Online Mathematics

This report describes the Online Math shell available in Scientific Work Place. The shell was not designed for typesetting, but rather to produce online documents, so the formatting was developed using a .cst file instead of the typesetting specifications. What you see online looks like what you see in the document window, but you will find formatting differences if you typeset the document. For example, sections have no numbers online but carry numbers when you typeset the document. This paragraph is Body Text.

Mathematics in This Shell

In-line and Displayed Mathematics

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

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

is displayed and automatically numbered as equation (!).

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. 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.

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.

Theorems

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 *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

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

Features of This Shell

Heading 3

To create a heading, type the text of the heading as a separate paragraph, and then with the insertion point in the paragraph, choose from Heading 1 through Heading 5 from the middle popup list at the bottom of the screen.

> To center a paragraph, place the insertion point within the paragraph and choose Centered from the middle popup list at the bottom of the screen.

> To set text off like this, type the text, then choose Block Quote from the middle popup list at the bottom of the screen.

Heading 4

Here is some information about this topic.

Heading 5

You can apply the Emphasized, ***Strongly Emphasized***, **Keyboard Input**, **Sample**, **Bold**, *Italics*, `Typed Code`, Bigger, and Smaller tags by selecting text, then choosing the tag from the popup menus at the bottom of the Scientific Notebook screen.

Lists

You can create numbered, bulleted, and description lists using the tag popup at the bottom left of the screen.

1. List item 1
2. List item 2

- Bullet item 1
- Bullet item 2

Description List   Each description list item has a term followed by the description of that term. Double click the term box to enter the term, or to change it.

Bunyip   Mythical beast of Australian Aboriginal legends.

This is a Body Math paragraph. Each time you press the Enter key, Scientific Notebook switches to mathematics mode. This is convenient for carrying out "scratchpad" computations.