THE TITLE OF AN ARTICLE

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Dedicated to the memory of S. Bach.

Abstract. This article illustrates many features of a mathematics article, but we do not explain the spurious appearance of the formula $(\nabla \times F) \cdot k = z + 1$ in this abstract.The Full

1. Sample Mathematics and Text

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.

1.1. **In-line and Displayed Mathematics.** The expression $\sum_{i=1}^{\infty} a_i$ is in-line mathematics, while the numbered equation

$$\sum_{i=1}^{\infty} a_i \tag{1.1}$$

is displayed and automatically numbered as equation 1.1.

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 $n \to \infty$, $a_{n,k} \to 0$ for each k, and $\gamma_n = \sum_{k=0}^{\infty} \left(a_{n,k+1} - a_{n,k}\right)^+ \to 0$. 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 LaTeX parameters govern mathematical displays.[1] 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.

1991 *Mathematics Subject Classification.* Primary 05C38, 15A15; Secondary 05A15, 15A18.
Key words and phrases. Keyword one, keyword two, keyword three.
Thanks to Mother.
This paper is in final form and no version of it will be submitted for publication anywhere.

[1] LaTeX automatically selects the spacing depending on the surrounding line lengths.

1.2. **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.

1.3. **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 $z \to \infty$ inside a cone $\Gamma_\varepsilon = \{z \in \mathbb{C}_+ : 0 < \varepsilon \le \arg z \le \pi - \varepsilon\}$ then

$$a_1 = -\lim z^2 f'(z),\ z \to \infty,\ z \in \Gamma_\varepsilon. \tag{1.2}$$

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

$$f(1/z) = a_0 + a_1 z + o(z). \tag{1.3}$$

Fix $z \in \overline{\Gamma}_\varepsilon$, 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 (1.3) that

$$\frac{1}{2\pi i}\int_{C_r(z)} \frac{f(\lambda)\,d\lambda}{(\lambda - z)^2} = \sum_{m=0}^{1} a_m \frac{1}{2\pi i}\int_{C_r(z)} \frac{(\lambda - z_0)^m\,d\lambda}{(\lambda - z)^2} + R(z), \tag{1.4}$$

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

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

Therefore $R(z) \to 0$ as $z \to \infty$, $z \in \overline{\Gamma}_{\varepsilon/2}$, and hence by the Cauchy theorem (1.4) implies

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

that implies (1.2) by substituting $1/z$ back for z. □

2. Section Headings

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

2.1. **Subsection Heading.** This text appears under a subsection heading.

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3. 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.

4. 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 $\mathbb{BLACKBOARD\ BOLD}$, $\mathcal{CALLIGRAPHIC}$, and $\mathfrak{fraktur}$. 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.

The Long Quotation tag is used for quotations of more than one paragraph. Following is the beginning of *Alice's Adventures in Wonderland* by Lewis Carroll:

> Alice was beginning to get very tired of sitting by her sister on the bank, and of having nothing to do: once or twice she had peeped into the book her sister was reading, but it had no pictures or conversations in it, 'and what is the use of a book,' thought Alice 'without pictures or conversation?'
>
> So she was considering in her own mind (as well as she could, for the hot day made her feel very sleepy and stupid), whether the pleasure of making a daisy-chain would be worth the trouble of getting up and picking the daisies, when suddenly a White Rabbit with pink eyes ran close by her.
>
> There was nothing so very remarkable in that; nor did Alice think it so very much out of the way to hear the Rabbit say to itself, 'Oh dear! Oh dear! I shall be late!' (when she thought it

> over afterwards, it occurred to her that she ought to have wondered at this, but at the time it all seemed quite natural); but when the Rabbit actually took a watch out of its waistcoat-pocket, and looked at it, and then hurried on, Alice started to her feet, for it flashed across her mind that she had never before seen a rabbit with either a waistcoat-pocket, or a watch to take out of it, and burning with curiosity, she ran across the field after it, and fortunately was just in time to see it pop down a large rabbit-hole under the hedge.
>
> In another moment down went Alice after it, never once considering how in the world she was to get out again.

5. 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].

References

[1] N. Dunford and J. Schwartz, *Functional Analysis*, v. 2, John Wiley and Sons, New York, 1963.

[2] Harstad, K. and Bellan, J., "Isolated fluid oxygen drop behavior in fluid hydrogen at rocket chamber pressures", *Int. J. Heat Mass Transfer*, 1998a, **41**, 3537-3550

[3] Harstad, K. and Bellan, J., "The Lewis number under supercritical conditions", *Int. J. Heat Mass Transfer,* in print

[4] Hirshfelder, J. O., Curtis, C. F. and Bird, R. B., *Molecular Theory of Gases and Liquids*, John Wiley and Sons, Inc., 1964

[5] Prausnitz, J., Lichtenthaler, R. and de Azevedo, E., Molecular thermodynamics for fluid-phase equilibrium, Prentice -Hall, Inc., 1986

[6] Reid, R. C., Prausnitz, J. M. and Polling, B. E., The Properties of Gases and Liquids, 4th Edition, McGraw-Hill Book Company, 1987

Appendix A. An Appendix

Because appendices may contain material that is supplementary rather than integral to the main text , many styles use a different numbering system for equations that appear in the appendices.

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \tag{A.1}$$

The quadratic equation shown as equation A.1 is used to demonstrate how equations are numbered in the appendix.

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