b)$$

1.13a is the first line, and 1.13b is the last line.

1.4 Algorithm

Our analysis leads to the algorithm in 1.

Algorithm 1 Build tree

```

Define  $P := T := \{\{1\}, \dots, \{d\}\}$ 
while  $\#P > 1$  do
    Choose  $C' \in \mathcal{C}_p(P)$  with  $C' := \operatorname{argmin}_{C \in \mathcal{C}_p(P)} \varrho(C)$ 
    Find an optimal partition tree  $T_{C'}$ 
    Update  $P := (P \setminus C') \cup \{\bigcup_{t \in C'} t\}$ 
    Update  $T := T \cup \{\bigcup_{t \in \tau} t : \tau \in T_{C'} \setminus \mathcal{L}(T_{C'})\}$ 
end while
return  $T$ 

```

Chapter 2

The second chapter

LaTeX is a high-quality typesetting system; it includes features designed for the production of technical and scientific documentation. LaTeX is the de facto standard for the communication and publication of scientific documents. LaTeX is based on the idea that it is better to leave document design to document designers, and to let authors get on with writing documents.

2.1 Table Environment

Additional results are available in the supplement in Table 2.1.

Table 2.1: Numerical error

degree	step-size h	L^2 -errors	order	H^1 -errors	order	L^∞ -errors	order
1	1/128	9.18E-06	2.02	7.70E-03	1.01	6.46E-07	2.02
	1/256	2.29E-06	2.01	1.92E-03	1.00	1.61E-07	2.01
	1/512	5.70E-07	2.00	9.56E-04	1.00	4.01E-08	2.00
2	1/128	1.39E-08	3.01	1.15E-05	2.01	3.48E-12	4.02
	1/256	1.73E-09	3.01	2.88E-06	2.01	3.27E-13	3.94
	1/512	2.17E-10	3.00	7.24E-06	2.00	6.66E-13	1.55
3	1/32	2.28E-09	4.05	6.92E-07	3.04	1.45E-15	8.21
	1/64	1.42E-10	4.03	8.65E-08	3.02	2.06E-14	3.85
	1/128	8.91E-12	4.01	1.08E-08	3.01	3.86E-14	0.91

Use the `tabularx` environment to generate Table 2.2.

Table 2.2: Table description

N	A	B	C	D	E
2	9.20E-05	9.90E-05	1.00E-06	8.00E-06	1.50E-05
4	9.80E-05	8.00E-05	7.00E-06	1.40E-05	1.60E-05
6	4.00E-06	8.10E-05	8.80E-05	2.00E-05	2.20E-05
8	8.50E-05	8.70E-05	1.90E-05	2.10E-05	3.00E-06
10	8.60E-05	9.30E-05	2.50E-05	2.00E-06	9.00E-06
12	1.70E-05	2.40E-05	7.60E-05	8.30E-05	9.00E-05

LaTeX is a high-quality typesetting system; it includes features designed for the production of technical and scientific documentation. LaTeX is the de facto standard for the communication and publication of scientific documents. LaTeX is based on the idea that it is better to leave document design to document designers, and to let authors get on with writing documents.

2.2 Figure Environment

Figure 2.1 shows some example results.

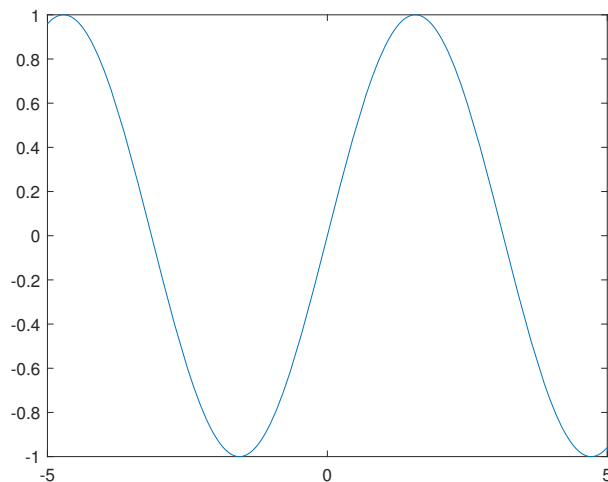


Figure 2.1: Example figure using external image files.

The two figures are placed side by side, sharing the one title, as shown in Figure 2.2.

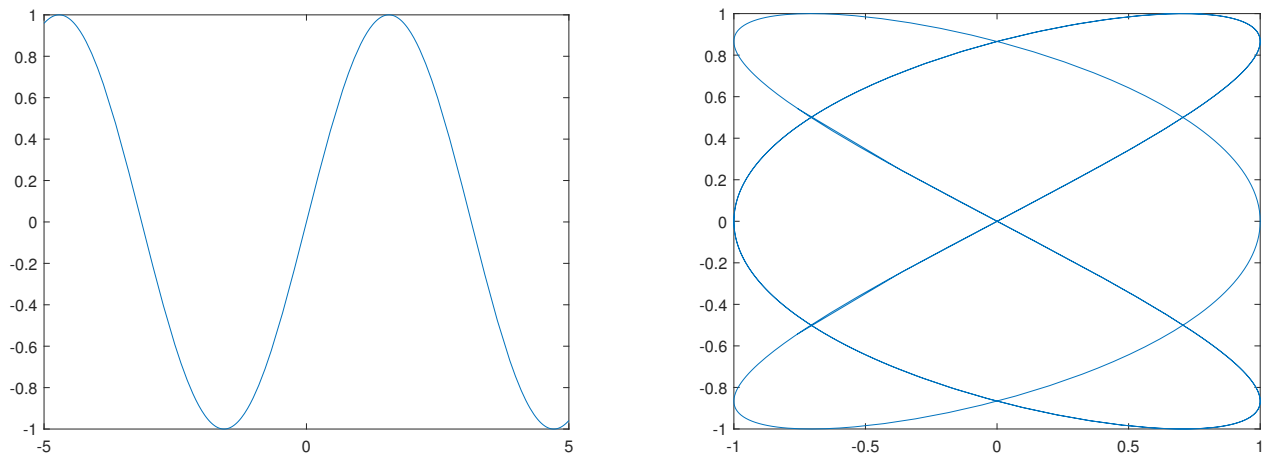


Figure 2.2: Left: Caption 1, Right: Caption 2.

Use `minipage` package to set images side-by-side, each with its own title, as shown in Figure 2.3 and Figure 2.4.

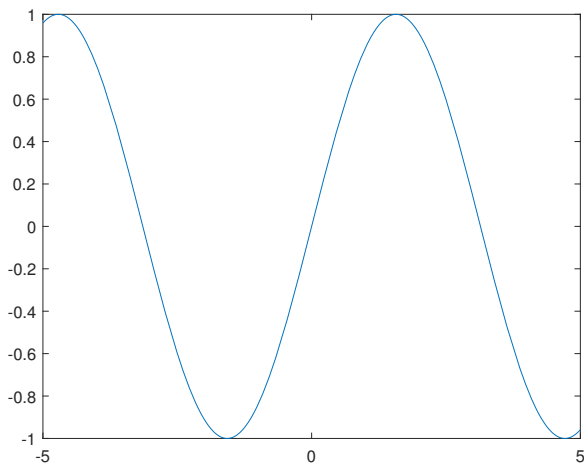


Figure 2.3: Caption A

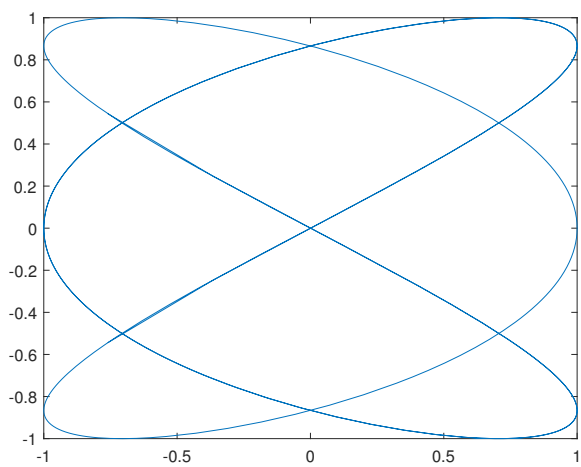


Figure 2.4: Caption B

2.3 Discussion of $Z = X \cup Y$

Some discussions here. Some discussions here. Some discussions here.

2.3.1 A sub section

LaTeX is not a word processor! Instead, LaTeX encourages authors not to worry too much about the appearance of their documents but to concentrate on getting the right content. For example consider this document:

The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog.

The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog.

2.4 The second section

LaTeX is a high-quality typesetting system; it includes features designed for the production of technical and scientific documentation. LaTeX is the de facto standard for the communication and publication of scientific documents.

2.4.1 A sub section

LaTeX is not a word processor! Instead, LaTeX encourages authors not to worry too much about the appearance of their documents but to concentrate on getting the right content.

The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog.

The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog.

Appendix A

This is the first appendix

LaTeX is a high-quality typesetting system; it includes features designed for the production of technical and scientific documentation. LaTeX is the de facto standard for the communication and publication of scientific documents. LaTeX is based on the idea that it is better to leave document design to document designers, and to let authors get on with writing documents.

A.1 A sub section

$$a^2 + b^2 = c^2. \tag{A.1}$$

Lemma A.1. *This is a lemma environment.*

This is Figure A.1.

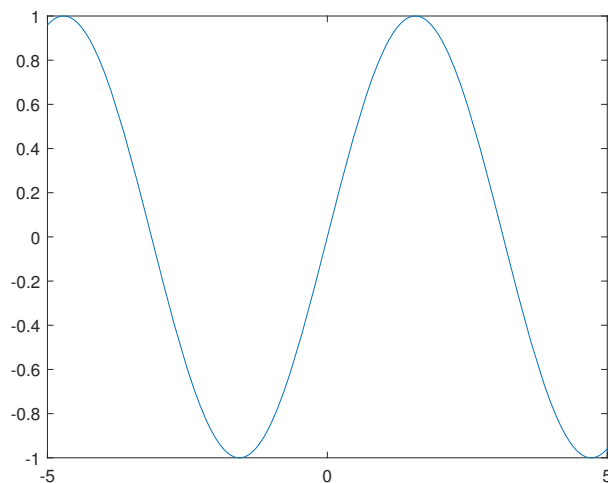


Figure A.1: Example figure using external image files.

Number	Age	Height	Weight
1	14	156	42
2	16	158	45
3	14	162	48
4	15	163	50
Mean	15	159.75	46.25

The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog.

The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog.

The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog.

The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog.

The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog.

The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.
The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.
The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.
The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.
The quick brown fox jumps over the lazy dog.

The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog.

The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy
dog. The quick brown fox jumps over the lazy dog.

Appendix B

This is the second appendix

B.1 A sub section

The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.
The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.
The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.
The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.
The quick brown fox jumps over the lazy dog.

B.2 A sub section

The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.
The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.
The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.
The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.
The quick brown fox jumps over the lazy dog.

References

- [1] Robert A Adams and John J F Fournier. *Sobolev spaces*. Elsevier, 2003.
- [2] Gene H. Golub and Charles F. Van Loan. *Matrix computations*. The Johns Hopkins University Press, Baltimore, 4th edition, 2013.
- [3] Jie Shen. Efficient spectral-Galerkin method I. Direct solvers of second- and fourth-order equations using Legendre polynomials. *SIAM J. Sci. Comput.*, 15(6):1489–1505, 1994.
- [4] Eitan Tadmor. A review of numerical methods for nonlinear partial differential equations. *Bull. Amer. Math. Soc.*, 49(4):507–554, 2012.
- [5] Lloyd N. Trefethen and J. A. C. Weideman. The exponentially convergent trapezoidal rule. *SIAM Rev.*, 56(3):385–458, 2014.

Index

fox, 12

LaTeX, 10