The Title of an Article

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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.

Key Words: Sample document, mathematics, text

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

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

is displayed and automatically numbered as equation 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 $\gamma_n = \sum_{k=0}^{\infty} (a_{n,k+1} - a_{n,k})^+ \to 0$. 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 [?].

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.

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*

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

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

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

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

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

$$f(1/z) = a_0 + a_1 z + o(z). \tag{3}$$

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 (3) that

$$\frac{1}{2\pi i}\int_{C_r(z)} \frac{f(\lambda)\,d\lambda}{(\lambda - z)^2} = \sum_{m=0}^{1} a_m \frac{1}{2\pi i}\int_{C_r(z)} \frac{(\lambda - z_0)^m\,d\lambda}{(\lambda - z)^2} + R(z), \tag{4}$$

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 (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 (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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This text appears under a subsubsection heading.

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Subsubsubsubsection Heading This text appears under a subsubsubsubsection heading.

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.

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.

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \tag{5}$$

The quadratic equation shown as equation 5 is used to demonstrate how equations are numbered in the appendix.

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