Getting Started with Scientific WorkPlace®, Scientific Word®, and Scientific Notebook®

Version 5

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Version 5

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MacKichan Software, Inc.

Printed in the United States of America

10 9 8 7 6 5 4 3 2 1

Trademarks

This document was produced with *Scientific WorkPlace*.

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Manuscript Editors: *John MacKendrick and George Pearson*
Compositor: *MacKichan Software, Inc.*
Printing and Binding: *Malloy Lithographing, Inc.*

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1 Tools for Scientific Creativity

Scientific WorkPlace, *Scientific Word*, *Scientific Notebook*, and *Scientific Viewer* set the stage for your creativity with their straightforward approach to working with mathematics and text. Together, they combine the ease of entering text and mathematics in natural notation with the power of symbolic and numeric computation, the flexibility and beauty of printed or typeset output, and the convenience of direct Internet access. Individually, they offer capabilities and features combined to meet a range of user needs.

Version 5 brings new features and enhancements to the MacKichan Software family of products: typeset PDF output, improved RTF import and export with MathType support, improved HTML and MathML export, and an improved user interface. *Scientific WorkPlace* and *Scientific Notebook* contain the MuPAD computer algebra engine. Explore Version 5 now. Make sure you have what you need to run the software, then complete the installation and enter the world of scientific creativity.

Understanding the Product Differences

With all four MacKichan Software products—which we refer to individually by their initials—you can work with an easy-to-learn, easy-to-use scientific word processor. Your text appears on the same screen as mathematics, which you create using familiar mathematical notation instead of special codes. With *SWP* and *SNB*, you can perform a wide range of mathematical computations using a fully integrated computational engine, and you can create interactive course materials using the Exam Builder.

Using any of the products, you can format documents by selecting a style and applying tags, rather than by entering detailed formatting instructions for each text element. *SWP* and *SW* have the added capabilities of TEX, with which you can produce beautifully typeset text and mathematics. With all four products, you can access the Internet directly. Available at no charge, *SV* provides an easy way to explore many of these features. Those who haven't purchased *SWP*, *SW*, or *SNB* can use *SV* to view and print documents created with the software, whether those documents are available on your local system or on the Internet.

Capabilities and Features	*SWP*	*SW*	*SNB*	*SV*
Document creation and printing	•	•	•	
Typesetting with LATEXand PDFLATEX	•	•		
Computation and plotting	•		•	
Internet browsing and printing	•	•	•	•
HTML output with MathML	•	•	•	
RTF output with MathType	•	•	•	
Creation of interactive course materials with Exam Builder	•		•	

Understanding the New Version

The program is characterized by a rich interface, beautiful output, natural entry of text and mathematics, and easy creation of complex documents. Version 5 brings additional capabilities and features to the workplace.

Compatibility

You can interact with colleagues more easily and distribute your documents in different formats when you take advantage of new and enhanced export filters in Version 5.

- **Export your documents as RTF files.** You can now export your *SWP*, *SW*, and *SNB* documents as Rich Text Format (RTF) files, so that interactions with colleagues in non-TEX environments are simplified. The RTF export preserves the formatting you see in the document window. Any mathematics in your document can be represented with MathType 3 (Equation Editor) or MathType 5 objects. The resulting RTF file can be viewed in Microsoft Word even if an Equation Editor is not part of the Word installation. If the Microsoft Word installation includes the appropriate Equation Editor, any MathType 3 or MathType 5 mathematical objects in the RTF file can be edited. The file can also be displayed in outline mode.
- **Read MathType mathematics in RTF files.** In Version 5, you can open and read the MathType equations in RTF files when you import the RTF files in *SWP*, *SW*, or *SNB*. The equations are converted to LATEX.
- **Create more accurate HTML files.** When you export your *SWP*, *SW*, or *SNB* documents to HTML, the program now places any graphics generated during the process in a subdirectory. Version 5 successfully exports fixed-width tables to HTML and saves the screen format to a Cascading Style Sheet (`.css` file). With HTML exports, you can make your mathematics available on various platforms over the Internet and in applications that can read HTML files.
- **Export mathematics as MathML.** When you export HTML files, you can output your mathematics as MathML or graphics. Note that not all HTML browsers support MathML.

Typesetting

Version 5 of *SWP* and *SW* provides new typesetting capabilities and many new document shells, some intended for international use.

- **Create typeset PDF files.** Now you can share your work across platforms in Portable Document Format (PDF) files by typesetting your *SWP* and *SW* documents with PDFLATEX. No extra software is necessary to generate PDF files. The program automatically embeds fonts and graphics in the PDF file.
- **Use PDFTEX to process files that contain graphics.** Until now, using PDFTEX with most graphics file formats has been tedious or impossible. Before typesetting your document with PDFLATEX, Version 5 of *SWP* and *SW* converts any graphics in the document to formats that can be processed by PDFLATEX.

- **Preserve LaTeX cross-references in PDF files.** If you add the *hyperref* package to your document, any cross-references in your *SWP* or *SW* document are converted to hypertext links when you typeset with PDFLaTeX. The package extends hypertext capabilities with hypertext targets and references. Additionally, PDFLaTeX fully links the table of contents in the resulting PDF file and includes in the file hierarchical markers and thumbnail pictures of all the pages in the document.
- **Rotate text in PDF files.** If you create PDF files from your *SWP* and *SW* documents, you can take advantage of the *rotating* package to rotate parts of text within the PDF file.
- **Use expanded typesetting documentation.** A new edition of *Typesetting Documents in Scientific WorkPlace and Scientific Word* provides more typesetting tips and information about more LaTeX packages. Learn how to tailor typesetting specifications from inside the program to achieve the typeset document appearance you need.
- **Examine an expanded gallery of shells.** View images of sample documents for each shell provided with the program in *A Gallery of Document Shells for Scientific WorkPlace and Scientific Word,* provided on the program CD as a PDF file. Use the documentation to choose document shells appropriately.
- **Choose shells tailored for international documents.** Version 5 includes new shells for documents created in non-English languages, including German, Japanese, Chinese, and Russian. *SWP* and *SW,* in combination with TrueTeX, support international typesetting with the Lambda system.

Computation

Complex computational capability makes *SWP* and *SNB* indispensable tools.

- **Compute with MuPAD.** In *SWP* and *SNB,* compute right in your document with the MuPAD computer algebra engine.
- **Use enhanced MuPAD capabilities.** The new MuPAD kernel is an upgrade from the MuPAD 2.0 kernel included in Version 4.0. New features include improved 2D and 3D plotting, expanded ODE capabilities, an expanded Rewrite submenu, and an improved Simplify operation.
- **Compute with MathType mathematics in RTF files.** If you open an RTF file containing MathType equations, the program converts the equations to LaTeX. In *SWP* and *SNB,* you can compute with the mathematics just like any other mathematics in your documents.
- **Use an improved Exam Builder.** The Version 5 Exam Builder is fully functional with MuPAD. Printed quizzes can be reloaded without losing their math definitions, just like other documents. Exam Builder materials generated with earlier versions using either Maple or MuPAD work successfully in Version 5.

Understanding the Logical Design Approach

The most important feature of the program and the key to our software approach is the separation of content and appearance. The content of your work results from the creative process of writing—forming ideas and putting them into words. The appearance of your

work results from the mechanical process of formatting—displaying the document on the screen and on the printed page in the most readable way.

Our approach, which is known as *logical design,* separates the creative process of writing from the mechanical process of formatting. Logical design frees you to focus on the content instead of its format. It results in increased productivity and a more consistent, higher-quality document appearance. Logical design is different from the approach used by many other word processors. That approach, known as *visual design* (or sometimes WYSIWYG, for What You See Is What You Get), focuses on making the screen look as much like the printed page as possible. If you've used only visual systems before now, you may at first be surprised by the differences between the two approaches.

One major difference is in document formatting. When you use a visual system, you constantly apply commands that affect the appearance of the content—you select text and then choose a font, a font size, or a typeface, or you apply alignment commands such as center, left justify, or right justify. To center a title or an equation, for example, you select it and choose the center alignment.

When you use a logical system, you focus on how the content relates logically to other parts of the document rather than on the appearance of the content. Commands that define the logical structure of the content replace commands that define its appearance. Thus, instead of applying a centering command to create a centered title, you apply a title tag to the title information. The *properties* of the tag you use determine the format and alignment of the title.

In *SNB*, tag properties are determined by the *style,* a collection of commands that define the way the document appears when you display it on the screen and when you produce it without typesetting. In *SWP* and *SW*, tag properties are determined in two ways: by the style and by the document's *typesetting specifications*—a collection of commands that define the way the document appears when you produce it with LaTeX or pdfLaTeX typesetting.

Another difference between visual and logical systems is in the display of page divisions. On the screen, visual systems divide documents into pages according to their anticipated appearance in print. To see an entire line, you often have to scroll horizontally because the screen dimensions and page dimensions do not match. In a logical system, working with pages is unnecessary, because the division of a document into pages has no connection to the document's logical structure. Thus, on the screen the program breaks lines to fit the window. If you resize the window, the program reshapes the text to fit it. The program displays page divisions when you preview the document.

Separating the processes of creating and formatting a document combines the best of the online and print worlds. You do the work of creating a good document; the program does the work of creating a beautiful one.

Using This Booklet

This brief guide to Version 5 of *SWP, SW,* and *SNB* explains how to install and register the software. It describes how to open, close, save, and manage documents on your local system, and how to create documents for and connect to the wider world of information available on the Internet. The booklet explains the basics of using the program to enter, format, edit, preview, and print text and mathematics. It also provides a series of step-by-step examples illustrating how to perform basic mathematical computations and plot

mathematical expressions in *SWP* and *SNB*. It briefly discusses using the Exam Builder to create algorithmically generated exams and quizzes. Finally, the booklet explains how to use the built-in power of LaTeX with *SWP* and *SW* when you need to produce a document with a finely typeset appearance.

Making Sure You Have What You Need

Before you attempt to install and use Version 5, make sure your personal computer or network client computer meets the hardware and software requirements shown below:

System Requirements	*SWP* or *SW*	*SNB*	*SV*
Available disk space	85–300 MB*	35–200 MB**	5–35 MB*
Windows XP, 2000, NT, Me, 98, or 95**	•	•	•
CD-ROM drive	•	•	

* Depending on the type of hard drive and installation options

** Windows Me, 98, and 95 require Windows Multilanguage Support

Installing and Licensing the Program

Important Before you open the product package, please read the license agreement that accompanies the software. By installing and using the product, you accept the terms of this agreement.

SWP, *SW*, and *SNB* are available on CD-ROM. Please remember that you may make copies of the software only for your personal use. *SV* is available from the MacKichan Software, Inc. website at **http://www.mackichan.com** or on CD.

Installation is a two-step process: installing the program files and registering to obtain a license. To install the program and its related files, you must run the installation program, which is supplied on the CD-ROM and with the downloaded program. The installation program decompresses the files and copies them to your hard disk or network, then automatically launches the registration process. You can register conveniently at that time or wait until later. At either time, you can obtain your license from an automated Web service or by email, fax, telephone, or letter. We recommend that you use the Web service.

You must register to activate all the capabilities and features of the program you have purchased. Until you have obtained your license, you can use only those program capabilities that are provided with *SV*, which doesn't require a license. You must have a serial number to obtain your license; the number is provided with *SWP*, *SW*, and *SNB*. Unless you're installing *SV*, which doesn't need a serial number, be sure you have your serial number handy before you begin the installation. If you don't have a serial number, you can continue to use the product in *SV* mode free of charge.

Follow the instructions on page 6 to install and license the program on your personal computer. Installation and licensing procedures for networks vary depending on your purchase arrangement. You must have administrative privileges to perform network installation and licensing; see your system administrator for more information.

► To install and license the program on a Windows computer

1. Start Windows.
2. If you're installing the program from a CD-ROM, insert the CD-ROM into your CD-ROM drive. Normally, the installation program starts automatically. If it doesn't,
   a. From the Windows Start menu, choose Run.
   b. Choose Browse and select the `setup.exe` program on the CD.
   c. Choose OK.
3. If you're installing the program from a downloaded file,
   a. From the Windows Start menu, choose Run.
   b. Choose Browse and select the `.exe` program you downloaded.
   c. Choose OK.
4. Follow the instructions on the screen while the program is installed on your hard disk.
5. When the installation program asks whether you want to register your program,
   - Choose Yes to register now and open the registration program, then continue these instructions.
     or
   - Choose No to complete the installation without registering and, when prompted, restart your computer.
     To register at a later date,
     i Start the program.
     ii From the Help menu, choose Register.
     iii Continue with these instructions, beginning with step 6.
6. If you want to register via the automated Web service,
   a. From the Register dialog box, choose By an automated web service and then choose Next.
   b. Enter the serial number for your program and for any additional dictionaries that you have purchased.
   c. Enter your email address.
      Other information is optional.
   d. Choose OK.
   e. Click OK to accept the MacKichan Software license agreement.
   f. If you aren't already connected to the Internet, dial up your Internet connection.
   g. Choose Register Now.
      The program displays a message that your license has been received and saved.
   h. Choose Finish.
   i. Choose OK to close and restart the program.

   or

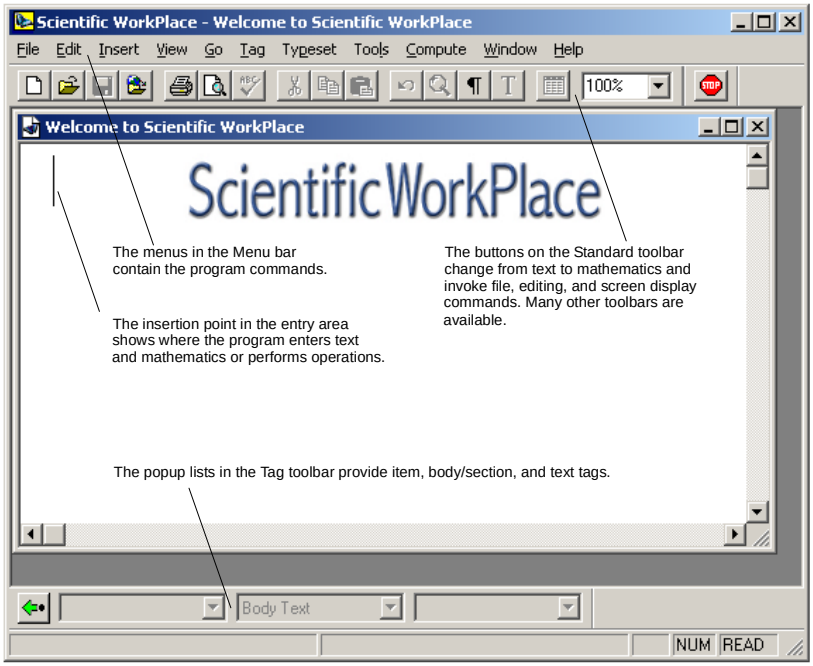
If you want to register via a different method,

a. From the Register dialog box, choose the method you want and then choose Next.
b. Follow the instructions on the screen to enter your serial number and other required information and to accept the license agreement.
c. When you receive your license, follow the accompanying instructions to install it.

7. When the program asks whether you want to restart your computer, choose Yes.

Exploring the Program

On first starting the program, you see a screen with buttons and toolbars similar to these:



The screen displays a Welcome document that contains valuable information about the program. Please read the Welcome document, then take a minute to try out the program. You'll see just how easy it is to work with text and mathematics.

Start a New Document

Open a new document with an empty page.

1. Click  .

2. If you're using *SNB* or *SV*,

   a. From the Shell Directories list, choose General.
   b. From the Shell Files list, choose Blank Document.

c. Choose OK.
d. If you're using *SV*, choose OK to open an editing window.

or

If you're using *SWP* or *SW*,

a. From the Shell Directories list, choose Standard LaTeX.
b. From the Shell Files list, choose Blank - Standard LaTeX Article.
c. Choose OK.

3. Display several toolbars:

a. From the View menu, choose Toolbars.
b. Check Math Templates and Editing to display the toolbars.
c. If you're using *SWP* or *SNB*, also check Compute.
d. Choose Close.

Enter Text and Math

You can use natural mathematical notation to enter an expression. The program correctly interprets your mathematics, which appears in red on your screen by default.

1. Type **To integrate** and press the spacebar.
2. Click  to change from text to mathematics.
3. Type **x**, click  , type **2**, and press the spacebar.
4. Click  to change back to text.
5. Press the spacebar; then type **in SWP, enter** and press the spacebar.
6. Click  .

   Note that the program changes to math automatically because it recognizes that $\int$ is mathematics.
7. Type **x**, click  , type **2**, press the spacebar, and then type **dx**.

   On your screen, you should see this:

   To integrate x^2 in SWP, enter $\int x^2 dx$

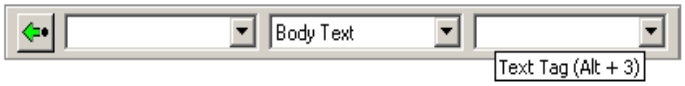
Change the Screen Appearance of Text

You can change the screen appearance of your document by changing the *tags,* or formatting instructions, applied to the content. By applying tags, you can emphasize a portion of text, such as by making it bold, italic, or large, and you can create headings, centered text, and lists.

1. Highlight SWP in the expression you have entered.
2. Click  .

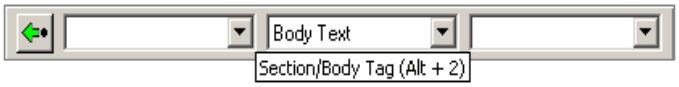
   or

   Click the Text tag box on the Tag toolbar at the bottom of the screen:

   and then on the list of tags displayed, click Bold.

   The program changes the selected text to boldface.
3. Place the insertion point anywhere in the expression.
4. Click the Section/Body tag box at the bottom of the screen and click Centered.

   Now your expression is centered:

   To integrate x^2 in **SWP**, enter $\int x^2 dx$

   For fast tag application, you can assign tags to function keys from the Tag menu.

Compute

In *SWP* or *SNB,* you can perform complex computations in your document.

1. Place the insertion point at the end of the expression $\int x^2 dx$.
2. Click  to evaluate the expression.

   The computational engine performs the integration (a special pointer shows while the computation is in progress) and places the calculated value in your document:

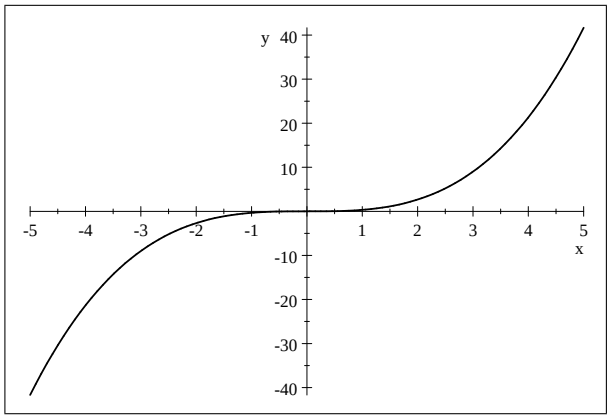
   To integrate x^2 in **SWP**, enter $\int x^2 dx = \frac{1}{3}x^3$

Plot Mathematics

With *SWP* and *SNB*, you can plot the values you compute, and then add values to those plots, all without leaving your document.

1. With the insertion point to the right of the expression $\int x^2 dx = \frac{1}{3}x^3$, click  .

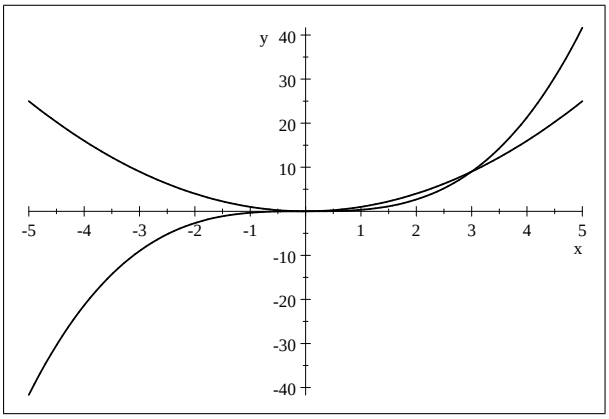
   The computational engine plots your mathematics:



2. Now see how easy it is to add to the plot:

   a. In your expression, select x^2.

   b. Hold down the mouse button and drag the selection to the plot, making sure the pointer is inside the plot border, and then release the mouse button. The graph is replotted, so that you now see this:



Print the Document

When you print your document, your output looks like what you see on the screen. (In *SWP* and *SW*, you can also choose to typeset your document with LaTeX or PDFLaTeX. See Chapter 4 "Typesetting Your Document" for more information.)

1. Click  .
2. In the Print dialog box, select the printer you want to use, and then choose OK.

Browse the Internet

If you have Internet access, you can go directly to any Internet location that has a Uniform Resource Locator (URL) without ever leaving your document. For example, you can visit our website, where you can find even more information about the program.

1. Click  .
2. Enter **http://www.mackichan.com** and choose Open.

You can specify any URL on the Web. If the location you specified isn't a `.tex` or `.rap` document created in *SWP*, *SW*, or *SNB*, the program activates the appropriate program on your computer, such as your Web browser or PDF viewer. Your document remains open. Any *SWP*, *SW*, or *SNB* documents that are available on the Internet are opened as read-only documents.

Save and Close the Document

Save and close your document, unless you are using *SV*.

1. Click  .
2. Type a name for the document and choose OK.
3. From the File menu, choose Close.

Leave the Program

You can leave the program several ways. If you haven't saved your *SWP*, *SW*, or *SNB* document, the program prompts you to save your work.

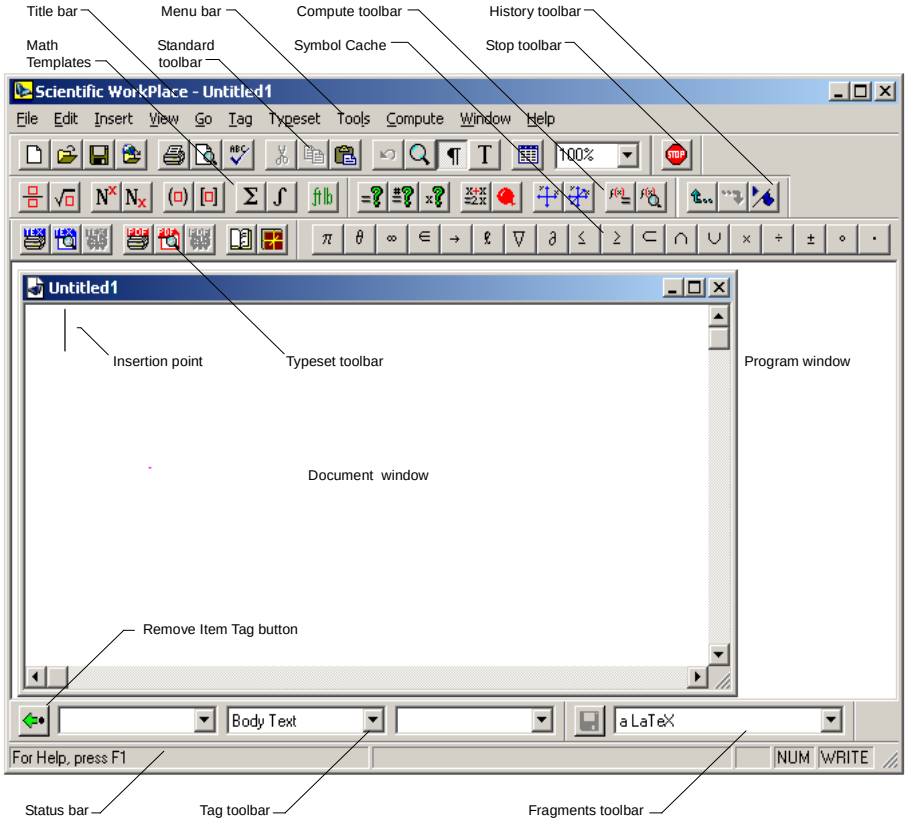
- From the File menu, choose Exit.
  or
- Press ALT+F4 (that is, hold down the ALT key and press F4).
  or
- At the top right corner of the program window, click the Close button  .
  or
- At the top left corner of the program window, double-click the program icon, or click the icon once and then choose Close.

2 Learning the Basics

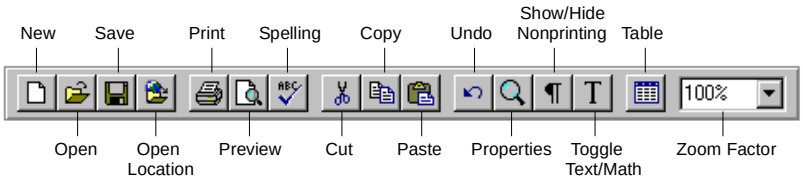
SWP, *SW*, and *SNB* are intuitive. Whether you're writing text or mathematics, you'll find that using the program is easy.

Using the Workplace

The program window is your workplace. Take a moment to familiarize yourself with the window, its menus, and some commonly used toolbars (shown below). Remember that not all toolbars appear for all products.



The toolbar buttons are identical in function to many of the menu commands. Briefly point the mouse at each button to display a *tooltip* identifying the button and its function. The Standard toolbar contains buttons for the most frequently used commands on the File and Edit menus:



Other toolbars are available from the View menu.

► **To display or hide a toolbar**

1. From the View menu, choose Toolbars.
2. In the Toolbars dialog box, check the box next to each toolbar you want to display, and uncheck the box next to each toolbar that you want to hide.
3. Choose Close.

Opening a Document

Starting the program automatically opens a blank document, which is a *shell,* or template, for a typical new document. If you want to produce a similar document, you can begin entering information right away. If you want to create some other kind of document, open a new file and choose a different kind of shell. Each shell is different. Explore a little to see what's available.

► **To open a new document**

1. On the Standard toolbar, click  or, from the File menu, choose New.
2. From the Shell Directories list, choose the kind of document you want.
3. From the Shell Files list, choose the shell you want for your document.
4. Choose OK.

Instead of opening a new document, you may want to open a document that already exists.

► **To open an existing document**

1. On the Standard toolbar, click  or, from the File menu, choose Open.
2. Choose the file folder and name of the existing document.
3. Choose Open.

Entering and Editing Text

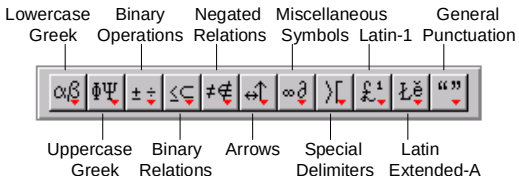
Entering information is straightforward, whether you prefer the keyboard or the mouse. You use standard editing tools to revise your document.

Entering Text

Unless you tell it otherwise, the program assumes that everything you type is text. When you're entering text, the Math/Text toggle on the Standard toolbar appears as  .

► To enter text, just start typing.

Although most keyboards don't contain special text characters, you can enter many of them from the panels available when you display the Symbol Panels toolbar:



► To enter special characters

1. From the View menu, choose Toolbars, check Symbol Panels, and choose Close to display the toolbar.
2. Click one of the buttons on the toolbar to display a panel of special characters. Most special text characters appear on the Greek, Latin-1, Latin Extended-A, or General Punctuation panels. Open the panels to view the available characters.
3. Click the character you want.

You can copy the special characters you use most often to the Symbol Cache toolbar; see page 35.

► To place information in a table

1. On the Standard toolbar, click  or, from the Insert menu, choose Table.
2. Set the number of rows and columns in the table. You can also change the alignment of the columns and the alignment of the table in relation to the text baseline.
3. Choose OK.
4. Fill your table with information, moving from cell to cell with the TAB key.

Editing Text

Once you've entered your text, you may need to edit it. You can use standard clipboard and drag-and-drop operations to cut, copy, paste, and delete selections. If you change your mind, you can undo the most recent change or deletion. To help revise your content, you can also use the spell check feature available from the Tools menu or the Standard toolbar, and the find and replace feature, available from the Edit menu or the Editing toolbar.

► To undo your most recent change or deletion

- On the Standard toolbar, click  or, from the Edit menu, choose Undo.

Another way to edit text is by changing the *properties* of individual characters. For example, you might add an accent to a character so that *a* becomes *ä*.

► To edit the properties of a character

1. Select the character or place the insertion point to its right.
2. Open the Character Properties dialog box:
   - On the Standard toolbar, click  .
   or
   - From the Edit menu, choose Properties.
   or
   - Press CTRL+F5 (hold down the CTRL key and press F5).
   or
   - Click the right mouse button or press the Application key  to open the Context menu and then choose Properties.
3. Make the changes you want, and then choose OK.

Entering and Editing Mathematics

Because the program assumes you're entering text, you must tell it when you want to enter mathematics. Then, you can enter mathematics easily using the toolbar buttons, Insert menu commands, or keyboard shortcuts.

► To start mathematics

- On the Standard toolbar, click  or, from the Insert menu, choose Math.

When mathematics is active, the Math/Text toggle appears as  .

► To return to text

- On the Standard toolbar, click  or, from the Insert menu, choose Text.

When text is active, the Math/Text toggle appears as  .

Entering Mathematical Characters

Mathematical characters and symbols are available from the customizable Symbol Cache toolbar and the symbol panels. We suggest you open the symbol panels one by one to explore all the available characters. Choosing a mathematical character automatically starts mathematics, even if you have not toggled to mathematics.

► To enter a mathematical character

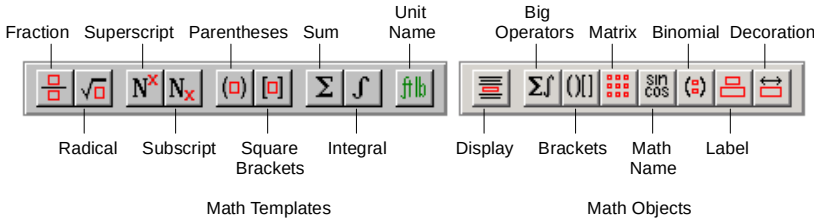
1. From the View menu, display the Symbol Cache and Symbol Panels toolbars.
2. Click the character you want from the Symbol Cache toolbar:

or

Click one of the buttons on the Symbol Panels toolbar to open a panel of special characters, and then click the character you want.

Entering Mathematical Objects

Mathematical objects such as fractions, radicals, subscripts, superscripts, operators, and brackets are available from the Insert menu and the Math toolbars. Many mathematical objects can be entered with keyboard shortcuts (see Appendix B).



When you enter a mathematical object, the program automatically starts mathematics and places a *template* for the object in the document. You fill in the template to complete the object. The instructions below explain how to enter some common mathematical objects and how to create in-line and displayed mathematics. Be sure the math toolbars are displayed. Appendix B contains shortcuts that make entering mathematics even faster.

► To enter a fraction

1. On the Math Templates toolbar, click  or, from the Insert menu, choose Fraction, or press CTRL+F.

   On the screen, you see  , and the Math/Text toggle changes to  .

2. Type the numerator, and then press TAB.
3. Type the denominator, and then press the spacebar.

► To enter a superscript or subscript

1. Click  or, from the Insert menu, choose Math to start mathematics.
2. Type a variable.
3. On the Math Templates toolbar, click  or press CTRL+UP ARROW to enter a superscript.

   or

   On the Math Templates toolbar, click  or press CTRL+DOWN ARROW to enter a subscript.
4. Type the superscript or subscript, and then press the spacebar.

► To enter an expression in parentheses

1. On the Math Templates toolbar, click  .
2. Type the expression. Notice that the parentheses are *elastic*—they expand horizontally and vertically as far as necessary to enclose the expression you enter.
3. Press the spacebar.

► To enter a matrix

1. On the Math Objects toolbar, click  or, from the Insert menu, choose Matrix.
2. Set the number of rows and columns, the alignment, and the baseline of the matrix.
3. Choose the delimiters for the matrix, if desired.
4. Choose OK.
5. Fill your matrix with mathematics, moving from cell to cell with the TAB key.
6. Press the spacebar to leave the matrix.

► To enter an operator

1. On the Math Objects toolbar, click  or, from the Insert menu, choose Operator.
2. Double-click the operator you want.
3. On the Math Templates toolbar, click  and then type the lower limit for the operator.

4. Press TAB, and then type the upper limit.
5. Press the spacebar, and then type the variable.
6. If the variable carries a subscript, click  , type the subscript, and then press the spacebar.

If the expression is in a line of text, the limits are automatically placed to the right, like this: $\sum_{i=1}^{n} a_i$. If the expression is displayed on a line by itself, the limits are automatically placed above and below the operator:

$$\sum_{i=1}^{n} a_i$$

► To change in-line mathematics to displayed mathematics

1. Enter a mathematical expression, and then select it.
2. On the Math Objects toolbar, click  .

► To change displayed mathematics to in-line mathematics

- Place the insertion point to the right of the display and press BACKSPACE.

Entering Mathematics with Fragments

If you enter a certain expression or equation frequently, you can save it as a *fragment* and then enter it in any document with just a few keystrokes. Fragments are available from the File menu and from the popup list on the Fragments toolbar:

You can save both mathematics and text in a fragment.

► To enter a fragment in your document

- Press ALT+4 or click the Fragments popup to display the list of available fragments, and then click the name of the fragment you want or use the arrow keys to select the fragment and then press ENTER.
  or
- From the File menu, choose Import Fragment, select the fragment you want, and then choose Open.

► To save an expression as a fragment

1. Select the expression or equation you want to save as a fragment.
2. On the Fragments toolbar, click  or, from the File menu, choose Save Fragment.

3. Type a file name to be used to recall the fragment. Avoid using the name of a TEX command for the fragment. If you leave the directory unchanged, your fragment will appear in the top part of the list of available fragments. You can create subdirectories for fragments.

4. Choose Save.

Using Body Math

You can enter a series of mathematical expressions quickly if you enter them in a Body Math paragraph. The Body Math tag is available from the Section/Body Tag popup list. Each time you press ENTER in a Body Math paragraph, the program automatically switches to mathematics. This makes it easy to use your document as a mathematics scratchpad. See Formatting with Tags on page 21.

Editing Mathematics

When you need to edit your mathematics, you can use standard clipboard and drag-and-drop operations to cut, copy, paste, and delete. You can also edit the properties of mathematical characters, symbols, and objects.

When you edit the properties of a mathematical character or symbol, the program opens the Character Properties dialog box. When you edit the properties of a mathematical object, the program opens a context-sensitive dialog box; that is, a dialog box that corresponds to the mathematical object you've selected. If you haven't selected an object, the program opens the dialog box appropriate for the object to the left of the insertion point.

► To edit the properties of a mathematical object

1. Select the object or place the insertion point to its right.

2. Open a context-sensitive Properties dialog box:
   - Click  .
   or
   - From the Edit or Context menu, choose Properties.
   or
   - Press CTRL+F5.

3. Make the changes you want, and then choose OK.

Formatting Your Document

In *SWP*, *SW*, and *SNB*, you can produce your document without typesetting it. In *SWP* and *SW*, you can also typeset your document. The appearance of your document depends on which method you use.

- If you display your document in the document window or produce it without typesetting, the program formats the document using the document style (`.cst`) file, the page setup specifications, and the Document Info print options.
- If you typeset your document, the program formats the document using the typesetting specifications, including the document class options, any LaTeX package options, and any TeX commands that have been added to the document. Chapter 4 "Typesetting Your Document" has more information.

Formatting with Tags

Both the document style and the typesetting specifications define *tags*—collections of formatting and behavior properties that determine the appearance of your document. The properties define the type face, font size, font style, paragraph indention, justification, and many other aspects of document appearance. When you apply a tag to information in your document, the program applies the formatting and behavior properties associated with the tag to that information. Using tags, you can create a consistent appearance throughout your document without having to format each element individually.

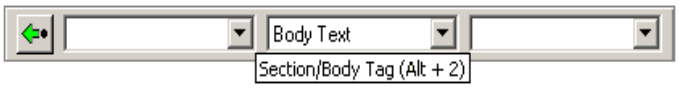
Tag properties are defined in the style file for the shell you used to create your document. In *SWP* and *SW,* tag properties are also defined in the typesetting specifications for the shell. In *SWP* and *SW,* the way you produce your document determines which set of properties the program uses.

The program has *section/body tags, item tags,* and *text tags.* Everything you enter in your document carries one or more tags. The program automatically applies the Body Text tag to all text that you enter. By changing the Body Text tag to a different section/body tag, you can create a heading or a centered paragraph, and by adding an item tag, you can create a list.

In addition to applying tags from the popup lists at the bottom of the program window, as described in these instructions, you can apply tags with the function keys and with the Apply command on the Tag menu.

► To enter a heading

1. Press ALT+2 or click the Section/Body Tag popup list:



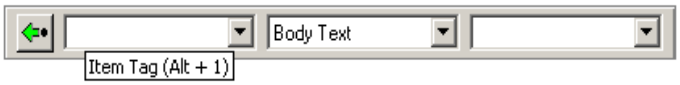
2. From the tag list that pops up, click the heading level you want.
3. Type the text of the heading and then press ENTER.

► To center text

1. Press ALT+2 or click the Section/Body Tag popup list.
2. From the tag list that pops up, click the centering tag you want.
3. Type the text to be centered and then press ENTER.
4. Click the Section/Body Tag popup list again and click the Body Text tag.

► **To enter a list**

1. Press ALT+1 or click the Item Tag popup list:



2. From the tag list that pops up, click the type of list you want.
3. Type the first item in the list and press ENTER. Repeat for each item in the list.
4. To complete the list, click the Remove Item Tag button or press F2.

With text tags, you can emphasize a text selection. For example, you might want to make a selection appear Bigger, Smaller, *Italic,* **Bold,** or *Strongly Emphasized*. Depending on the text tags available in the document style, your text might appear as `Typewriter text`, Sample Text, or KEYBOARD INPUT.

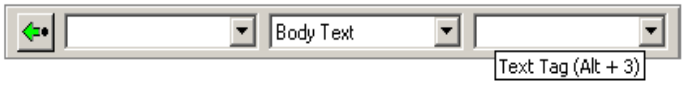
You can apply four frequently used text tags (Normal, Bold, Italic, and Emphasized) with the corresponding N, B, I, and E buttons on the Editing toolbar.

► **To emphasize a portion of text**

1. Select the text you want to emphasize or, if you haven't typed the text, place the insertion point where you want the emphasis to begin.
2. Click B, I, or E to choose Bold, Italic, or Emphasized.

   or

   Press ALT+3 or click the Text Tag popup list:



   and from the tag list that pops up, click the text tag you want.
3. If you haven't yet typed the text, type it and then click N to turn off the emphasis.

Changing the Appearance of Your Document

All formatting specifications are initially defined by the shell with which your document was created, but you can modify them. You can modify the style (`.cst`) file to change the appearance of your document when you display it or produce it without typesetting. Style modifications can apply during the current editing session only, or they can apply globally for all documents created with the same style file. You can also create a new style to produce documents that fit specific formatting requirements.

Changing the typesetting specifications is more complex. You can make some modifications to the typesetting specifications by changing the document class options and the options for LaTeX packages used with your document, and you can add TeX commands

to the preamble, front matter, and body of the document. However, extensive modification of the typesetting specifications isn't advisable and requires a knowledge of TEX and LATEX. Please see Chapter 4 "Typesetting Your Document" for more information about changing the typesetting specifications.

Modifying the Tag Properties Defined in the Style

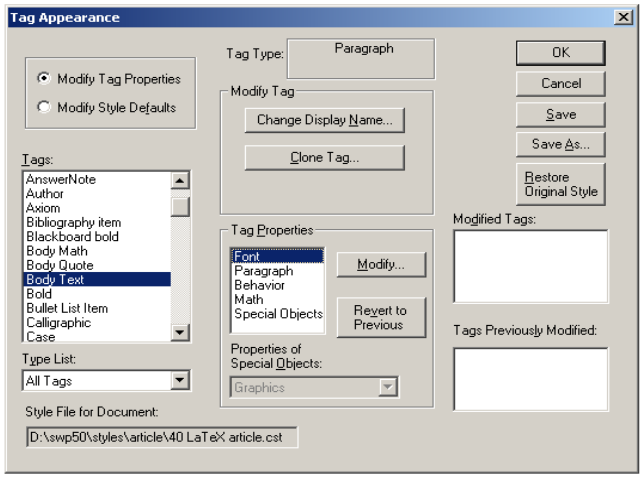
You can change the way tagged text appears in the document window and when you produce it without typesetting if you modify the *tag properties* defined in the style (`.cst`) file for the document shell. Tag properties have some subtle characteristics.

- **Basic properties.** Tag properties define the appearance of tagged text in terms of the tag type font; the spacing, background color, and indention of tagged paragraphs; the color and size of mathematics and mathematical objects that occur in tagged text; and the behavior of the tag. Tag properties also define the appearance of special objects (such as citations, lead-in objects, tables, and mathematical displays) when they occur within tagged text.
- **Nested properties.** Tags can be nested and so can their properties. The style determines the properties to use beginning with the innermost tag.
- **Inherited properties.** Rather than specifying a value for a tag property, the style can specify that the property *inherit* its values from the surrounding text.
- **Unspecified properties.** If the style doesn't define a specific or inherited value for a particular tag property, the style uses the corresponding property value for the surrounding tag.
- **Default properties.** When no other properties apply in a given context, the style uses default properties.

Examples illustrating these characteristics appear in the online Help.

► To change the screen appearance of tagged text

1. On the Editing toolbar, click  or, from the Tag menu, choose Appearance to open the Tag Appearance dialog box.



2. In the Tags list, select the tag whose screen appearance you want to change.

3. In the Tag Properties area, select the property and, if necessary, the special object that you want to change, and then choose Modify.

   In addition to many others, these properties are available for most tags:

Choose	To modify the appearance of
Font	Type face, size, style, and color
Paragraph	Justification, indention, line spacing, background color
Behavior	Tag for the following paragraph; appearance of the tag name in popup lists
Math	Screen color, size, and placement of mathematical objects
Special Objects	Citations, lead-in objects, tables, matrices, displays, graphic and plot captions, formulas, input buttons, hypertext links, hypertext markers, and cross-references

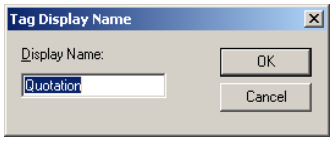
4. Make the changes you want in the property dialog box and then choose OK.
5. Repeat steps 2-4 for all tags whose style properties you want to change.
6. If you decide you don't want the changes for a particular tag property,
   a. Select the tag.
   b. Select the property in the Tag Properties area.
   c. Choose Revert to Previous.
7. If you decide you don't want any of the tag property changes, choose Restore Original Style to return to the settings saved in the style file.
8. Save the changes:
   - Choose Save to save the changes to the current style file, which is listed in the box labeled Style File for Document. This will alter the screen appearance of all documents created with the style.
     or
   - Choose Save As to save the settings in a new style file. Enter a name for the new file and choose Save.
9. Choose OK.

Adding Tags

You can create a new body or text tag by *cloning,* or copying, an existing tag and then modifying the new tag as necessary. Item tags and section tags can't be cloned.

► To clone a tag

1. In the Tags list, select the body or text tag you want to clone and choose Clone Tag.



2. Enter a name for the new tag and choose OK.

   The program displays the name in the Tags list and in the corresponding tag popup list in the program window.

3. In the Tags list, select the new tag.

4. Select and modify the tag properties as necessary, and then choose OK.

5. Save the changes in the same style (`.cst`) file or as a new style.

Formatting the Page

If you produce your document without typesetting it, the margins, headers, footers, and page numbers are set initially by the page setup specifications for the document shell. Margins, headers, footers, and page numbers don't appear in the document window, but you can see them when you preview. You can change them to suit your needs.

► **To modify the page setup specifications**

1. From the File menu, choose Page Setup.

2. Choose the tab you need:

Choose	To
Margins	Set the left, right, top, and bottom page margins
Headers/Footers	Specify headers, footers, and page numbering
Counters	Specify the page numbering style

3. Make the necessary modifications.

4. Choose OK.

Remember that if you typeset your document in SWP or SW, the program ignores the page setup specifications, and sets the margins, headers, footers, and page numbers according to the typesetting specifications.

Working with Hypertext Links

You can use *hypertext links,* or jumps, to link your document to information in another location. You can access information located elsewhere in the same document, in other documents on the current system or network, or, if you have Internet access, on the Web. See Browsing the Internet on page 31 for more information.

Creating Hypertext Links

Hypertext links have two parts: the link and the target. The link creates a pointer to the target and defines the appearance of the pointer in your document. (Read more about hypertext links and typesetting in *Creating Documents with Scientific WorkPlace and Scientific Word* and in the online Help.)

The target of a hypertext jump can be any object to which you've assigned an identifying key or marker—such as a figure, a section, or equation—or any file, including files on the Internet. The address of the target differs depending on the target itself and follows the model used in standard Web browsers.

► To create a hypertext link

1. Place the insertion point where you want the link to appear.
2. On the Field toolbar, click  or, from the Insert menu, choose Hypertext Link.
3. In the Hypertext Link dialog box, enter the screen text for the link. The screen text can contain a graphic.

   See the online Help for information about printing documents containing hypertext links.
4. In the Target box, enter the address of the target:
   - If the target is outside the current document, enter the document address in the URL box, and the marker, if any, in the Marker box.
   - If the target is inside the current document, enter the marker in the Marker box.
5. Choose OK.

► To create a marker in a document

1. Open the target document and place the insertion point where you want the marker.
2. On the Field toolbar, click  or, from the Insert menu, choose Marker.
3. In the Key box, enter a unique key for the item and choose OK.
4. Save the document.

Jumping with Hypertext Links

By default, hypertext links appear in color in the program window. Any time you encounter a link in a document, you can jump immediately to the linked information, whether that information is in the same document, in other documents on the current system or network, or, if you have Internet access, on the Web.

► To jump to the target of a hypertext link

1. Place the insertion point in the link so that the hypertext pointer appears.
2. From the Tools menu, choose Action.

   or

Press CTRL while you click the link.

or

If the link appears in a document saved as read-only (such as those provided with the program), click the link.

The program moves the insertion point to the specified location, opening specified documents or linking to the Internet as necessary.

Saving Your Document

When you've finished writing, save your document.

► **To save your document**

1. On the Standard toolbar, click  or, from the File menu, choose Save.
2. Type a name for your document.

   Any file name compatible with your Windows system is acceptable. The name cannot include the following characters: ***** **?** \ **/** **:** | < > $ ^.

   Note If the name includes characters that have special meaning to TEX, such as a space or ~, you won't be able to typeset your document in *SWP* or *SW*.
3. Choose OK.

   The program saves your document as a `.tex` file.

Saving Portable LATEX Files

If you're working in *SWP* or *SW*, you can save your document using the Portable LATEX output filter. This filter creates documents that have a `.tex` extension but are more easily read by standard LATEX installations. When you output a document as a Portable LATEX file, the program doesn't include the special set of macros called `tcilatex` in your document (the line `\input{tcilatex}` doesn't appear in the document preamble), nor does it include any LATEX packages that aren't part of a standard LATEX installation. Graphics and mathematics plots are exported as graphics; you can select the export format you prefer. Portable LATEX is unavailable in *SNB*, for Style Editor styles, and for styles created under LATEX 2.09.

► **To save your document as a Portable LATEX file**

1. If you want to change the export settings for graphics and mathematics plots,
   a. From the Typeset menu, chose General Settings.
   b. Choose Portable LaTeX Graphics Settings.
   c. Change the graphics export settings as necessary, then choose OK to close the dialog boxes and return to your document.
2. From the File menu, choose Save As.

3. Type the name and location of the file.
4. In the Save as type area, select Portable LaTeX (*.tex) and choose Save.

Exporting Files

You can *export* your document in several formats, including Rich Text Format (RTF) and HTML (see page 30). Saving and exporting differ. If you save the file, the program creates and opens a new file, then closes your original file. If you export the file, the program creates the file but doesn't open it, and leaves your original document open.

When you export your document as an RTF file, the program preserves the formatting you see in the document window. Any mathematics in your document can be represented with MathType 3 (Equation Editor) or MathType 5 objects, depending on the selections you make for RTF exports in the Export Settings dialog box. The resulting RTF file can be viewed in another program, such as Microsoft Word, even if an Equation Editor is not part of the Word installation. If the Microsoft Word installation includes the appropriate Equation Editor, the MathType 3 or MathType 5 objects can be edited.

► To export your document as an RTF file

1. If you want to change the RTF export settings,
   a. Choose Export Settings and choose the RTF Document Export Options tab.
   b. Change the settings as necessary and choose OK.
2. From the File menu, choose Export Document.
3. Type the name of the file.
4. In the Save as type area, select RTF Document (*.rtf).
5. Choose Save.

Note that RTF documents that contain many mathematical objects can load slowly in Microsoft Word. If you need to stop the process, press ESC. You may want to split math-intensive documents into several smaller documents before exporting them as RTF files.

Previewing and Printing Your Document

You can print documents from the document window or the preview window. For information about typesetting, see Chapter 4 "Typesetting Your Document."

► To preview a document

1. On the Standard toolbar, click  or, from the File menu, choose Preview.
2. Use the scroll bars and the toolbar buttons to examine your document in the preview window.
3. When you're ready to leave the previewer, click the Close button.

► **To print a document**

1. From the Standard toolbar in the document window, click  or, from the File menu, choose Print, or press CTRL+P.

   or

   From the Menu bar of the preview window, choose Print.

2. Specify the printer and the print options you want and then choose OK.

The program uses the same routines to preview and print your document as it does to display it in the document window. Therefore, what you see when you preview or print your document without typesetting it resembles what you see when you display it, except that margins, headers, footers, and page numbers aren't displayed in the document window.

You can set the zoom factor for printing your document from 50% to 400% of the normal size. This feature doesn't apply to typesetting.

► **To change the zoom factor for printing**

1. From the File menu, choose Document Info.
2. Choose the Print Options tab.
3. Set the zoom factor you want and choose OK.

Working on the Web

With Version 5 of *SWP* and *SW*, you can create typeset PDF files that can be read by PDF viewers such as Acrobat Reader. You can also export your `.tex` documents as HTML files or place them directly on the web as `.tex` or `.rap` files. Without ever leaving your document, you can activate your Web browser or PDF viewer to open URLs on the Web.

Creating PDF Files

In Version 5 of *SWP* and *SW*, you can create beautifully typeset PDF files. *SWP* and *SW* include PDFTEX, a system based on TEX, that produces PDF files instead of DVI files. No additional software is necessary to create PDF files from your *SWP* and *SW* documents; you need a PDF viewer to preview and print the files.

The PDFTEX system uses PDFLATEX to create fully typeset files. All cross-references and other document elements that are generated automatically by LATEX are preserved. Fonts and graphics are automatically embedded in the resulting PDF file. If you add the *hyperref* package to your document, PDFLATEX converts any cross-references in your document to hypertext links in the PDF file and also creates links from the table of contents to the corresponding sections of the file. Your document looks the same whether you typeset it with PDFLATEX or with LATEX. See Chapter 4 "Typesetting Your Document" for more information about typesetting.

► **To create a PDF file**

1. Create an *SWP* or *SW* document.
2. From the Typeset menu, choose Output Choice.
3. Select PDF output or Both DVI and PDF output and choose OK.

   You can also change the way graphics and mathematics plots are exported. See the online Help and *Creating Documents with Scientific WorkPlace and Scientific Word* for more information.
4. From the Typeset menu, choose Preview PDF or Print PDF.

   Your PDF viewer displays the typeset PDF file or sends it to the printer.

Exporting Documents as HTML Files

The HTML export filter provides a fast way to create accurate HTML versions of your documents. The files can be viewed with recent versions of the most popular browsers and may also be readable by word processors that can't read LaTeX. When you export a document as an HTML file, the filter exports graphics in a default format, which you can change. It also converts any instances of mathematics or mathematics plots in your document to graphics files in a default format. The mathematics are not "live" and you can't perform computations with them. As an option, you can export any mathematics as MathML. However, not all HTML browsers support MathML. You can insert HTML commands in *fields* in your document; the HTML filter passes them to your browser. See *Creating Documents with Scientific WorkPlace and Scientific Word* for more information.

Because the HTML filter ignores cross-references and other document elements that are generated automatically by LaTeX, you should develop the document without regard for its typeset form and appearance. By default, the filter creates a Cascading Style Sheet (`.css` file) that reflects the style (`.cst`) file for your document.

► **To export a document as an HTML file**

1. Format your document so that its appearance in the document window is as you want it to appear online.
2. If you want to change the export settings for mathematics, graphics, and mathematics plots,
   a. Choose Export Settings and choose the HTML Document Export Options tab.
   b. Change the mathematics export settings as necessary.
   c. If you want to change the graphics export settings, choose Graphics Settings, make the changes you need, and choose OK.
   d. Choose OK.
3. From the File menu, choose Export Document.
4. Enter a location and a name for the document.

5. In the box labeled Save as type, specify the format you want.

6. Choose Save.

Using TEX Files on the Web

You can place any .tex or .rap document created with the program on the Web. Anyone with Internet access and *SWP*, *SW*, *SNB*, or *SV* can open the document. See Browsing the Internet, below, for information about opening Internet locations from inside the program.

SWP, *SW*, and *SNB* documents residing on the Web are opened as read-only documents in a new document window. You must save the files locally if you want to work with information in the documents, use *SWP* or *SW* to typeset the document, or use *SWP* or *SNB* to compute with any mathematics they contain.

Browsing the Internet

In addition to jumping to any Internet location defined in a hypertext link, you can open any URL on the Web from within the program.

► To open an Internet location

1. From the File menu, choose Open Location.

2. In the Open Location dialog box, enter the URL of the location you want to access.

3. Choose Open.

If the location you specify isn't a .tex or .rap document created with *SWP*, *SW*, or *SNB*, the program activates the appropriate program on your system, such as your Web browser or PDF viewer. Any open documents remain open while you browse. Program documents with a .tex or .rap extension that are placed on the Internet are available as read-only documents. You must save a copy of them locally if you want to use or perform computations on any information they may contain.

► To cancel an attempt to open an Internet location

- On the Stop toolbar, click  or press CTRL+BREAK.

Managing Your Documents

Documents created with *SWP*, *SW*, and *SNB* are associated with many files in addition to the one that contains the document itself. Some of these files may contain graphics, subdocuments, or style information. Others are created by the program when you typeset. Depending on the file type, the program may not store an associated file in the same directory that holds the document file. Therefore, when you copy, delete, or rename a document and especially when you exchange documents with colleagues, use the Document Manager to ensure that all the files associated with your document are handled correctly.

With the Document Manager, you can copy, delete, rename, view, or clean up a document. Also, you can *wrap* or *unwrap* a document. That is, you can gather together into a single text file all those files that accompany a document, or you can break a file that has been wrapped into separate files again. Wrapping a file before you send it to another location by email or on diskette ensures that all necessary files are sent along with the primary document file. You can unwrap a file with *SWP, SW,* or *SNB;* the Document Manager; or an ASCII editor.

► To start a Document Manager operation

1. From the Tools menu, choose Document Manager.
2. Choose a document.
3. Choose the operation you want.

► To wrap a document

1. From the Tools menu, choose Document Manager.
2. In the File Selection box, type the name of the document you want to wrap.
3. Choose Wrap.
4. Exclude any files you don't want to wrap with your document.

   In most cases, if you're sending the document to someone who has *SWP* or *SW,* you don't need to send standard typesetting specifications. If you're sending the document to someone who has *SWP* or *SNB,* you don't need to send plot snapshots.
5. Choose OK.

   The Document Manager creates a `.rap` file with the same name as your document. The file contains your document, the additional files you included, and instructions for using an ASCII editor to recreate the original files, in case the recipient uses different software.
6. When the operation is complete, choose OK and then choose Close.

You can also create a `.rap` file from the Export Document command on the File menu, but the style and LaTeX typesetting specifications are not included in the resulting file, and some wrapping options are unavailable.

► To open a wrapped document from the File menu

1. From the File menu, choose Open.
2. In the Files of type area, select Wrap (*.rap) or Wrap created by SW/SWP 2.5 (*.msg).
3. Select the name and location of the wrapped file and choose OK.

► **To unwrap a document with the Document Manager**

1. From the Tools menu, choose Document Manager.
2. In the File Selection box, type the name of the document you want to unwrap or use the Browse button to locate and select the document.
3. Choose Unwrap.
4. Select the destination folder for the files and choose OK.
5. Exclude any files you don't want to unwrap with the document and choose OK.

   The Document Manager unwraps the document, placing each file in the correct directory.
6. When the operation is complete, choose OK and then choose Close.

► **To unwrap a document with an ASCII editor**

- Open the wrapped file with the editor and follow the instructions in the file header.

Customizing the Program

The program is flexible: you can customize it to suit the way you work. By modifying the appearance of the program and document windows and the use of program tools and defaults, you can make *SWP, SW,* and *SNB* even more convenient to use.

Changing the Appearance of the Toolbars

You can modify the program window by displaying only those toolbars and symbol panels you use most frequently and by moving toolbars to screen locations that are convenient for you. Additionally, you can add the symbols and characters you use most often to the Symbol Cache toolbar.

► **To display or hide toolbars**

1. From the View menu, choose Toolbars.
2. Check the toolbars you want to display and uncheck the toolbars you want to hide.
3. Choose Close.

► **To return to the original toolbar display**

1. From the View menu, choose Toolbars.
2. Choose Reset and then choose Close.

You can *dock* the toolbar at the top, bottom, or sides of the program window, or you can let it *float* on your desktop or in the entry area of the program window.

► **To move a toolbar to a new location**

1. Display the toolbar.
2. Place the mouse pointer anywhere in the gray area surrounding the toolbar buttons.
3. Drag the toolbar to a new location.

► **To reshape a toolbar**

1. Float the toolbar on the screen.
2. Place the mouse pointer on the edge of the toolbar.

   The pointer changes to indicate that the toolbar can be reshaped.
3. Drag the toolbar to reshape it.

Customizing the Symbol Panels

For faster access to symbols and characters, you can leave open the symbol panels you use most often and float them anywhere you want.

► **To float a symbol panel on the screen**

1. On the Symbol Panels toolbar, click the symbol panel you want.
2. Place the mouse pointer on the title bar of the panel.
3. Drag the panel to a new location on the screen.

You can tailor the panels to move characters and symbols to a new location or remove characters and symbols that you don't use from the panel.

► **To move a symbol on a panel**

- Hold down the SHIFT key, select the symbol, and drag it to a new location.

► **To remove a symbol from a panel**

- Hold down the SHIFT key, select the symbol, and drag it off the panel.

► **To restore a panel to its original configuration**

- Click the right mouse button in the toolbar and choose Reset to Defaults.

► **To close a symbol panel**

- In the upper-right corner of the symbol panel, click  .

  or
- On the Symbol Panels toolbar, click the button for the symbol panel.

Customizing the Symbol Cache Toolbar

You can add to the Symbol Cache toolbar as many symbols from the symbol panels as you need and you can rearrange the symbols or remove any symbols you don't need.

► To add a symbol to the Symbol Cache toolbar

1. Open the Symbol Cache toolbar and the symbol panel containing the symbol.
2. Select the symbol and drag it to any location on the Symbol Cache toolbar.

► To rearrange the symbols on the Symbol Cache toolbar

- Hold down the SHIFT key, select a symbol, and drag it to a new location on the toolbar.

► To remove a symbol from the Symbol Cache toolbar

- Hold down the SHIFT key, select the symbol, and drag it off the toolbar.

Changing the Appearance of the Document Windows

In addition to sizing the program window to your liking, you can customize the document windows. You can have several document windows open at the same time, and you can arrange them conveniently within the program window. You can set the magnification and the characteristics of the view separately for each window.

► To open a document in a new window

- Open an existing document:

  a. On the Standard toolbar, click  or, from the File menu, choose Open.
  b. Specify the file you want to open, and then choose Open.

  or

- Open a new document:

  a. On the Standard toolbar, click  or, from the File menu, choose New.
  b. From the New dialog box, choose the shell you want, and then choose OK.

  or

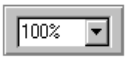
- Open another view of the active document:
  - From the Window menu, choose New Window.

► To arrange the open document windows

- From the Window menu, choose Cascade, Tile Horizontally, or Tile Vertically.
  or
- With the mouse, drag the title bar of a document window to the position you want.

You can change the magnification of the document in each window from 50% to 400% of normal size.

► **To change the magnification in the active window**

- From the View menu, choose 100% or 200%; or choose Custom, set the percentage of magnification you want, and choose OK.
  or
- On the Standard toolbar, click the Zoom Factor box 

, and then choose the percentage of magnification you want or type it and press ENTER.

Note that you can set separate zoom factors for displaying and for printing the document without typesetting.

Changing the Tools and Defaults

Working in *SWP*, *SW*, and *SNB* is fast and convenient, but you can make it even more so if you set the function keys to apply the tags you use most often and set the program defaults to customize the way the program works.

Customizing the Function Key Assignments

Initially, the function keys have these tag assignments:

Key	Tag	Key	Tag
F2	Remove Item Tag	F7	Numbered List Item
F3	Body Text	F8	Bullet List Item
F4	Normal	F9	Typewriter
F5	Bold	F11	Section
F6	Emphasize	F12	Subsection

You can set global function key assignments that apply to all documents, or you can override the global settings with different function key assignments for each style.

► **To change a function key assignment**

1. From the Tag menu, choose Function Keys.
2. In the Tag Key Assignments dialog box, select the tag you want to assign to a function key.
3. Place the insertion point in the box marked Press New Keys, and press the function key you want to use. You can use modifiers such as CTRL, ALT, and SHIFT.
4. Choose Assign to Style or Assign Globally.

   If the function key you choose is already assigned to a tag, the program clears the old assignment.
5. Choose Close.

► **To clear a tag assignment**

1. In the Tag Key Assignments dialog box, select the tag whose assignment you want to clear.
2. In the Current Assignments box, select the assignment, and then choose Remove.
3. Choose Close.

Customizing the User Setup

By changing the User Setup defaults, you can customize the way the program works with files, text, mathematics, and graphics. The online Help and *Creating Documents with Scientific WorkPlace and Scientific Word* contain more information.

► **To customize a program default**

1. From the Tools menu, choose User Setup.
2. Choose the tab for the kind of default you want to set:

These defaults	Relate to
General	How the program operates internally
Edit	How certain keys and the mouse function as you type
Start-up Document	Which document shell is displayed when you open the program
Graphics	How the program treats new graphics
Files	Where files are located; how and when you save files
Math	How the Math/Text toggle and other mathematics controls operate
Font Mapping/IME	Which fonts are used to display characters not in the standard ASCII range, and how the Input Method Editor (IME) behaves when entering and leaving mathematics

3. Specify the setting you want by checking or unchecking boxes and buttons, entering numbers to indicate settings, or typing information in the dialog boxes.
4. Choose OK.

3 Computing and Plotting

In *SWP* and *SNB*, you can perform basic and complex mathematical computations right in your document. You can use the computational engine to perform symbolic computations fundamental to algebra, trigonometry, and calculus: evaluating, factoring, combining, expanding, and simplifying terms and expressions containing integers, fractions, and real and complex numbers. You can also perform integration, differentiation, matrix and vector operations, standard deviations, and many other more complex computations involved in calculus, linear algebra, differential equations, and statistics. *SW* and *SV* don't include a computational engine.

You can plot the results of your computations or use them to perform additional computations. You can plot additional items by dragging them onto an existing plot. You can build a series of expressions that show a step-by-step approach to a problem solution by *computing in place*—performing computations within an expression, rather than on an entire expression. And you can perform computations on data files you import from your calculator. Finally, you can combine the power of the computational engine and the Exam Builder to create algorithmically-generated, computer-graded course materials.

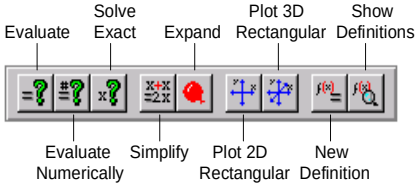
Use the Engine Setup tab sheet on the Tools menu to display a full or simplified Compute menu. Extensive information about computing and plotting appears in the online Help and in *Doing Mathematics with Scientific WorkPlace and Scientific Notebook.*

To try the sample computations in this chapter, display the Math Templates, Math Objects, Compute, and Symbol Cache toolbars. Results may differ slightly depending on the defaults selected.

► To perform a computation or plot a graph

1. Enter a mathematical expression.

2. With the insertion point in or at the immediate right of the expression, choose the command you want from the Compute menu or the Compute toolbar:



While the computation takes place, the program displays a computational pointer. Then, the program inserts the result in your document. Most computations are fast, but some take several minutes. Occasionally, you may want to cancel a computation.

► To stop a computation

- Click  or press CTRL+BREAK.

Evaluate and Evaluate Numerically

You can easily collect terms, find the sum or difference of polynomials, change a quotient to rational form, or raise a number to a power with the Evaluate and Evaluate Numerically commands. When you evaluate an expression, the computational engine returns an exact or symbolic answer whenever appropriate and a numerical approximation otherwise. You can use the Evaluate Numerically command to force a numerical result for any evaluation.

- **Example** Evaluate $\sqrt{2.36}$

1. Click  . The program starts mathematics automatically.
2. Type **2.36**. Your screen shows the expression $\sqrt{2.36}$.
3. Click  . The computational engine evaluates and you see this result:

$$\sqrt{2.36}. = 1.536\,2$$

- **Example** Evaluate $(0.16)^{-1}$

1. Click  . The program starts mathematics automatically.
2. Type **0.16**, and press the spacebar.
3. Click  and type **-1**. Your screen shows the expression $(0.16)^{-1}$.
4. Click  . The computational engine evaluates the expression:

$$(0.16)^{-1} = 6.25$$

- **Example** Evaluate Numerically $936 \div 14$

1. Click  or, from the Insert menu, choose Math to start mathematics.
2. Type **936**, click  on the Symbol Cache toolbar, and type **14**.
3. Click  . Your screen displays this result:

$$936 \div 14 = 66.857$$

- **Example** Evaluate π Numerically

1. On the Symbol Cache toolbar, click  , and then click  . The evaluation yields this result:

$$\pi =: 3.141\,6$$

2. Now see how the results differ when you change the numerical accuracy with which the computational engine operates:

   a. From the Tools menu, choose Engine Setup and choose the General tab.
   b. Change the setting for Digits Used in Computations to **20** and choose OK.
   c. From the Tools menu, choose Computation Setup and choose the General tab.
   d. Change the setting for Digits Shown in Results to **20** and choose OK.
   e. Press ENTER, click  , and then click  . Now you see this result:

$$\pi = 3.141\,592\,653\,589\,793\,238\,5$$

3. Return to the original settings for Digits Used in Computations and Digits Shown in Results.

Evaluate these expressions

Compute these expressions with Evaluate:

$27 + 33 - 16$ $\quad$ 14.2×83.5 $\quad$ $|-11.3|$ $\quad$ $\left(3x^2 + 3x\right) + \left(8x^2 + 7\right)$

Compute these expressions with Evaluate Numerically:

$$\frac{8}{9} \qquad \sqrt{2} \qquad \int_0^1 e^{x^2}\,dx$$

Compute these expressions with Evaluate and Evaluate Numerically; note the different results:.

$$\frac{-\frac{2}{3}}{\frac{8}{7}} \qquad \frac{5}{8} \times \frac{1}{7} \qquad (x+3) + (x-y) \qquad 4^{-3}$$

Factor

You can use the Factor command when you need to find the elements or quantities whose multiplication gives a certain product or polynomial.

- **Example** Factor 12345

1. Click  or, from the Insert menu, choose Math to start mathematics.
2. Type **12345**.
3. From the Compute menu, choose Factor. Your screen shows this result:

$$12345 = 3 \times 5 \times 823$$

- **Example** Factor $x^2 - y^2$

1. Click  or, from the Insert menu, choose Math to start mathematics.
2. Type **x**, click  , type **2**, and press the spacebar.
3. Type **-y**, click  , and type **2**.
4. From the Compute menu, choose Factor. Your screen shows this result:

$$x^2 - y^2 = (x - y)(x + y)$$

Factor these expressions

$$24! \qquad x^6 - y^6 \qquad \frac{1}{2}x^2 + 3x - \frac{20}{9}$$

$$5x^5 + 5x^4 - 10x^3 - 10x^2 + 5x + 5$$

Combine

In addition to combining the items in mathematical expressions, you can use the Combine command to demonstrate the laws of exponents and the properties of logarithms.

- **Example** Combine $\sin x \cos y + \cos x \sin y$

You don't need to type any spaces as you enter the functions. The program interprets the trigonometric functions and formats the expression correctly. Note that because Automatic Substitution is on by default, the function names are displayed in gray.

1. Click  or, from the Insert menu, choose Math to start mathematics.
2. Type **sinxcosy+cosxsiny**.
3. From the Compute menu, choose Combine, and then choose Trig Functions. This is the result:

$$\sin x \cos y + \cos x \sin y = \sin (x + y)$$

- **Example** Combine the powers of $10^x 10^y$

1. Click  or, from the Insert menu, choose Math to start mathematics.
2. Type **10**, click  , type **x**, and then press the spacebar.
3. Type **10**, click  , and type **y**.
4. From the Compute menu, choose Combine, and then choose Powers. After the calculation is complete, your screen shows this result:

$$10^x 10^y = 10^{x+y}$$

Combine the terms in these expressions

$(e^x)^y$ $\sin x \sin y$ $(2^x)^y$

Expand

You can expand the products or powers of polynomials with the Expand command.

- **Example** Expand $\frac{18229}{94}$

1. Click  .
2. Type **18229**, press TAB, and type **94**.
3. Click  to obtain this result:

$$\boxed{\frac{18229}{94} = 193\frac{87}{94}}$$

- **Example** Expand $\sin 2x$

1. Click  or, from the Insert menu, choose Math to start mathematics.
2. Type **sin**.

   The program automatically recognizes the trigonometric function and displays it on your screen in gray.
3. Type **2x**.
4. Click  . After the computation, you see this result:

$$\boxed{\sin 2x = 2\cos x \sin x}$$

Expand these expressions

$$\left(3x^2+3x\right)^3 \qquad \sin\left(x+y\right) \qquad \left(3x^2+3x\right)\left(8x^2+7\right) \qquad \left(x+y\right)^4$$

Simplify

You can reduce expressions to standard form, collecting like terms in addition and canceling common factors in division. When possible, the computational engine performs indicated operations exactly or reduces them to lower-level operations.

- **Example** Simplify $4a + 7b - (2a + b)$

1. Click  or, from the Insert menu, choose Math to start mathematics.

2. Type **4a+7b-**, click  , type **2a+b**, and click  . The computational engine returns this answer:

$$4a + 7b - (2a + b) = 2a + 6b$$

- **Example** Simplify $\left(x^2 - 6x + \left(\frac{-6}{2}\right)^2\right) + \left(y^2 + 10y\left(\frac{10}{2}\right)^2\right)$

1. Enter the first expression:

   a. Click  , type **x**, click  , type **2**, and press the spacebar.

   b. Type **-6x+**, click  , and then click  .

   c. Type **-6**, press TAB, type **2**, and press the spacebar twice.

   d. Click  , type **2**, and press the spacebar twice.

2. Type the second expression:

   a. Type + , click  , type **y**, click  , type **2**, and press the spacebar.

   b. Type **+10y**, click  , and then click  .

   c. Type **10**, press TAB, type **2**, press the spacebar twice, click  , and type **2**.

3. Click  . The computational engine simplifies the mathematics:

$$\left(x^2 - 6x + \left(\frac{-6}{2}\right)^2\right) + \left(y^2 + 10y\left(\frac{10}{2}\right)^2\right) = x^2 - 6x + y^2 + 250y + 9$$

Simplify these expressions

$$\sqrt[3]{8} + 3 \qquad \sin^2 x + \cos^2 x \qquad \int_1^a \frac{1}{t}\,dt \qquad 14\frac{5}{9}$$

Check Equality

You can determine whether an equality is true or false or whether, if the test is inconclusive, the inequality may be true or false.

- **Example** Check the equality $1 + 1 = 3$

1. Click  or, from the Insert menu, choose Math to start mathematics.
2. Type **1+1=3**.
3. From the Compute menu, choose Check Equality. You see this result:

$$1 + 1 = 3 \text{ is false}$$

- **Example** Check the equality $\frac{9}{8} - \frac{8}{9} = \left|\frac{9}{8} - \frac{8}{9}\right|$

1. Click  , type **9**, press TAB, type **8**, and press the spacebar.
2. Type **-** , click  , type **8**, press TAB, type **9**, and press the spacebar.
3. Type = , click  , select  , and choose OK.
4. Type the two fractions again.
5. From the Compute menu, choose Check Equality. This is the result:

$$\frac{9}{8} - \frac{8}{9} = \left|\frac{9}{8} - \frac{8}{9}\right| \text{ is true}$$

Check these equalities

$$e^{i\pi} = -1 \qquad \pi = 3.14 \qquad \sin^2 x + \cos^2 x = 1$$

Solve Exact and Numeric

As with evaluation, when you solve an expression, the computational engine returns an exact or symbolic answer whenever appropriate. You can use the Solve Numeric command to force a numerical result for any solution.

You can solve equations with one or more variables. You can solve inequalities with Solve Exact. And you can solve a system of equations if you place the equations in a matrix cell and then apply the Solve Exact command to the matrix.

- **Example** Solve Exact $3x + 5 \leq 5x - 3$

1. Click  or, from the Insert menu, choose Math to start mathematics.
2. Type **3x+5**.
3. On the Symbol Cache toolbar, click  .
4. Type **5x-3**.
5. Click  or, from the Compute menu, choose Solve, and then choose Exact. On your screen, you see this solution:

$$3x + 5 \leq 5x - 3, \text{ Solution is: } [4, \infty)$$

- **Example** Solve Exact $2x + 3y = 1$

1. Click  or, from the Insert menu, choose Math to start mathematics.
2. Type **2x+3y=1**. Remember that you don't need to enter any spaces; the program spaces the expression correctly.
3. From the Compute menu, choose Solve, and then choose Exact.
4. In the Solution Variables box, enter **x** and choose OK. The computational engine presents this solution:

$$2x + 3y = 1, \text{ Solution is: } \tfrac{1}{2} - \tfrac{3}{2}y$$

- **Example** Solve Numeric $x^2 - 2 = 0$

1. Click  or, from the Insert menu, choose Math to start mathematics.
2. Type **x**, click  , type **2**, and press the spacebar.
3. Type **-2=0**.
4. From the Compute menu, choose Solve, and then choose Numeric. The computational engine returns this numeric solution:

$$x^2 - 2 = 0, \text{ Solution is: } \{[x = -1.414\,2], [x = 1.414\,2]\}$$

- **Example** Solve a system of equations

1. Click  or, from the Insert menu, choose Matrix.
2. Specify 2 rows and 1 column, and then choose OK.
3. Type **2x+3y=41** and press TAB.
4. Type **x+y=146** and press the spacebar. You see this matrix:

$$\begin{matrix} 2x + 3y = 41 \\ x + y = 146 \end{matrix}$$

5. From the Compute menu, choose Solve, and then choose Exact. The computational engine solves the system of equations in the matrix and displays this result:

$$\begin{matrix} 2x + 3y = 41 \\ x + y = 146 \end{matrix}, \text{ Solution is: } [x = 397, y = -251]$$

Solve these expressions

Use Solve Exact to solve these relations:

$\frac{1}{x} + \frac{1}{y} = 1$ (for x) $\quad x^2 - 5x + 4 = 0 \quad \frac{7 - 2x}{x - 2} \geq 0 \quad \begin{bmatrix} 2x + y = 5 \\ 3x - 7y = 2 \end{bmatrix}$

Use Solve Numeric to solve these relations:

$16 - 7y = 10y - 4 \quad x^5 - 5x^4 + 3x + 4 = 0 \quad \begin{bmatrix} \sin x = \cos x \\ x \in (9, 12) \end{bmatrix}$

Work with Polynomials

Use the commands on the Polynomials and Calculus submenus to collect and order the terms in polynomials, divide polynomials, find roots, and write a rational expression as the sum of partial fractions.

- **Example** Collect the terms in $3x - 7x^2 + 8x - 3 + x^5$

1. Click  or, from the Insert menu, choose Math to start mathematics.
2. Type **3x-7x**, click  , type **2**, and press the spacebar.
3. Type **+8x-3+x**, click  , type **5**, and press the spacebar.
4. From the Compute menu, choose Polynomials, and then choose Collect.
5. Type **x** in the Need Polynomial Variable dialog box and choose OK. The computational engine collects the terms and displays this result:

$$3x - 7x^2 + 8x - 3 + x^5 = x^5 - 7x^2 + 11x - 3$$

- **Example** Order the terms in $3xt^2 - 16t^5 + y + 9 - 2xt^2$

1. Click  or, from the Insert menu, choose Math to start mathematics.
2. Type **3xt**, click  , type **2**, and press the spacebar.
3. Type **-16t**, click  , type **5**, and press the spacebar.
4. Type **+y +9-2xt**, click  , type **2**, and press the spacebar.
5. From the Compute menu, choose Polynomials, and then choose Sort.
6. Type **t** in the Need Polynomial Variable dialog box and choose OK. The computational engine orders the terms and then displays this result:

$$3xt^2 - 16t^5 + y + 9 - 2xt^2 = -16t^5 + t^2x + y + 9$$

- **Example** Write this expression as the sum of partial fractions: $\frac{x^6-5x^4+3x+4}{(x^2-2)(x+3)^3}$

1. Click  .
2. Type **x**, click  , type **6**, and press the spacebar.
3. Type **-5x**, click  , type **4**, and press the spacebar.

4. Type **+3x+4** and press TAB.
5. Click  , type **x**, click  , type **2**, and press the spacebar.
6. Type **-2** and press the spacebar.
7. Click  , type **x+3**, and press the spacebar.
8. Click  and type **3**.
9. From the Compute menu, choose Calculus, and then choose Partial Fractions. The computational engine computes the partial fraction and returns this result:

$$\frac{x^6-5x^4+3x+4}{(x^2-2)(x+3)^3} = x + \frac{\frac{367}{343}x-\frac{534}{343}}{x^2-2} + \frac{17\,126}{343(x+3)} - \frac{4491}{49(x+3)^2} + \frac{319}{7(x+3)^3} - 9$$

- **Example** Find the roots of the expression x^2+4

1. Click  or, from the Insert menu, choose Math to start mathematics.
2. Type **x**, click  , type **2**, press the spacebar, and type **+4**.
3. From the Compute menu, choose Polynomials, and then choose Roots. Your screen shows this result:

$$x^2+4, \text{ roots: } \begin{matrix} -2i \\ 2i \end{matrix}$$

Try these exercises with polynomials

Collect the terms in these expressions:

$$5t^2+2t-16t^5+t^3-2t^2+9$$

$$x^2+y+5-3x^3y+5x^2+4y^3+13+2x^4 \text{ (Use the variable } x)$$

Order the terms in these expressions:

$$3x-7x^2+8x-3+x^5$$

$$x^2+y+5-3x^3y+5x^2+4y^3+13+2x^4 \text{ (Use the variable } x)$$

Divide these polynomials:

$$\frac{x^5-5x^4+3x+4}{x^2-2} \qquad \frac{(3x^2+3x)}{(8x^2+7)}$$

Find the roots of these expressions:

$$x^3-2x-2x^2+4 \qquad x^3-\frac{13}{5}ix^2-8x^2+\frac{29}{5}ix+\frac{81}{5}x+6i-\frac{18}{5}$$

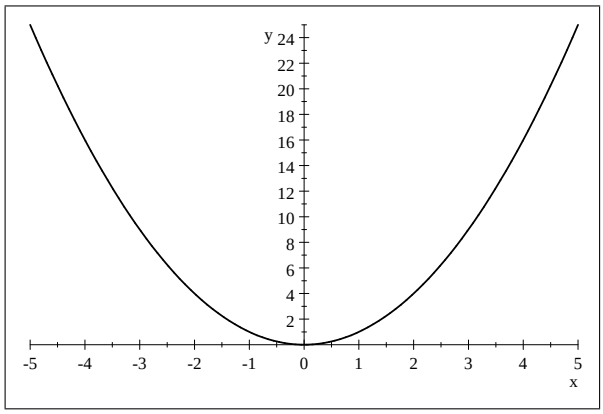
Create 2D and 3D Plots

In *SWP* and *SNB*, you can create 2-dimensional and 3-dimensional plots of polynomials, trigonometric functions, and exponentials.

- **Example** Plot x^2

1. Click  or, from the Insert menu, choose Math, then type **x**, click  , and type **2**.

2. Click  or, from the Compute menu, choose Plot 2D and then choose Rectangular. The computational engine plots the expression x^2:

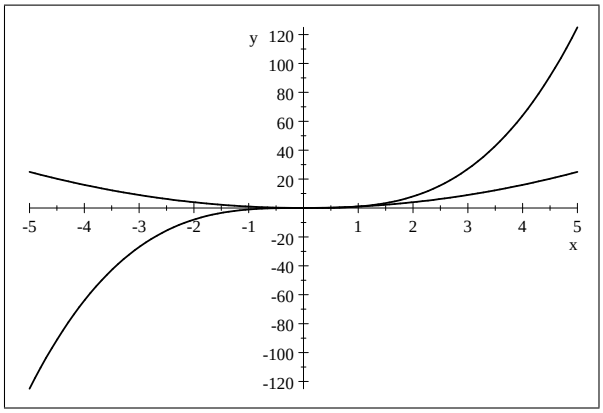


3. Add to the plot:

   a. Press ENTER to start a new line and then start mathematics.

   b. Type **x**, click  , and type **3**.

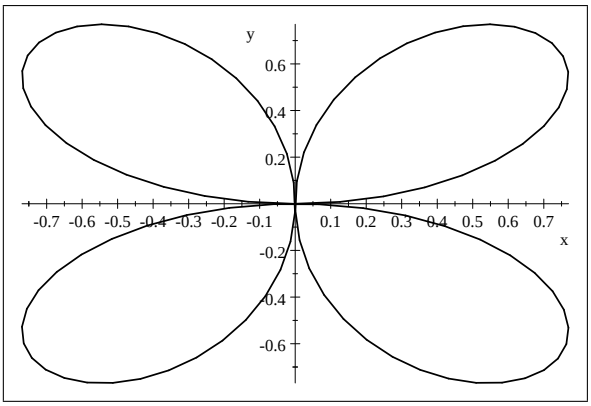
   c. Select the expression x^3 and drag it onto the plot. The computational engine replots, adding the new function:



- **Example** Create a polar plot

1. Click  or, from the Insert menu, choose Math, then type **sin2t**.

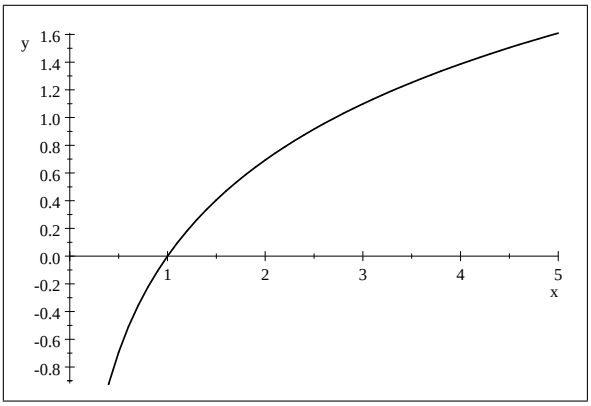
2. From the Compute menu, choose Plot 2D and then choose Polar. The computational engine plots the expression $\sin 2t$:



- **Example** Plot $\ln x$

1. Click  or, from the Insert menu, choose Math, then type **lnx**.

2. Click  or, from the Compute menu, choose Plot 2D and then choose Rectangular. The computational engine plots the expression:

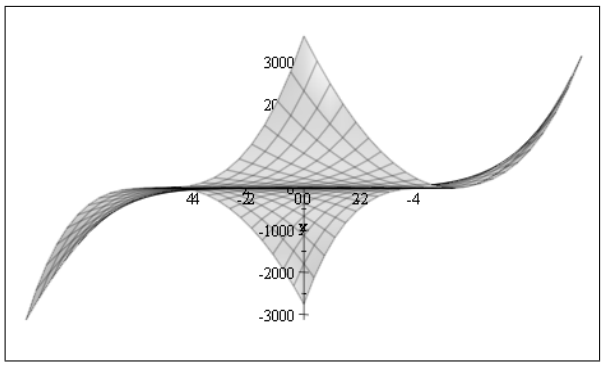


- **Example** Plot x^2y^3

1. Click  or, from the Insert menu, choose Math to start mathematics.

2. Type **x**, click  , type **2**, and press the spacebar; then type **y**, click  , and type **3**.

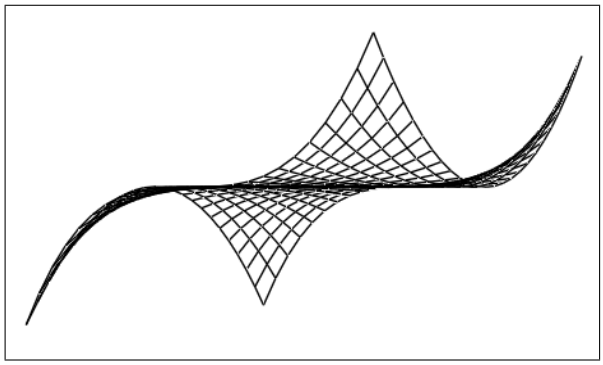
3. Click  or, from the Compute menu, choose Plot 3D and then choose Rectangular. The computational engine plots the expression x^2y^3:



4. If you want this plot to appear more clearly in print, you can change its properties:

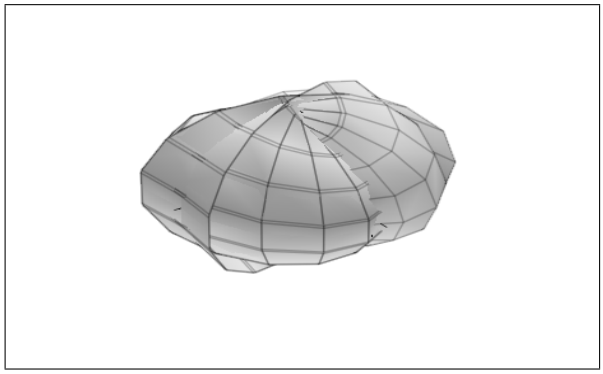
   a. Select the plot and click the Graphic Properties icon  in the lower right corner of the plot.
   b. Choose the Items Plotted tab.
   c. In the Directional Shading area, choose Flat.
   d. In the Base Color area, choose Black.
   e. In the Surface Style area, choose Wire Frame.
   f. Select the Axes tab.
   g. In the Axes Type area, choose None.
   h. Select the View tab.
   i. In the Orientation area, set Turn to **34**.
   j. Choose OK.

   Here's the result:



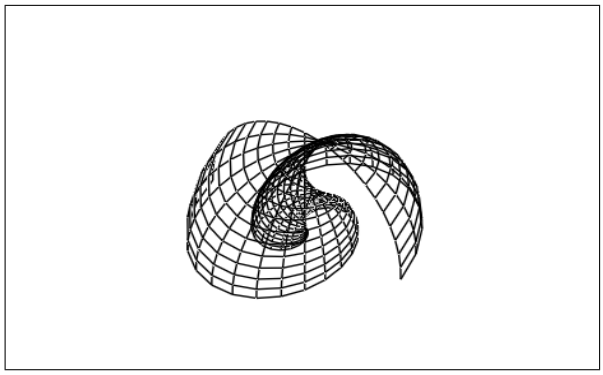
- **Example** Plot $[x \sin x \cos y, x \cos x \cos y, x \sin y]$

1. Click  .
2. Type **xsinxcosy,xcosxcosy,xsiny**.
3. Click  or, from the Compute menu, choose Plot 3D and then choose Rectangular. The computational engine produces a plot whose components you can change:



4. Change the plot properties:
   a. Select the plot and click the Graphic Properties icon  in the lower right corner of the plot.
   b. Choose the Items Plotted tab.
   c. In the Directional Shading area, choose Flat.
   d. In the Base Color area, choose Black.
   e. In the Surface Style area, select Wire Frame.
   f. Choose Variables and Intervals.
   g. In the Plot Intervals area, set the interval values for x to **0** to **6.28**.
   h. Set the interval values for y to **0** to **3.14** and choose OK.
   i. Select the Axes tab.
   j. In the Axes Type area, choose None and choose OK.

   The computational engine replots the expression $[x \sin x \cos y, x \cos x \cos y, x \sin y]$:



Plot these expressions

Use Plot 2D, Rectangular to plot $x \sin \frac{1}{x}$

Use Plot 2D, Parametric to plot $(\sin 2t, \cos 3t)$

Use Plot 2D, Implicit to plot $(x-2)^2 + (y-3)^2 = 25$, where $-3 \le x \le 7$ and $-2 \le y \le 8$; edit the plot to choose Equal Scaling from the Axes tab

Use Plot 3D, Cylindrical to plot $1 - z$, where $0 \le \theta \le 2\pi$ and $0 \le z \le 1$

Use Plot 3D, Spherical to plot 2, where $0 \le \theta \le 2\pi$ and $0 \le z \le 2\pi$

Compute in Place

You can use many computational commands to compute in place, replacing part of an expression with the result of an operation. You can use this technique to demonstrate the steps involved in the solution to a problem.

- **Example** Simplify $\frac{x^2-5x+6}{x^2-2x-3}$ and show the steps in the solution

1. Click  , type **x**, click  , type **2**, press the spacebar, and type **-5x+6**.
2. Press TAB, type **x**, click  , type **2**, press the spacebar, and type **-2x-3**.
3. Position the insertion point after the original expression and type **=**.
4. Select the original expression.
5. Hold down the CTRL key while you drag a copy of the expression to the right of the first equals sign.
6. Select the numerator in the copied expression, then hold down the CTRL key while you choose Factor from the Compute menu.
7. Select the denominator in the copied expression, then hold down the CTRL key while you choose Factor from the Compute menu.
8. Click  . The computational engine returns this result. Now, you see all the steps in the solution:

$$\frac{x^2-5x+6}{x^2-2x-3} = \frac{(x-2)(x-3)}{(x+1)(x-3)} = \frac{1}{x+1}(x-2)$$

Compute in place to show the steps in the solutions of this problem

Simplify $\frac{x^2-4x-21}{x^3+3x^2-x-3}$ to $\frac{1}{(x-1)(x+1)}(x-7)$, showing the steps in the process

Perform Matrix Operations

You can perform a full range of matrix operations including addition, multiplication, and inversion.

- **Example** Transpose the matrix $\begin{bmatrix} 1 & 4 \\ 2 & 5 \\ 3 & 6 \end{bmatrix}$

1. Click  and specify a matrix of 3 rows and 2 columns.
2. In the Built-in Delimiters area, specify Brackets [m] and choose OK.
3. Fill the matrix:
   a. Type **1**, press TAB, type **4**, and press TAB.
   b. Type **2**, press TAB, type **5**, and press TAB.
   c. Type **3**, press TAB, type **6**.
4. From the Compute menu, choose Matrices and then choose Transpose. The computational engine transposes the matrix:

$$\begin{bmatrix} 1 & 4 \\ 2 & 5 \\ 3 & 6 \end{bmatrix}, \text{ transpose: } \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$$

- **Example** Invert the matrix $\begin{bmatrix} 1 & 2 \\ 7 & -3 \end{bmatrix}$

1. Click  and specify a matrix of 2 rows and 2 columns.
2. In the Built-in Delimiters area, specify Brackets [m] and choose OK.
3. Fill the matrix: type **1**, press TAB, type **2**, press TAB, type **7**, press TAB, and type **-3**.
4. From the Compute menu, choose Matrices and then choose Inverse. The computational engine inverts the matrix:

$$\begin{bmatrix} 1 & 2 \\ 7 & -3 \end{bmatrix}, \text{ inverse: } \begin{bmatrix} \frac{3}{17} & \frac{2}{17} \\ \frac{7}{17} & -\frac{1}{17} \end{bmatrix}$$

Perform these matrix operations

Adjugate $\begin{bmatrix} 97 & 50 \\ 56 & 49 \end{bmatrix}$ Concatenate $\begin{bmatrix} a & 5 \\ 6 & b \end{bmatrix} \begin{bmatrix} 9 & c \\ d & 4 \end{bmatrix}$

Find the determinant of $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$

Solve Differential Equations

Many differential equations have answers in terms of familiar functions. You can use the Solve ODE command to find those functions. If you specify initial conditions for an equation, you can solve the equation numerically.

- **Example** Compute $\frac{dy}{dx} = x$

1. Click  .
2. Type **dy**, press TAB, type **dx**, and press the spacebar.
3. Type **=x**.
4. From the Compute menu, choose Solve ODE, and then choose Exact. The computational engine gives this result:

$$\frac{dy}{dx} = x, \text{ Exact solution is: } \left\{\frac{1}{2}x^2 + C_2\right\}$$

- **Example** Find the solution of the initial value problem $\begin{bmatrix} y' = y \\ y(0) = 1 \end{bmatrix}$

1. Click  and specify a matrix of 2 rows and 1 column.
2. In the Built-in Delimiters area, specify Brackets [m] and then choose OK.
3. Type **y'=y** and press TAB.
4. Type **y**, click  , type **0**, and press the spacebar.
5. Type **=1** and press the spacebar.
6. From the Compute menu, choose Solve ODE, and then choose Exact.
7. Type **x** as the independent variable you want the computational engine to use and choose OK. The computational engine returns this result:

$$\begin{bmatrix} y' = y \\ y(0) = 1 \end{bmatrix}, \text{ Exact solution is: } \{e^x\}$$

Compute these differential equations

$$\frac{dx}{dy} = 2xy \qquad y'' = y \qquad y'' + y = 0$$

Compute Statistics

Basic and advanced statistical computations are available.

- **Example** Find the modes of $1, 1, 3, 4, 4, 4, 5, 3, 8, 1, 9, 5, 2$

1. Click  or, from the Insert menu, choose Math to start mathematics.
2. Type the numbers **1,1,3,4,4,4,4,5,3,8,1,9,5,2**. Include the commas.
3. From the Compute menu, choose Statistics, and then choose Mode. The computational engine returns this answer (the modes are the numbers in brackets and the final number indicates the number of times that each mode appears in the set):

$$\boxed{\text{Mode(s): } [1, 4]\,, 3}$$

- **Example** Find the medians of the columns of the matrix $\begin{bmatrix} 1.5 & 6.7 \\ 3.9 & 2.2 \\ 5.5 & 4.3 \end{bmatrix}$

1. Click  , and specify a matrix of 3 rows and 2 columns.
2. In the Built-in Delimiters area, specify Brackets [m] and then choose OK.
3. Fill the matrix with the values **1.5**, **6.7**, **3.9**, **2.2**, **5.5**, and **4.3**, pressing TAB to move from cell to cell.
4. From the Compute menu, choose Statistics, and then choose Median. The computational engine returns these medians:

$$\boxed{\text{Median(s): } [3.9, 4.3]}$$

- **Example** Find the standard deviation of $2.5, 6.8, 3.5, 1.9, 2.3, 4.5$

1. Click  or, from the Insert menu, choose Math to start mathematics.
2. Enter the numbers **2.5**, **6.8**, **3.5**, **1.9**, **2.3**, and **4.5**, separated by commas.
3. From the Compute menu, choose Statistics, and then choose Standard Deviation. The computational engine returns this answer:

$$\boxed{\text{Standard deviation(s): } 1.8357}$$

Compute these statistics

Find the mean of these values: $1, 2, 3, 4$ $\begin{bmatrix} 1.5 & 6.7 \\ 3.9 & 2.2 \end{bmatrix}$

Find the variance of $2.5, 6.8, 3.5, 1.9, 2.3, 4.5$

Using multiple regression, fit a curve to these points (dependent variable in column 2): $\begin{bmatrix} x & y \\ 1 & 2 \\ 2 & 4 \\ 3 & 7 \end{bmatrix}$

Compute with Units of Measure

You can convert values from one unit of physical measure to another and perform computations on equations containing units.

- **Example** Convert 28.6 pound-force to newtons

1. Click  or, from the Insert menu, choose Math to start mathematics.
2. Type **28.6** and then click  or, from the Insert menu, choose Unit Name.
3. In the Physical Quantity box, select Force.
4. In the Unit Name area, select Pound-force, and then choose Insert. The program inserts the unit of measure and leaves the Unit Name dialog box open.
5. Type **=x**.
6. In the Unit Name area, select Newton, choose Insert, and close the dialog box.
7. Click  or, from the Compute menu, choose Solve, and then choose Exact.

   The computational engine yields this result:

$$28.6\,\text{lbf} = x\,\text{N}, \text{ Solution is: } \{127.\,22\}$$

- **Example** Express 20.0 miles/hour in kilometers/minute

1. Click  or, from the Insert menu, choose Math to start mathematics.
2. Type **20.0** and then click  or, from the Insert menu, choose Unit Name.
3. In the Physical Quantity box, select Length.
4. In the Unit Name area, select Mile and choose Insert.
5. Type /.
6. In the Physical Quantity area, select Time.
7. In the Unit Name area, select Hour, and choose Insert.
8. Type **=x**.
9. In the Physical Quantity area, select Length.
10. In the Unit Name area, select Kilometer, and choose Insert.
11. Type /.
12. In the Physical Quantity area, select Time.

13. In the Unit Name area, select Minute, and choose Insert and close the dialog box.

14. Click  or, from the Compute menu, choose Solve and then choose Exact. This is the result:

$$20.0\,\mathrm{mi/h} = x\,\mathrm{km/min}, \text{ Solution is: } 0.536\,45$$

Compute these conversions

Express $53.7\,\mathrm{lbf/in^2}$ in newtons per square meter

Compute $3\,\mathrm{A}6\,\mathrm{V}$ and then convert the answer to watts

Convert $3.7\,\mathrm{N/cm^2}$ to pounds per square inch

Create Exams and Quizzes

In *SWP* and *SNB*, you can create algorithmically-generated course materials such as exams, quizzes, tests, tutorials, problem sets, drills, and homework assignments. Instead of writing a series of exams, each containing a variation of your questions and answers, you can use the Exam Builder to write a single exam and state the questions and answers with algorithms. Students can drill and practice a skill at length by opening the same Exam Builder file repeatedly, obtaining a different set of questions each time. Similarly, you can test each student with a different version of an exam, with each version drawn from the same Exam Builder source file.

The Exam Builder is appropriate for any level of mathematics instruction—elementary arithmetic, algebra, trigonometry, calculus, linear algebra, differential equations, probability, or statistics. Course materials created with the Exam Builder can be worked and graded online or in the traditional pencil-and-paper form. The online Help system contains detailed instructions for using the Exam Builder.

You can find many sample quizzes in the `Quizzes` directory of your program installation. These instructions explain how to open and take one of the sample exams.

► To open a quiz

1. Open *SWP* or *SNB* and from the File menu, choose Open.

2. Specify the `Quizzes` directory of your program installation.

3. In the Files of type box, choose Quiz (*.qiz).

4. Select one of the files in the directory and choose OK to open the sample exam.

5. Enter your name on the exam and answer each question.

6. Choose Click to grade. The program grades the exam and opens a file containing the results.

7. Open the same `.qiz` file again and note that the program has automatically generated a different set of questions.

4 Typesetting Your Document

With MacKichan Software products, you can create beautiful documents for use on-line or in print. If you have *SWP* or *SW*, you can typeset your documents with LaTeX, which creates finely formatted documents with automatically generated tables of contents, cross-references, citations, and other document elements. With Version 5 of *SWP* and *SW*, you can also create typeset Portable Document Format (PDF) files with pdfTeX, which processes documents through pdfLaTeX to provide all the beauty and features of LaTeX typesetting in PDF form. If you have *SNB* or you're using *SWP* or *SW* to produce documents that don't require typesetting, you can print attractive documents without LaTeX.

SWP and *SW* are supplied with TrueTeX, which includes a TeX formatter, a TeX screen previewer, and scalable TrueType fonts. The version of TrueTeX shipped with *SWP* and *SW* also includes pdfTeX support. No other software is required to generate PDF files, but you must have a PDF viewer to be able to preview and print PDF files. More information about using other previewers and print drivers is available in the online Help and in *Creating Documents with Scientific WorkPlace and Scientific Word.*

We refer to the processes that involve LaTeX typesetting as *typeset compile, typeset preview,* and *typeset print,* and to those that involve pdfTeX typesetting as *typeset compile PDF, typeset preview PDF,* and *typeset print PDF.* (The processes are similar; general statements about *typesetting* refer to both sets of processes.) We refer to the processes that don't involve any typesetting as simply *preview* and *print.*

You typeset your document using commands on the Typeset menu or the buttons on the Typeset toolbar (available in *SWP* and *SW* only):

Menu	Command	Button	Menu	Command	Button
Typeset	Compile		Typeset	Compile PDF	
Typeset	Preview		Typeset	Preview PDF	
Typeset	Print		Typeset	Print PDF	

You produce your document without typesetting using the commands on the File menu or buttons on the Standard toolbar:

Menu	Command	Button
File	Preview	
File	Print	

Each time you preview or print your *SWP* or *SW* document, you can choose whether or not to typeset it. The results differ noticeably.

Understanding the Typesetting Process

When you typeset, the program compiles your document with LaTeX or pdfLaTeX. The compilation applies special LaTeX formatting features to resolve typographic details such as hyphenation, ligatures, line spacing, and line and page breaking. The process also creates automatic numbering, cross-references, citations, and footnotes. It generates any document elements specified in the document shell, such as a table of contents, bibliography, or index. Depending on the complexity of your document, the program may process it through LaTeX or pdfLaTeX more than once. During the compilation, *SWP* and *SW* remain open, but they are suspended.

The results of the compilation differ depending on whether you typeset your document with LaTeX or pdfLaTeX. In either case, your original document is unchanged.

- If you typeset with LaTeX (using the Preview or Print commands on the Typeset menu), the compilation yields a *device independent,* or *DVI,* file that contains your typeset document in a form independent of any output device. The compilation may also result in other generated files, such as table of contents files or bibliography files, that are required by the DVI file.

- If you typeset with pdfLaTeX (using the Preview PDF or Print PDF commands on the Typeset menu), the compilation yields a PDF file that contains your typeset document embedded with all necessary fonts and graphics. If you have added the *hyperref* package to your document, the compilation creates hypertext links in place of cross-references and links the table of contents to the rest of the document with hypertext links.

If you typeset with the Compile or Compile PDF command, the program compiles the document and creates the DVI or PDF file but doesn't preview or print it. Otherwise, following the compilation, the program previews or prints the file, according to your choice. Because of the typesetting specifications and the features and elements added during compilation, the appearance of your document may be quite different from its appearance in the document window.

When you don't typeset your document, the program uses many of the same routines to preview and print as it does to display the document on the screen. The program doesn't use special formatting features, nor does it automatically generate any document elements. Therefore, the appearance of the previewed or printed document is quite similar to its appearance in the document window.

These general guidelines may help you decide which document production method to use:

- When a finely typeset document appearance is a high priority, typeset preview or typeset print the document with the commands on the Typeset menu.

- When you need a finely typeset PDF document for viewing on multiple platforms, typeset the document with the PDF commands on the Typeset menu.

- When a finely typeset document appearance and automatically generated document elements aren't a priority or you need output quickly, preview or print the document with the commands on the File menu.

Typeset Previewing and Typeset Printing

You can examine the typeset appearance of your document before you print it. You can send it to the printer from the document window, the TrueTEX preview window, or the window of your PDF viewer. You can also access the TrueTEX Formatter and Previewer from the program submenu on the Windows Programs menu. PDFLATEX isn't available outside *SWP* or *SW*.

► To typeset preview a document

1. From the Typeset menu, choose Output Choice.
2. Select the type of output you want, and choose OK.
3. On the Typeset toolbar, click the Typeset DVI Preview button  or, from the Typeset menu, choose Preview.

   or

   On the Typeset toolbar, click the Typeset PDF Preview button  or, from the Typeset menu, choose Preview PDF.

   If your document doesn't have a current DVI or PDF file, the program automatically compiles the document, then opens the TrueTEX preview screen or your PDF viewer to display your document as it will appear in print.
4. Use the scroll bars, keyboard, or menu commands to examine your document.
5. Choose Exit from the File menu to leave the previewer.

► To typeset print a document from the document window

1. From the Typeset menu, choose Output Choice.
2. Select the type of output you want, and choose OK.
3. On the Typeset toolbar, click the Typeset DVI Print button  ; from the Typeset menu, choose Print; or press CTRL+P.

   or

   On the Typeset toolbar, click the Typeset PDF Print button  or, from the Typeset menu, choose Print PDF.

   The program compiles the document if necessary.
4. Make any necessary selections in the Print dialog box, and then choose OK.

► To typeset print a document from the TrueTEX Previewer or PDF viewer

1. From the Typeset menu, choose Output Choice.
2. Select the type of output you want, and choose OK.

3. From the Typeset menu, choose Preview or Preview PDF.

   The program compiles the document if necessary.

4. From the File menu in the TrueTEX preview window or the PDF viewer, choose Print.

5. Select the printer and print specifications you want, and then choose Print.

Remember that you can use the Compile and Compile PDF commands on the Typeset menu to compile your document independently and then preview or print the typeset document at a different time. The Compile commands are active only when you've saved the document and made no further changes.

► **To compile a document**

1. From the Typeset menu, choose Output Choice.

2. Select the type of output you want, and choose OK.

3. Save the document.

4. On the Typeset toolbar, click the Typeset DVI Compile button  or, from the Typeset menu, choose Compile.

   or

   On the Typeset toolbar, click the Typeset PDF Compile button  or, from the Typeset menu, choose Compile PDF.

5. Select the options you want from the Compile or Compile PDF dialog box, and then choose OK.

Understanding the Appearance of Typeset Documents

When you typeset, the program formats your document using these specifications:

- The *typesetting specifications* for the document shell. The specifications are a collection of LATEX formatting instructions that govern all aspects of the typeset appearance of your document: type face, type size, margins, page size, line spacing, location and appearance of headers and footers, paragraph layout and indention, section headings, page breaks, and countless other typographic details. The specifications are contained in files with extensions of `.sty` and `.cls`.
- Any specified LATEX *class options* or LATEX *packages* specified for the document or its shell. Class options and packages contain instructions that modify the typesetting specifications in some way. Class options are contained in files with a `.clo` extension; LATEX package files have an `.sty` extension.
- Any additional TEX or LATEX commands you have entered in the document itself.

The typesetting specifications are set initially by the shell you use to create your document. Some modifications to the shell and the document are possible by modifying

LaTeX class options, adding packages, and using commands on the Typeset menu, as described in *Typesetting Documents in Scientific WorkPlace and Scientific Word.* We discourage attempts to modify the specifications if you aren't extremely familiar with TeX and LaTeX. If the shell for your document doesn't produce the typeset results you want, start a new document with a shell that meets your requirements more closely.

Note Don't attempt to modify the typesetting specifications unless you are familiar with TeX and LaTeX.

The program uses the typesetting specifications *only when you typeset.* When you produce the document without typesetting it, the program ignores the typesetting specifications. Instead, it uses the margins, headers, footers, and page numbers specified in the Page Setup dialog box and the tag properties specified in the style (`.cst` file). Modifications to tag properties that you make from the Tag Appearance dialog box *do not affect* the typeset appearance of your document.

In other words, the way you choose to produce your document determines which set of specifications the program uses and, consequently, how your document appears on the preview screen and in print.

When the document is	The program formats according to
Produced with LaTeX or pdfLaTeX typesetting	Typesetting specifications, LaTeX options and packages, LaTeX commands
Displayed in the document window	Style, View settings
Produced without typesetting	Style, Page setup specifications, Print options

Creating Typeset Document Elements

Many document shells contain predefined fields that instruct LaTeX and pdfTeX to generate document elements—especially those in the front matter, such as title pages and abstracts—when you typeset your document. If you don't typeset, the fields are ignored and the elements aren't generated.

As you build your document, you can add objects that automatically create other document elements (such as notes, citations, index entries, and cross-references to numbered parts of the document) whenever you typeset.

If you add the *hyperref* package to your *SWP* or *SW* document and then typeset with PDF, the program not only creates any cross-references, page references, notes, and citations, but also converts them to hypertext links. Then, the resulting PDF file contains live hypertext links that you can use to jump from one part of the PDF file to another when you view the file with a PDF viewer. See *Typesetting Documents in Scientific WorkPlace and Scientific Word* and the online Help for more information about the *hyperref* package.

Also, if you are very familiar with TeX and know the TeX or LaTeX command for an object or operation not available in the program, you can enter it in your document in a TeX field.

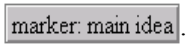
Important Remember that you must typeset your document to generate document elements. If you produce your document without typesetting it, the program doesn't process the document with LaTeX and the elements aren't generated, so the field or object doesn't appear in print.

Creating Cross-References

When you typeset your document, you can generate automatic cross-references to other numbered objects in your document, such as equations, theorems, graphics, or sections, or to the pages on which they appear. Cross-references have two parts, a *marker* containing a *key* for the numbered object and the reference itself. When you typeset the document, the cross-reference is resolved and replaced with the number of the marked object. The *hyperref* package extends cross-reference capabilities; see *Creating Documents with Scientific WorkPlace and Scientific Word* for more information. If you don't typeset, cross-references and markers don't appear in print.

► To create a marker for a numbered object

1. Place the insertion point where you want the marker.
2. On the Field toolbar, click the Marker button  or, from the Insert menu, choose Marker.
3. In the Key box, enter a unique key for the object, and then choose OK.

   When the Markers display is turned on in the View menu, a marker looks like this in the document window: 

   .
4. Save the document.

   Note that creating markers for graphics, numbered equations, and manual bibliography items requires a different process; see online Help for more information.

► To create a cross-reference to a numbered object

1. Place the insertion point where you want the reference to appear.
2. On the Typeset Object toolbar, click the Cross Reference button  or, from the Insert menu, choose Typeset Object, and then choose Cross Reference.
3. In the Print area, choose Object Counter.
4. In the Key area, enter the key of the marked object or click the arrow to the right to select from a list of keys in the current document.
5. Choose OK.

The program displays the reference on the screen in a gray box containing the word *ref* and the key you entered, as in this example: ref: main idea .

Creating Notes

Your documents can contain references to margin notes and footnotes that appear elsewhere in your document. When you typeset, a cross-reference to the note is generated and the note is formatted according to the typesetting specifications. If you don't typeset, footnotes and margin notes don't appear in print.

► To enter a footnote

1. Place the insertion point where you want the reference to the footnote to appear.
2. On the Field toolbar, click the Note button  or, from the Insert menu, choose Note.
3. In the Type of Note box, select footnote as the type of note.
4. Enter the text of the footnote, and then choose OK.

   A footnote looks like this in the document window: footnote .

Creating Bibliographies and Citations

If the document shell supports bibliographies, you can create a bibliography list and automatic cross-references, or *citations,* to items in the list. When you typeset your document, the citation is generated and formatted correctly, according to the typesetting specifications for the shell.

You can create bibliographies in two ways. If your bibliography is complex, you can create an automatic bibliography using BIBTEX, a public domain program created by Oren Patashnik. BIBTEX generates and formats the bibliography list automatically by extracting references from a database using the citations you insert into your document. Because you don't have to create the bibliography list yourself, a BIBTEX bibliography is convenient if you have a long list of references that you plan to use in other articles or books. The creation and use of BIBTEX bibliographies is somewhat complex. Please refer to the online Help for detailed instructions.

If your bibliography is a simple one, you can create it manually. A manual bibliography, which works just like a series of cross-references, is convenient when your list of references is short and you don't plan to use those references in other articles or books. You must format entries in a manual bibliography yourself.

► To specify a manual bibliography

1. From the Typeset menu, choose Bibliography Choice.
2. Select Manual Entry and choose OK.

► **To create a list of bibliography items**

1. Move the insertion point to the end of the line that is to precede the bibliography, and press ENTER.
2. Apply the Bibliography Item tag.
3. In the Bibliography Item Properties dialog box, enter a unique key for the item and choose OK.
4. Type the bibliographic information for the item.
5. If you want to create another bibliographic item, press ENTER and repeat steps 3–4.
6. When you have completed all the entries, press ENTER and then click  to leave the list.

► **To create a citation for an item in a manual bibliography**

1. Place the insertion point where you want the citation to appear.
2. On the Typeset Object toolbar, click the Citation button  or, from the Insert menu, choose Typeset Object, and then choose Citation.
3. In the Citation dialog box, enter the key for the bibliography item you want to cite, and then choose OK.

In the document window, you see the citation in a small gray box containing the key for the bibliography item, like this: cite: Lamport. When you typeset the document, the number of the item in the bibliography list replaces the key.

Obtaining More Information About Typesetting

A detailed discussion of LaTeX typesetting is beyond the scope of this booklet. However, you can find much more information about typesetting with *SWP* and *SW* in the following sources:

- The online Help.
- *Creating Documents with Scientific WorkPlace and Scientific Word.*
- *Typesetting Documents in Scientific WorkPlace and Scientific Word.*

You can find more information about LaTeX in these books:

- *LaTeX, A Document Preparation System* by Leslie Lamport.
- *The LaTeX Companion* by Michel Goossens, Frank Mittelbach, and Alexander Samarin.
- *A Guide to LaTeX: Document Preparation for Beginners and Advanced Users* by Helmut Kopka and Patrick W. Daly.

Also, you can find information about TeX in *The TeXbook* by Donald E. Knuth.

5 Getting the Most from Your Software

SWP, SW, and *SNB* are straightforward and easy to use, especially if you take advantage of the many resources available to you. The program is supplied with documentation including a Help system and tutorial materials that can help you learn how to create documents and enter mathematics. If you have an Internet connection, additional documentation—in particular, the Help system for *SV*—is available from the MacKichan Software website. Additionally, three manuals provide program details:

- *Creating Documents with Scientific WorkPlace and Scientific Word* provides information about entering and editing text and mathematics; formatting documents; structuring documents for typesetting and for use online; maintaining files; and customizing your installation. Much of the information in the manual is applicable to *SNB*.
- *Doing Mathematics with Scientific WorkPlace and Scientific Notebook* explains how to use the built-in computer algebra system to do mathematics without dealing directly with the syntax of the computer algebra system. Along with examples and exercises, the manual provides basic procedures for using the system to compute and plot and to solve problems in analytic geometry, calculus, linear algebra, vector analysis, differential equations, statistics, and applied modern algebra.
- *Typesetting Documents in Scientific WorkPlace and Scientific Word* provides answers to common questions about LaTeX typesetting in *SWP* and *SW*. It helps you choose document shells appropriately and explains when and how to tailor document shells from within the program so that the documents you create meet your typesetting needs more precisely.

Accompanying this version of the program is another volume, *A Gallery of Document Shells for Scientific WorkPlace and Scientific Word,* available on your program CD. *A Gallery of Document Shells* explains the key characteristics of the shells provided with the program. It contains brief discussions and illustrations of typeset documents created with each shell (except those created with *SNB,* which are not intended for typesetting).

If you can't find the information you need in one of these resources, technical support is available. We regularly make additional information available on our unmoderated discussion forum and email list. We also have an electronic newsletter that you can request on our website or when you register your program.

Using Online Help

The program includes an extensive Help system available online or from your CD-ROM. While you're working, you can get information quickly from the online Help feature. You can search Help to find basic and advanced information about commands and operations, including instructions for using the built-in computational engine to perform numeric, symbolic, and graphic computations. If you save copies of the Help documents in *SWP* or *SNB*, you can interact with the mathematics they contain, experimenting with or reworking the included examples. In addition, two programs—the Style Editor and the Document Manager—have their own online Help.

► **To use the Help system**

- From the Help menu, choose the command you need:

Choose	To
Contents	See a list of online information
Search...	Find a Help topic
Index	Access the online index to General Information, Computing Techniques, or the Reference Library
MacKichan Software Website	Open the link to the MacKichan Software, Inc. website
Register...	Register your software and obtain a license
System Features...	See a list of available features; change the serial number for your installation
License Information	Obtain information about registering your system
About...	Obtain information about your installation

Also, we urge you to explore the supplemental technical documents supplied with the program. You can open, view, and print the documents. In particular, we suggest you read the following documents:

- The document `50techref.tex` in the `Help\general` directory, which contains technical information on the features in Version 5.
- The documents in the `Play` directory, which demonstrate the use of computation in *SWP* and *SNB*.
- The documents in the `SNSamples` directory, which are examples of online documents created with the program.
- The documents in the `SWSamples` directory, which include examples of documents intended for typesetting in *SWP* and *SW*.

Obtaining Technical Support

If you can't find the answer to your questions in the manuals or the online Help, you can obtain technical support from our website at

http://www.mackichan.com/techtalk/knowledgebase.html

or from our Web-based Technical Support forum at

http://www.mackichan.com/techtalk/UserForums.htm

You can also contact our Technical Support staff by email, telephone, or fax. We urge you to submit questions by email whenever possible in case our technical staff needs to obtain your file to diagnose and solve the problem.

When you contact us by email or fax, please provide complete information about the problem you're trying to solve. We must be able to reproduce the problem exactly from your instructions. When you contact us by telephone, you should be sitting at your computer with the program running.

Please provide the following information any time you contact Technical Support:

- The MacKichan Software product you have installed.
- The version and build numbers of your installation (see Help / About).
- The serial number of your installation (see Help / System Features).
- The version of the Windows system you're using.
- The type of hardware you're using, including network hardware.
- A description of what happened and what you were doing when the problem occurred.
- The exact wording of any messages that appeared on your computer screen.

► **To contact technical support**

- Contact Technical Support by email, fax, or telephone between 8 AM and 5 PM Pacific Time:

Internet email address: support@mackichan.com
Fax: 360-394-6039
Telephone: 360-394-6033
Toll-free telephone: 877-SCI-WORD (877-724-9673) or
877-SCI-NOTE (877-724-6683)

Obtaining Additional Information

You can learn more about the program on our website, which we update regularly to provide the latest technical information about the software. The site also houses links to other TEX and LATEX resources. We maintain an unmoderated discussion forum and an unmoderated email list so our users can share information, discuss common problems, and contribute technical tips and solutions. You can link to these valuable resources from our home page at

http://www.mackichan.com

Learning to Use the Program

You can learn a great deal about the program just by working with it. Start by opening the program, typing a few sentences, entering some mathematics, and then previewing and printing your document, as described in Chapter 1 "Tools for Scientific Creativity."

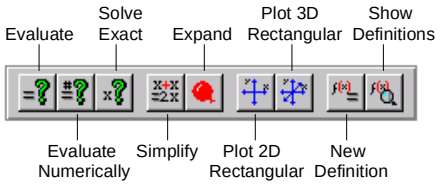
We also urge you to work through the tutorial exercises, available from online Help. The exercises guide you step-by-step as you create several increasingly complex documents and learn how to enter a variety of mathematical expressions, compute while working in your document, and print with and without typesetting.

► To open the tutorial exercises

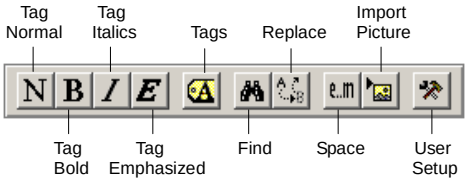
1. From the Help menu, choose Contents.
2. Choose Learn the Basics.
3. Choose the exercise you want:
   - "Before You Start" provides information about the notation, terminology, and instructions used in the exercises.
   - "Creating a Simple Document" provides instructions for creating a basic document.
   - "Printing and Typesetting" explains several ways to produce your document.
   - "Creating an Advanced Document" gives instructions for creating a somewhat more complex document in *SWP* or *SW*. The exercise, which takes about 90 minutes to complete, focuses on document structuring, guiding you step-by-step through the unique procedures for creating titles, headings, and theorem statements. Because the document you create contains equations, the exercise also illustrates the straightforward entry and editing of mathematics.
   - "Creating Mathematics" presents a series of mathematical examples. The exercises give step-by-step instructions for entering a variety of mathematical expressions using the mouse and the keyboard.
   - "Sharing Your Work" presents information about creating documents for use across platforms, installations, and systems; on a network; or on the Web.
   - "Performing Computations" presents a series of mathematical computation exercises. The step-by-step instructions guide you through basic computational procedures for *SWP* and *SNB*.

A Toolbars and Buttons

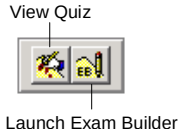
Compute Toolbar



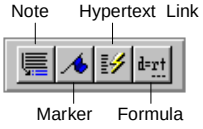
Editing Toolbar



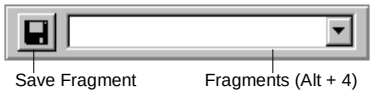
Exam Toolbar



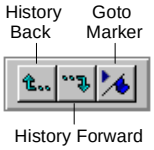
Field Toolbar



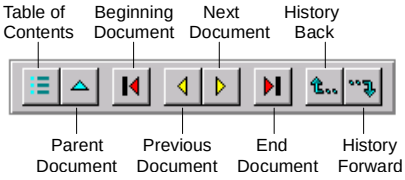
Fragments Toolbar



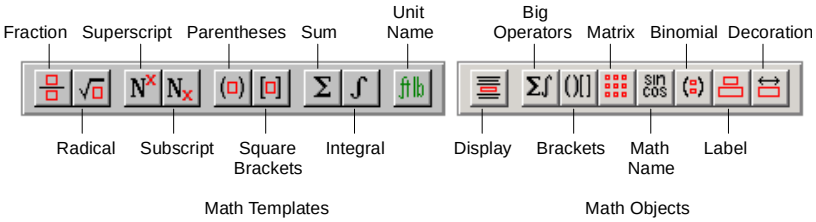
History Toolbar



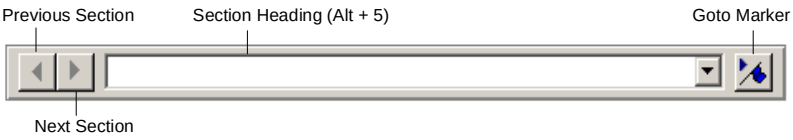
Link Toolbar



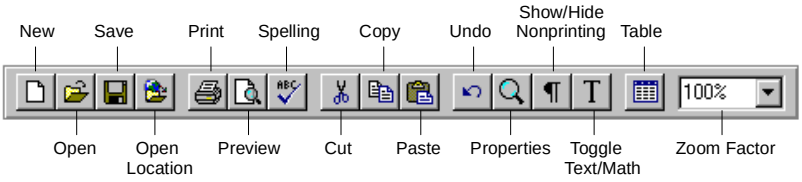
Math Toolbars



Navigate Toolbar



Standard Toolbar

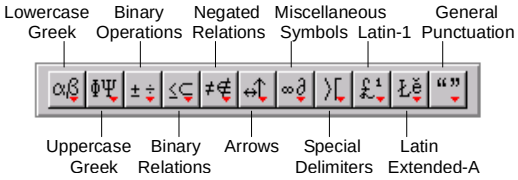


Stop Toolbar

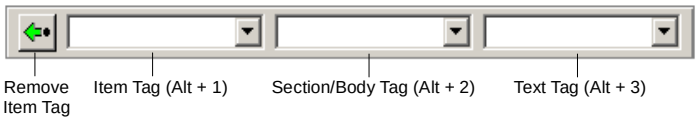
Symbol Cache Toolbar

Default configuration:

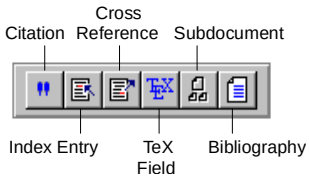
Symbol Panels Toolbar



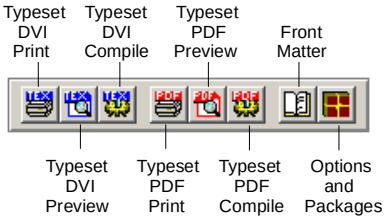
Tag Toolbar



Typeset Object Toolbar



Typeset Toolbar



B Keyboard Shortcuts

These instructions assume that you haven't changed the program defaults.

Scrolling and Editing

Working with Files

To	Press
Open a file	CTRL+O
Close a file	CTRL+F4
Print	CTRL+P
Exit	ALT+F4
Open Help contents	F1

Scrolling

To move	Press
To the left	LEFT ARROW
To the right	RIGHT ARROW
Up	UP ARROW
Down	DOWN ARROW
To start of the line	HOME
To end of the line	END
To next screen	PAGE DOWN
To previous screen	PAGE UP
To document start	CTRL+HOME
To document end	CTRL+END
To next field inside a template	TAB or ARROW KEYS
To previous field inside a template	SHIFT+TAB or ARROW KEYS
To outside a template	SPACEBAR or RIGHT ARROW or LEFT ARROW (repeated)
To the word to the right of the insertion point	CTRL+RIGHT ARROW
To the word to the left of the insertion point	CTRL+LEFT ARROW
Between open documents	CTRL+TAB

Editing

To	Press
Copy the selection to clipboard	CTRL+C
Cut the selection to clipboard	CTRL+X
Paste from clipboard	CTRL+V
Edit Properties	CTRL+F5
Undo the last deletion	CTRL+Z
Delete the word to the right	CTRL+DELETE
Delete the word to the left	CTRL+BACKSPACE
Delete	DELETE
Negate the character to the left	CTRL+N
Find	CTRL+Q
Replace	CTRL+W
Refresh the screen	ESC or SHIFT+ESC

Selecting

To select	Press
The following screen	SHIFT+PAGE DOWN
The previous screen	SHIFT+PAGE UP
The word to the right of the insertion point	CTRL+SHIFT+RIGHT ARROW
The word to the left of the insertion point	CTRL+SHIFT+LEFT ARROW
The object or symbol to the left of the insertion point	SHIFT+LEFT ARROW
The object or symbol to the right of the insertion point	SHIFT+RIGHT ARROW
Everything in the document	CTRL+A
Everything between the insertion point and the start of the line	SHIFT+HOME
Everything between the insertion point and the end of the line	SHIFT+END
Everything between the insertion point and the start of the document	CTRL+SHIFT+HOME
Everything between the insertion point and the end of the document	CTRL+SHIFT+END
To choose a command	ALT+the Accelerator keys (the underlined letters for the menu and command)

Entering Mathematics and Text

Toggling Between Mathematics and Text

To	Press*
Toggle math/text	CTRL+M or CTRL+T or INSERT

* Assumes default user settings

Entering Mathematical Objects and Punctuation

To enter	Press		
Fraction	CTRL+F	or CTRL+/	or CTRL+1
Radical	CTRL+R	or CTRL+2	
Superscript	CTRL+H	or CTRL+3	or CTRL+UP ARROW
Subscript	CTRL+L	or CTRL+4	or CTRL+DOWN ARROW
Summation	CTRL+7		
Integral	CTRL+I	or CTRL+8	
Parentheses	CTRL+9	or CTRL+0 or CTRL+)	or CTRL+(
Square brackets	CTRL+[	or CTRL+]	or CTRL+6
Angle brackets	CTRL+<		
Braces	CTRL+{	or CTRL+}	or CTRL+5
Display	CTRL+D		
Absolute value	CTRL+\		
Norm	CTRL+| (CTRL+SHIFT+\)		
Required space	SHIFT+SPACEBAR		
Nonbreaking space	CTRL+SPACEBAR		
Thin space	CTRL+,		
Thick space	CTRL+SHIFT+SPACEBAR		
“ (double open quote)	Single open quote (‘) twice		
” (double close quote)	Single close quote (’) twice		
- (intraword dash or hyphen)	Hyphen (-)		
– (en dash)	Hyphen (-) twice		
— (em dash)	Hyphen (-) three times		
- (Discretionary hyphen)	CTRL+– (CTRL + hyphen twice)*		
¿ (inverted question mark)	? followed by ‘		
¡ (inverted exclamation point)	! followed by ‘		

* Visible only when Invisibles are displayed

Entering Symbols and Characters

To enter	Press CTRL+S then press	To enter	Press CTRL+S then press
→	1	⊂	c
↑	2	∨	v
←	3	•	b
↓	4	∇	n
⊇	5	⇓	$
∩	6	⇒	!
⊆	7	⇑	@
∪	8	⇐	#
(□)	9 or 0 or (or)	⊃	%
≡	-	≅	_
≠	=	±	+
≈	w	ℵ	W
∈	e	∉	E
√□	r or R	∞	I
⊗	t or T	℘	P
∫	i	{□}	{ or }
∅	o	∀	A
∏	p	⊕	S
[□]	[or]	◇	D
∠	a	÷	X
∑	s	·	C
∂	d	∧	V
□/□	f or F	¬	N
$a^{\square}$	h or H	≤	<
$a_{\square}$	l or L	≥	>
×	x	∃	z
Last matrix created	m	□□ □□	M

Entering Mathematical Accents

To enter accents	Press
â	CTRL+^ (CTRL+SHIFT+6)
ã	CTRL+~ (CTRL+SHIFT+`)
á	CTRL+'
à	CTRL+`
ȧ	CTRL+.
ä	CTRL+" (CTRL+SHIFT+')
ā	CTRL+_ (CTRL+SHIFT+-)
$\vec{a}$	CTRL+-

Entering Greek Characters

To enter		Press CTRL+G then press	To enter		Press CTRL+G then press
alpha	α	a	pi	π	p
beta	β	b		Π	P
gamma	γ	g		ϖ	v
	Γ	G	rho	ρ	r
delta	δ	d		ϱ	R
	Δ	D	sigma	σ	s
epsilon	ε	e		Σ	S
	ϵ	E		ς	T
zeta	ζ	z	tau	τ	t
eta	η	h	upsilon	υ	u
theta	θ	y		Υ	U
	ϑ	Z	phi	ϕ	f
	Θ	Y		Φ	F
iota	ι	i		φ	j
kappa	κ	k	chi	χ	q
	$\varkappa$	K	psi	ψ	c
lambda	λ	l		Ψ	C
	Λ	L	omega	ω	w
mu	μ	m		Ω	W
nu	ν	n	digamma	$\digamma$	I
xi	ξ	x			
	Ξ	X			

Entering ANSI Characters

The ANSI codes depend on the Windows code page in use. The sequences in the table below are for U.S. Windows systems.

► To enter an ANSI character

- Hold down the ALT key and on the numeric keypad, type **0** and the number for the ANSI character you want, then release the ALT key.

To enter	Type 0 +	To enter	Type 0 +	To enter	Type 0 +	To enter	Type 0 +
space	160	¸	184	Ð	208	è	232
¡	161	¹	185	Ñ	209	é	233
¢	162	º	186	Ò	210	ê	234
£	163	»	187	Ó	211	ë	235
¤	164	¼	188	Ô	212	ì	236
¥	165	½	189	Õ	213	í	237
¦	166	¾	190	Ö	214	î	238
§	167	¿	191	×	215	ï	239
¨	168	À	192	Ø	216	ð	240
©	169	Á	193	Ù	217	ñ	241
ª	170	Â	194	Ú	218	ò	242
«	171	Ã	195	Û	219	ó	243
¬	172	Ä	196	Ü	220	ô	244
	173	Å	197	Ý	221	õ	245
®	174	Æ	198	Þ	222	ö	246
¯	175	Ç	199	ß	223	÷	247
°	176	È	200	à	224	ø	248
±	177	É	201	á	225	ù	249
²	178	Ê	202	â	226	ú	250
³	179	Ë	203	ã	227	û	251
´	180	Ì	204	ä	228	ü	252
µ	181	Í	205	å	229	ý	253
¶	182	Î	206	æ	230	þ	254
·	183	Ï	207	ç	231	ÿ	255

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