

# Sample SW Book 4

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# PREFACE

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This is the preface and it is created using a TeX field in a paragraph by itself containing `\chapter*{Preface}`. When the document is loaded, this appears in the edit window like a normal chapter, but it is actually an unnumbered chapter. The `markboth` TeX field at the beginning of this paragraph sets the correct page heading for the Preface portion of the document. The preface does not appear in the table of contents.



# 1. PURPOSE OF THIS DOCUMENT

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This short sample document illustrates the typeset appearance of in-line and displayed mathematics in documents. It also illustrates five levels of section headings and three kinds of lists. Finally, the document includes entries for a manual bibliography and an appendix.





## 2. SAMPLE MATHEMATICS AND TEXT

### 2.1 In-line and Displayed Mathematics

The expression  $\sum_{i=1}^{\infty} a_i$  is in-line mathematics, while the numbered equation

$$\sum_{i=1}^{\infty} a_i \tag{2.1}$$

is displayed and automatically numbered as equation 2.1.

Let  $H$  be a Hilbert space,  $C$  be a closed bounded convex subset of  $H$ ,  $T$  a nonexpansive self map of  $C$ . Suppose that as  $n \rightarrow \infty$ ,  $a_{n,k} \rightarrow 0$  for each  $k$ , and  $\gamma_n = \sum_{k=0}^{\infty} (a_{n,k+1} - a_{n,k})^+ \rightarrow 0$ . Then for each  $x$  in  $C$ ,  $A_n x = \sum_{k=0}^{\infty} a_{n,k} T^k x$  converges weakly to a fixed point of  $T$  [1].

Two sets of L<sup>A</sup>T<sub>E</sub>X parameters govern mathematical displays.<sup>1</sup> The spacing above and below a display depends on whether the lines above or below are short or long, as shown in the following examples.

A short line above:

$$x^2 + y^2 = z^2$$

and a short line below.

A long line above may depend on your margins

$$\sin^2 \theta + \cos^2 \theta = 1$$

as will a long line below. This line is long enough to illustrate the spacing for mathematical displays, regardless of the margins.

### 2.2 Mathematics in section heads $\int_{\alpha}^{\beta} \ln t dt$

Mathematics can appear in section heads. Note that mathematics in section heads may cause difficulties in typesetting styles with running headers or table of contents entries.

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<sup>1</sup>L<sup>A</sup>T<sub>E</sub>X automatically selects the spacing depending on the surrounding line lengths.

## 2.3 Theorems, Lemmata, and Other Theorem-like Environments

A number of theorem-like environments is available. The following lemma is a well-known fact on differentiation of asymptotic expansions of analytic functions.

**Lemma 1** *Let  $f(z)$  be an analytic function in  $\mathbb{C}_+$ . If  $f(z)$  admits the representation*

$$f(z) = a_0 + \frac{a_1}{z} + o\left(\frac{1}{z}\right),$$

for  $z \rightarrow \infty$  inside a cone  $\Gamma_\varepsilon = \{z \in \mathbb{C}_+ : 0 < \varepsilon \leq \arg z \leq \pi - \varepsilon\}$  then

$$a_1 = -\lim_{z \rightarrow \infty, z \in \Gamma_\varepsilon} z^2 f'(z). \quad (2.2)$$

**Proof.** Change  $z$  for  $1/z$ . Then  $\Gamma_\varepsilon \rightarrow \bar{\Gamma}_\varepsilon = \{z \in \mathbb{C}_- : \bar{z} \in \Gamma_\varepsilon\}$  and

$$f(1/z) = a_0 + a_1 z + o(z). \quad (2.3)$$

Fix  $z \in \bar{\Gamma}_\varepsilon$ , and let  $C_r(z) = \{\lambda \in \mathbb{C}_- : |\lambda - z| = r\}$  be a circle with radius  $r = |z| \sin \varepsilon/2$ . It follows from (2.3) that

$$\frac{1}{2\pi i} \int_{C_r(z)} \frac{f(\lambda) d\lambda}{(\lambda - z)^2} = \sum_{m=0}^1 a_m \frac{1}{2\pi i} \int_{C_r(z)} \frac{(\lambda - z)^m d\lambda}{(\lambda - z)^2} + R(z), \quad (2.4)$$

where for the remainder  $R(z)$  we have

$$\begin{aligned} |R(z)| &\leq r^{-1} \max_{\lambda \in C_r(z)} o(|z|) = r^{-1} \max_{\lambda \in C_r(z)} |\lambda| \cdot O(|z| + r) \\ &= \frac{|z| + r}{r} \cdot O(|z| + r) = \frac{1 + \sin \varepsilon}{\sin \varepsilon} \cdot O(|z|). \end{aligned}$$

Therefore  $R(z) \rightarrow 0$  as  $z \rightarrow \infty$ ,  $z \in \bar{\Gamma}_{\varepsilon/2}$ , and hence by the Cauchy theorem (2.4) implies

$$\frac{d}{dz} f(1/z) = a_1 + R(z) \rightarrow a_1, \text{ as } z \rightarrow \infty, z \in \bar{\Gamma}_{\varepsilon/2},$$

that implies (2.2) by substituting  $1/z$  back for  $z$ . ■

## 2.4 Section Headings

Use the Section tag for major sections, such as the one just above. Four additional heading levels are available, as described below.

### 2.4.1 Subsection Heading

This text appears under a subsection heading.

#### Subsubsection Heading

This text appears under a subsubsection heading.

**Subsubsubsection Heading** This text appears under a subsubsubsection heading.

**Subsubsubsubsection Heading** This text appears under a subsubsubsubsection heading.

## 2.5 Tags

You can apply the logical markup tag *Emphasized*.

You can apply the visual markup tags **Bold**, *Italics*, Roman, Sans Serif, *Slanted*, SMALL CAPS, and *Typewriter*.

You can apply the special, mathematics only, tags BLACKBOARD BOLD, *CALLIGRAPHIC*, and *fraktur*. Note that blackboard bold and calligraphic are correct only when applied to uppercase letters A through Z.

You can apply the size tags tiny, scriptsize, footnotesize, small, normalsize, large, Large, LARGE, huge and Huge.

Following is a group of paragraphs marked as Body Quote. This environment is appropriate for a short quotation or a sequence of short quotations.

The only thing we have to fear is fear itself. *Franklin D. Roosevelt*,  
Mar. 4, 1933

Ask not what your country can do for you; ask what you can do  
for your country. *John F. Kennedy*, Jan. 20. 1961

There is nothing wrong with America that cannot be cured by what  
is right with America. *William J. "Bill" Clinton*, Jan. 21, 1993

## 2.6 Lists

Bullet, numbered and description list environments are available. Lists, which can extend four levels deep, look like this:

1. Numbered list item 1.
  2. Numbered list item 2.
    - (a) A numbered list item under a list item.  
The typeset appearance for this level is often different from the screen appearance. The typeset appearance often uses parentheses around the level indicator.
    - (b) Another numbered list item under a list item.
      - i. Third level numbered list item under a list item.
        - A. Fourth and final level of numbered list items allowed.
- Bullet item 1.
  - Bullet item 2.
    - Second level bullet item.
      - \* Third level bullet item.
        - Fourth and final level bullet item.

**Description List** Each description list item has a lead-in followed by the item. Double-click the lead-in box to enter or customize the text of the lead-in.

**Bunyip** Mythical beast of Australian Aboriginal legends.

## 2.7 About the Bibliography

Following the text of this article is a short manual bibliography. This sample bibliography has no relationship to the previous text, but it shows sample citations such as [4], [5] and [6]. You can also have multiple citations appear together. Here is an example: [2, 3, 4].

# A. THE FIRST APPENDIX

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The appendix fragment is used only once. Subsequent appendices can be created using the Chapter Section/Body Tag.



# AFTERWORD

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The back matter often includes one or more of an index, an afterword, acknowledgements, a bibliography, a colophon, or any other similar item. In the back matter, chapters do not produce a chapter number, but they are entered in the table of contents.





# BIBLIOGRAPHY

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