

Function Browsers and Help Stacks

Several help facilities are available for machines running the notebook front end. This review compares Version 2.2's Function Browser and hypertext-based help systems for Macintosh and Windows.

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Mathematica Help Stack for Macintosh and *Mathematica* Help for Windows, version 2.2 (both \$129), from Variable Symbols, Inc., 6537 Chabot Road, Oakland, CA 94618. Tel: 510 652 8462. Fax: 510 652 8461. A French translation is available from Ritme Informatique, 34 Boulevard Haussmann, 75009 Paris, France. Tel: +33 1 42 46 00 42. Fax: +33 1 42 46 00 33.

COMPUTER ALGEBRA SYSTEMS make symbolic and numeric computations less daunting, but may themselves seem overwhelming when first encountered. A good help system is essential for both beginners and experienced users.

Until the release of Version 2.2, on-line information about *Mathematica*'s functions was limited to the usage messages displayed by the ? and ?? commands. A common complaint about this form of help is that you need to know (at least part of) the name of a command to get information.

For some systems with the notebook interface, Version 2.2 provides a new help facility. The Function Browser is a separate window containing a listing of commands, organized by functionality. Information is available about built-in functions and options, as well as functions defined in packages that are currently loaded. The Browser contains a menu with three scrolling columns. The left column lists broad categories such as Numerical Computation and Graphics and Sound. Selecting a topic with the mouse brings up a list of subcategories in the next column to the right. When the menu is followed from Numerical Computation to Integration to `INtegrate`, for example, the usage message for this function is displayed, providing the same information as the command `?INtegrate`. Selecting a function also brings up a list of its options and a template of the function call, which can be edited, pasted, and evaluated. In addition to browsing in the menus, you can locate information by selecting a name typed in a notebook cell and using a Find command.

The great advantage of the Function Browser is easy access: You don't need to know the exact name of a command to find information about it. The Function Browser by itself is worth the cost of the upgrade to Version 2.2. It is currently available with all the notebook front ends, except the Windows version.

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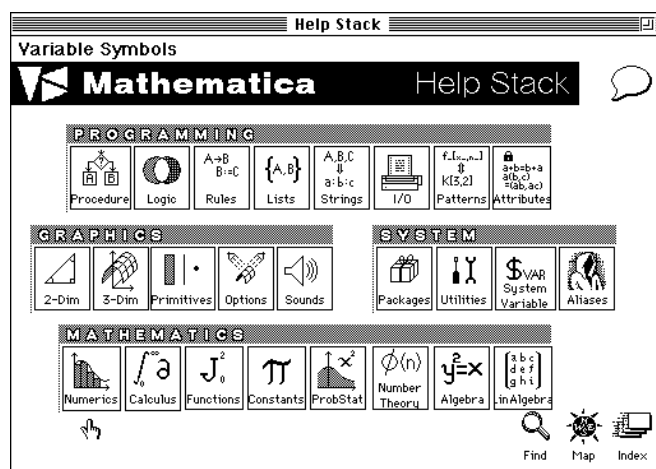


FIGURE 1. The Map card of the *Mathematica* Help Stack for Macintosh.

Variable Symbols offers two hypertext-based help facilities: the *Mathematica* Help Stack for Macintosh and *Mathematica* Help for Windows. (These products are quite similar, so I will refer to them both as the Help Stack.) The Help Stack is organized by functionality, like the Function Browser, but it includes much more information, such as examples, references, bugs, and workarounds. The hypertext format presents an immense amount of information in a very convenient form. Cards are accessed by icon buttons, rather than scrolling lists, and the information is only a few layers deep. Searching and indexing are also provided, making help easier to find if you don't know the name of a command.

Invoking the Help Stack leads to the Map card (Figure 1). *Mathematica*'s commands and options are divided into four categories: Programming, Graphics, Systems, and Mathematics. These categories are further divided into topics represented by icon buttons. Clicking on the Numerics button in the Mathematics category, for example, brings up the Numeric Functions card. The 23 functions in this topic are presented under the headings Roots, Sums, Approximations, and Accuracy. Clicking the `INtegrate` item, under Sums, brings up the card shown in Figure 2.

These cards hold the primary data provided by the Help Stack. Information on syntax, usage, and cross references to related topics fills the large area on the left. The smaller area on the right shows references to the *Mathematica* book and buttons to access subsidiary cards containing user's notes, examples, attributes and options, and discussions of bugs and

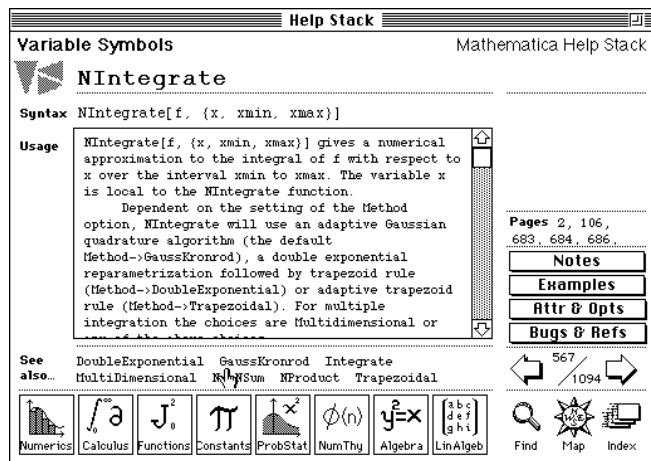


FIGURE 2. The NIntegrate card.

references to the literature. Additional buttons bring up the Map card (Figure 1), an Index listing, and a Find tool. The arrow buttons access the preceding and following cards (the NIntegrate card in Figure 2 is the 567th of 1094, in alphabetic order).

The Help Stack's discussion of usage is much more extensive than that offered by *Mathematica's* built-in help system. Though terminology (such as Gaussian quadrature) is not explained, the use of a command, and its place in the grand scheme of the program, is discussed in an intelligent, informal manner. The usage discussion on the NIntegrate card is about 120 words long; the subsidiary cards carry it further.

The single most appealing feature of the Help Stack may be the Examples cards, which provide a shortcut into the semantics. The cards show sample inputs and the resulting outputs. The examples can be copied and pasted. The NIntegrate Examples card illustrates the dangers posed by singularities within the interval of integration and shows how to cope with them. This discussion is continued in the Bugs and References card. The cross references are also helpful on this point: Clicking on GaussKronrad, we find that the option Method \rightarrow DoubleExponential is better suited to integrands with singularities at the endpoints, and adaptive Gauss-Kronrad quadrature (the default Method for NIntegrate) is better for slowly varying integrands without singularities. We also learn a bit about the GaussPoints option. While this information doesn't replace a course in numerical analysis, it provides an excellent supplement, a reminder of the powerful options available in *Mathematica*, and a guide around some of the pitfalls of computer-assisted mathematics.

The Index is not as extensive as you would expect in a book. The Index card is a four-column listing of the names of all the cards; clicking on a name brings up the card. The Find tool is limited, but useful. Searching on "fixed point" brings up the Nest card with the name FixedPoint indicated. This term is also one of the cross references, so its card is immediately accessible by clicking on the cross-reference listing.

Both the Help Stack for Macintosh and the Help for Windows installed easily and worked very well. They are valuable resources, and I recommend them to both beginners and experienced users of *Mathematica*. 