Maple 7

Getting Started Guide

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Contents

1 Introduction to Maple

Maple is an analytic computation system. It performs mathematical computations and manipulations for solving problems from various technical disciplines. Most significantly, Maple can compute both numerical as well as symbolic solutions to mathematical expressions. This means that Maple can perform computations on expressions that contain symbols, such as π or x, without performing numerical approximations. For example, Maple can determine that the derivative of `sin(x)` is `cos(x)`, even when `x` has not been assigned a value. This enables Maple to provide exact solutions to many technical problems. In addition, Maple has visualization tools that can contribute to the problem-solving process.

1.1 Installing Maple

For installation and licensing instructions, see the `Install.htm` file on your Maple CD.

1.2 Starting Maple

You can run the Maple program with either a graphical user interface or a command-line interface. In the graphical user interface, you can type Maple commands at the prompt, or you can use palettes, context-sensitive menus, and other features to construct commands. The worksheet is your Maple document, and in it you can format and document your commands.

In the command-line interface, you type Maple commands at the prompt. While you cannot access the graphical interface features, the command-line

interface uses less memory than the worksheet interface. It is therefore useful in solving very large or complex problems on computers with limited memory.

This guide covers the standard interface. For more information on the command-line interface, look in your Maple folder for the `cmdline.txt` file (for Macintosh, see the `Command Line Readme` file).

To start the standard interface in Windows:

- From the **Start** menu, choose **Programs**, **Maple 7**, then **Maple 7**.

To start the standard interface on a Macintosh computer:

1. Double-click the Maple 7 application icon on the Macintosh hard drive.
2. If prompted, type your **User ID** in the Maple 7 Multiple User Logon dialog box, and click **Log On**. If you have entered a new ID, you have to confirm its creation.

To start the standard interface in UNIX or Linux:

- Enter the full path, for example, `/usr/local/maple/bin/xmaple`.

Or,

1. Add your Maple 7 directory (for example, `/usr/local/maple/bin`) to your command search path.
2. Enter `xmaple`.

On all operating systems, the first Maple worksheet session opens with the *Introduction to Maple 7* page that points you to the new user's tour, updates, and other introductory help pages. Subsequent worksheet sessions start with a new, blank worksheet.

1.3 The Maple Window

The Maple window resembles that of a typical application program. The main features are shown in Figure 1-A on page 3.

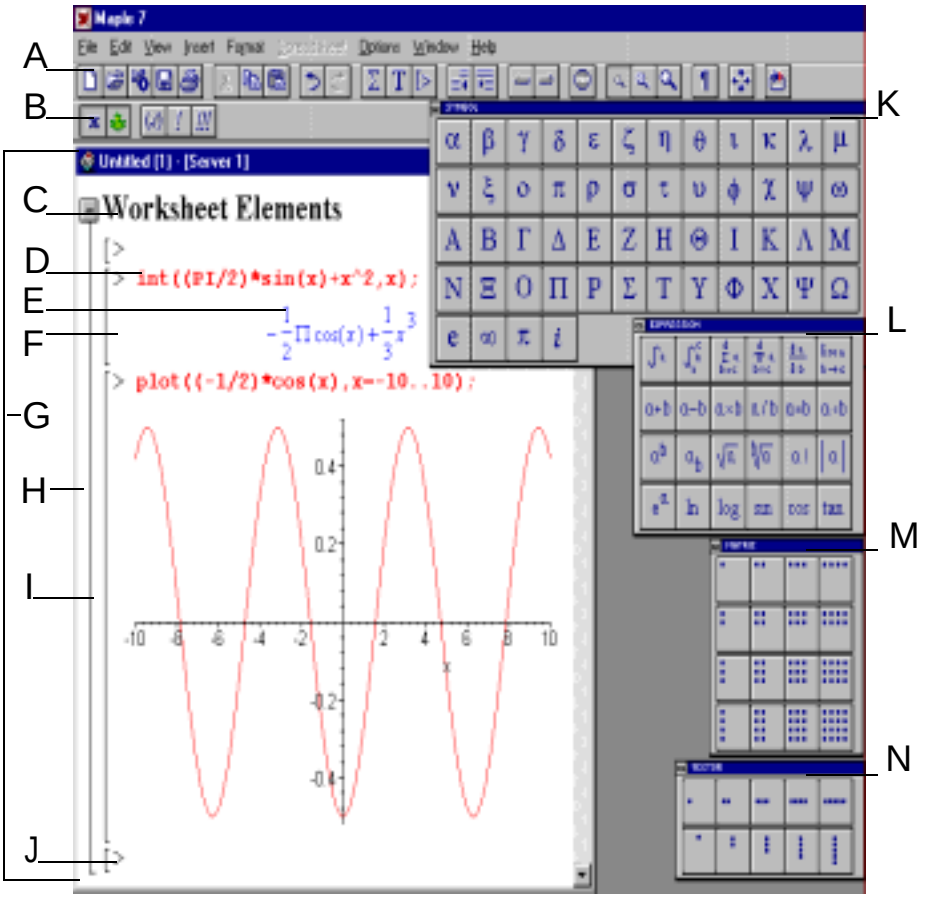

Figure 1-A Maple window features

A **Toolbar**
A toolbar containing shortcut buttons.

B **Context bar**
A toolbar containing context-sensitive shortcut buttons. (This means that the buttons change based on the cursor location or selection.) It can also contain a field for entering and editing text.

C **Section heading**
The name or title of a section.

D **Maple input**
A mathematical expression that Maple evaluates. By default, input commands are entered at the prompt, “>”, and are displayed in red type. The resulting output is displayed beneath.

E **Maple output**
The result of an executed Maple input command. By default, Maple output is displayed in blue type in Standard Math Notation.

F **Execution group**
A set of Maple input with its corresponding output.

G **Worksheet**
A Maple document.

H **Section**
A grouping of worksheet elements.

I **ection range bracket**
A line that “brackets” the elements of a section.

J **Prompt**
By default, the Maple prompt is a greater-than symbol that indicates where to enter Maple input.

K **Symbol palette**
A collection of buttons for entering mathematical symbols in Maple.

L **Expression palette**
A collection of templates for entering mathematical expressions in Maple.

M **Matrix palette**
A collection of templates for entering matrices in Maple.

N **Vector palette**
A collection of buttons for entering vectors in Maple.

1.4 Accessing Help Pages

The commands and features in Maple are documented in online help pages. To view help pages, at the prompt, type a question mark (?) followed by the name of the command or subject on which you want help. Do not type any spaces. For example, to see the help page on natural logarithms, type `?ln`. For information on different ways to get help, see *The Help System* on page 25.

1.5 Entering Expressions in Maple

To enter expressions at the prompt, use the keyboard, the palettes, or both. Using the keyboard is the most direct method, but the palettes enable you to enter a command without knowing its syntax.

There are two types of input display. Use **Maple Notation** to display input as Maple syntax. Maple Notation is the default. Use **Standard Math Notation** to display input in typeset notation as it appears in a textbook.

These examples step you through entering $\int_0^{\pi} \sin(x)dx$ in various ways.

To enter the integral in Standard Math Notation by using the palettes:

1. Display the palettes, if necessary. From the **View** menu, choose **Palettes**, then **Show All Palettes**. The Symbol, Expression, Matrix, and Vector palettes are displayed. Move the palettes to the side of the worksheet, if necessary.
2. If required, change the input to Standard Math Notation. (If there is a question mark (?) after the prompt, the input is already set to Standard Math Notation.) At the prompt, right-click. The context-sensitive menu is displayed. Choose **Standard Math**.
3. On the **Expression** palette, click  . The integral symbol appears, and the question mark placeholder is selected.
4. On the **Expression** palette, click  . The function *sin* appears, with another placeholder.
5. Type x (on the keyboard), and press TAB to go to the next placeholder.
6. Repeat step 5.
7. Type 0 (zero), and press TAB.
8. On the **Symbol** palette, click  . (It's in the bottom row.)
9. Press ENTER.

Your worksheet should resemble that of Figure 1-B on page 6.

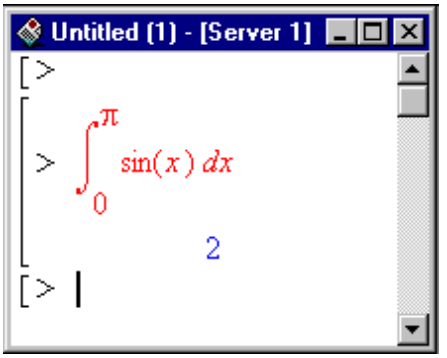

Figure 1-B Integral input in Standard Math Notation

The next example shows you how you can use the palettes to enter the expression and learn the Maple command syntax at the same time.

To enter the integral in Maple Notation by using the palettes:

1. On the **Expression** palette, click $\int_a^c$. The integral command appears, and the %? placeholder is selected.
2. On the **Expression** palette, click sin. The function *sin* appears, with another placeholder.
3. Type x (on the keyboard), and press TAB to go to the next placeholder.
4. Repeat step 5.
5. Type 0 (zero), and press TAB.
6. On the **Symbol** palette, click π. (It's in the bottom row.)
7. Press ENTER.

   Note: Maple adds a semicolon to the end of the command. The semicolon signifies the end of the statement.

Your worksheet should look similar to the one in Figure 1-C.

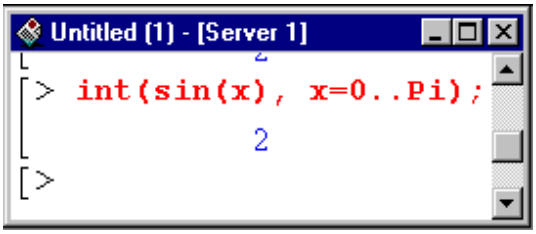

Figure 1-C Integral input in Maple Notation

Now that you know the correct notation, you could type the expression at the prompt. For more information on entering expressions, see the examples in the next chapter and `?worksheet,expressions,entering` (*Enter Expressions in Maple*). For more information on using palettes, see `?worksheet,expressions,palettes` (*Overview of Palettes*).

For the rest of this guide, it is assumed that you are entering expressions in Maple Notation.

2 Solving a Problem

This chapter presents a mathematical problem with its solution. The discussion of the problem and its solution introduces you to key features of the Maple program. Do not worry too much about the mathematics. The purpose of this problem is to show you Maple; the mathematics is secondary.

> ***Note:*** When entering Maple commands, please keep in mind that they are case-sensitive.

2.1 Scenario

A skier has made her way to the top of a mountain. She wants to take the steepest path down, which she can find by performing the calculations outlined in this chapter. Start by opening a new worksheet for this problem.

To open a new worksheet:

- From the **File** menu, choose **New**.

2.2 Commands in Packages

Some of the commands used in the discussion are found in packages. A *package* is a group of routines related to a particular area of mathematics. You can always access commands in packages by using the long form, that is, specifying both package and function name: `package[function](..)`, but to be able to use the short form, that is, specify only the function name, use the `with` command first.

To access commands in the `plots` package:

- At the prompt, type the following and press ENTER.
  `with(plots);`

After executing the command, Maple lists any warnings, then lists all of the commands that are included in the package. For the `plots` package, a warning indicates that the name of one of the commands in the package, `changecoords`, is the same as a global name that is already defined. After executing the `with` command, the original meaning of the command is not available until you restart Maple.

For other methods of accessing commands in packages, see Section 3.7, "The Organization of Maple," in the *Maple 7 Learning Guide*. For a list of all the packages in Maple, see `?index,packages` (*Index of descriptions for packages of library functions*).

2.3 Math and Visualization

Use some mathematical and visualization commands to determine basic properties of the hill. If you want more information on any of the commands used here, enter a question mark, followed by the name of the command. For example, to find help on the exponential command, enter `?exp` *(The Expontential Function)*.

Suppose that the height at a point `(x,y)` of the hill is given by `f`, in thousands of feet.

$$f = 3\frac{1}{(1+x^2+y^2)\left(\frac{1}{4}+\frac{1}{2}(x+1)^2+\frac{1}{2}(y+2)^2\right)}$$

To enter the expression in Maple:

- At the prompt, type the following and press ENTER:
  `f := 3/(1+x^2+y^2)/(1/4+1/2*(x+1)^2+1/2*(y+2)^2);`

The expression for the shape of the hill is assigned to the name `f` by means of the assignment operator ":=" so that it can be referred to in subsequent calculations. For more information about assignments, see `?:=` (*The*

assignment statement), and for more information about names, see `?names` (*Names*).

Plotting the hill

Before solving the problem, it would be helpful to get an idea of what the hill looks like (and an idea of what the answer should be).

To plot the expression:

1. Right-click the output of the expression (for Macintosh, option-click). The context-sensitive menu is displayed.
2. Choose **Plots**, **3-D Plot**, then **x,y**. Maple adds the plot to the worksheet.

   Note: The content of context-sensitive menus varies depending on the cursor location or selected expression. For more information, see `?worksheet,expressions,manipulatecsm` (*Use Context-Sensitive Menus to Manipulate Expressions*).

To add axes:

- Right-click the plot (for Macintosh, option-click), choose **Axes**, then **Boxed**.

To modify the axes ranges:

1. Right-click the plot (for Macintosh, option-click), choose **Axes**, then **Ranges**.
2. In the Axis Range dialog box:
   a. Under **X Axis**, click the button beside the top range box. Type –4 in the top box, then type 3 in the bottom box.
   b. Similarly, change the **Y Axis** to range from –4 to 3.
   c. Click **OK**.

The visualization tools in Maple enable you to see the surface from more than one angle.

To rotate the surface:

1. Click the plot to select it.
2. Place the pointer on the plot, but not directly on the surface of the hill.
3. Drag the plot in any direction. The surface rotates.

Depending on how you rotated the plot, it may look similar to Figure 2-A.

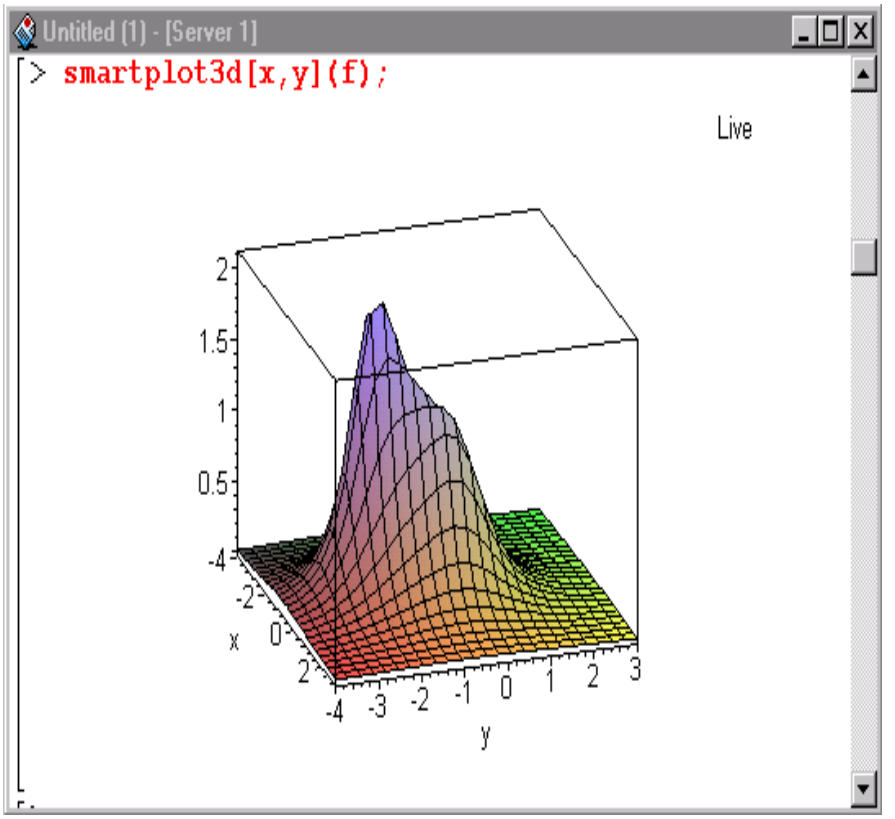

Figure 2-A Plot of the hill

While you could look at the surface and guess what the highest point is, you can obtain a more precise answer by using calculus.

Finding the maximum point of the surface

Determine the location of the top of the hill by taking partial derivatives, setting them to `0`, and solving for `x` and `y`.

To find the partial derivative of `f` with respect to `x`:

- At the prompt, type the following and press ENTER.
  ```
  fx := diff(f,x);
  ```

To find the partial derivative of `f` with respect to `y`:

- At the prompt, type the following and press ENTER.
  ```
  fy := diff(f,y);
  ```

Since you are interested in the real solution, use the `fsolve` command instead of the more general `solve` command.

To solve the system of equations `{fx=0, fy=0}`:

- At the prompt, type the following and press ENTER.
  ```
  top_xy := fsolve({fx=0,fy=0},{x,y},{x=-3..0,y=-3..0});
  ```

The top of the hill is therefore at approximately `{x = –.9026100199, y = -1.805220040}`.

> ***Note:*** Sets do not preserve order, so you may instead obtain the equivalent set: `{y = –1.805220040, x = –.9026100199}`.

Finding the skier's starting point

Assume that the skier does not start at the peak but slightly to the side. To approximate this location, add a small factor, say `0.05`, to the `x-` and `y-` values. Assign these values to the variables `x` and `y` and then add the approximating factor.

To assign the values to the variables:

- At the prompt, type the following and press ENTER.
  ```
  assign(%);
  ```

The ditto operator (%) refers to the result of the previous computation. For more information, see `?%` (*The ditto operators*).

To define the starting `x-` and `y-`values, `x1` and `y1`, respectively:

- At the prompt, type the following and press ENTER.
  ```
  x1:=x+0.05;
  y1:=y+0.05;
  ```

The names `x` and `y` have values assigned to them. Since `x` and `y` are used as variables in future calculations, they must be unassigned before proceeding.

To unassign `x` and `y`:

- At the prompt, type the following and press ENTER.
  ```
  x:='x';
  y:='y';
  ```

To find the z-coordinate of the starting point:

- Evaluate the function representing the hill at the x- and y-values representing the starting point (x1,y1). At the prompt, type the following and press ENTER.
  `z1:=eval(f,{x=x1,y=y1});`

The numerical result `{x1 =-.8526100199 , y1 = -1.755220040, z1 = 2.145631453}` is an approximation of the skier's starting point.

Finding the path down

Before you find the path, take a look at the level curves of the hill to get an idea of the skier's path.

To plot the level curves:

- The `contourplot` command with five contours suggests an interesting shape, as shown in Figure 2-B. At the prompt, type the following command and press ENTER.
  `contourplot(f, x=–2..1, y=–3..1, contours=5, filled=true);`

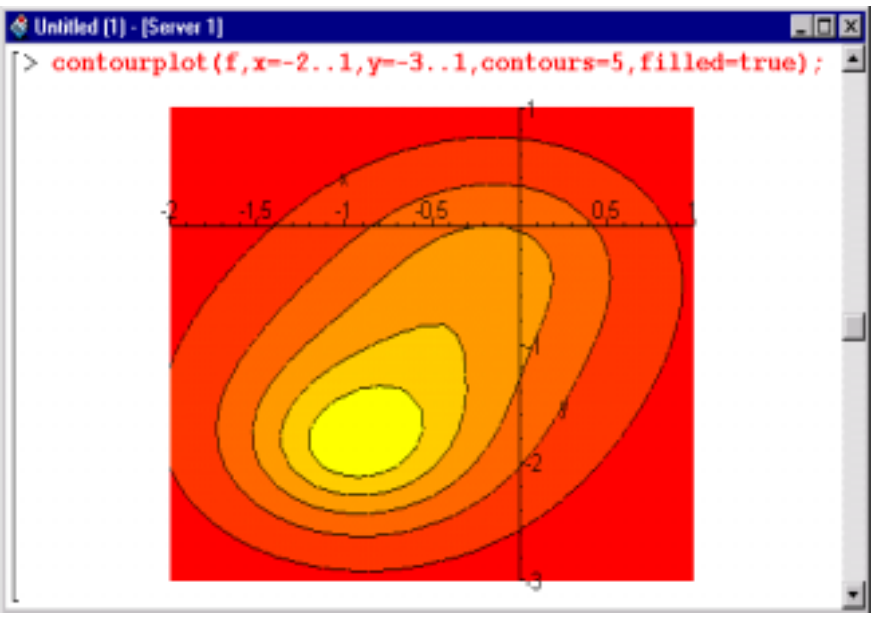

Figure 2-B Level curves of the hill

2.4 Using a For Loop—Finding the Path

Next, construct and plot the path on the surface of the hill that the skier should take. The negative of the gradient ($-\nabla f(x,y)$ or `–grad(f(x,y))` in the Maple language), gives the `x` and `y` components of the direction of steepest descent. At each point `(x,y,z)` on the surface, the skier should travel in the direction of $-\nabla f(x,y)$, while staying on the surface. Since $-\nabla f(x,y)$ changes from point to point, you can break the process into steps, building an approximation of the path of steepest descent. If the step size is too large, the path may leave the surface of the hill. If the step size is too small, you derive no benefit from the increased number of calculations.

Performing the initialization

Assume that the skier is currently at the starting point (`x1,y1,z1`). Use a timestep of 0.1 and find 25 points along the path. Use the arrays point3d and route3d to store the values of the computed points and the direction taken, respectively. To simplify the calculation of the points and route, define vector representations of the expressions for the hill and the derivatives with respect to both `x` and `y`.

To define vector representations of the expressions:

- At the prompt, type the following and press ENTER.

```
g:=eval(f,{x=P[1],y=P[2]});
gx:=eval(fx,{x=P[1],y=P[2]});
gy:=eval(fy,{x=P[1],y=P[2]});
```

To declare the arrays for storing the values at each timestep:

- At the prompt, type the following and press ENTER.

```
point3d:=Array(1..25);
route3d:=Array(1..25);
```

To define the initialization:

- At the prompt, type the following and press ENTER.

```
timestep:=0.1;
point3d[1]:=<x1,y1,z1>;
```

  Note: The notation `<x1,y1,z1>` defines a Vector while P[i] accesses the i^{th} element of the list P. For more information about Vectors, see `?Vector` (*Vector - construct a Vector*). For more information about lists, see `?lists` (*Sets and Lists*).

Specifying the For Loop

To obtain the additional 24 points, use a `for` loop. A `for` loop repeatedly executes a sequence of Maple commands entered between the `for` and `end` commands of the loop, that is, in the loop body. It executes the commands as the value of a numeric variable, called an index, varies from its specified initial value to its specified final value. The value of the index is incremented after each execution of the commands in the body of the loop. The iteration stops when the value of the index is greater than the specified final value. For information on other programming structures in Maple, see the *Maple 7 Programming Guide*.

To start the `for` loop:

- At the prompt, type the following and press ENTER.
  ```
  for i from 1 to 24 do
  ```

  Note: After you press ENTER, Maple returns the message: "Warning, premature end of input." It is simply reminding you that the `for` statement is not complete. To continue entering your input without receiving this warning, use SHIFT+ENTER to go to the next line.

The next commands comprise the body of the `for` loop. These commands find the skier's position at the end of each time step.

To construct the 3-D normalized negative of the gradient vectors:

- At the prompt, type the following and press ENTER.
  ```
  route3d[i] := LinearAlgebra[Normalize](eval(<-gx,-gy,0>,
  P=point3d[i]));
  ```

To find the next point in the skier's path:

- At the prompt, type the following and press ENTER.
  ```
  point3d[i+1] :=
  eval(<P[1],P[2],g>,P=point3d[i]+timestep*route3d[i]);
  ```

To complete the `for` loop:

- At the prompt, type the following and press ENTER. Remember to end the line with a colon to suppress the output.
  ```
  end do:
  ```

This command ends the `for` loop. After you press ENTER, the five commands in the loop body are repeated 24 times. At the end of each iteration, the value of `i` is increased by 1. That is, for the first iteration, the value of `i` is its initial value 1, for the second 2, and so on. For the last iteration the value of `i` is 24. Maple exits at the end of the 24th iteration once `i` is set to 25 (since 25 is outside of the bounds of the loop).

To graph the path, you must convert the points representing the path of the skier, which are stored in the `point3d` array, to a list.

To convert the `point3d` array to a list:

- At the prompt, type the following and press ENTER.
  ```
  listpoints3d := [seq( convert( point3d[i], list ), i=1..25 )]:
  ```

You'll use these lists in the next section.

2.5 Visualization Revisited

The visualization tools in Maple enable you to create different kinds of two- and three-dimensional plots in a number of coordinate systems. In addition, you can plot more than one element on a single set of axes. First assign the individual plots to names, then plot them together by using the `display` command.

To plot the hill and assign it to the name `mountain`:

- At the prompt, type the following and press ENTER. Remember to end the line with a colon to suppress the output.
  ```
  mountain := plot3d(f, x=–3..3, y=–4..4, axes=boxed):
  ```

To plot the set of points on the path as a straight line and assign it to `path3d`:

- At the prompt, type the following and press ENTER.
  ```
  path3d := pointplot3d(listpoints3d, style=line, color=red):
  ```

To plot the starting point of the skier and assign it to `skier`:

- At the prompt, type the following and press ENTER.
  ```
  skier := pointplot3d(convert(point3d[1],list), symbol=cross,
  symbolsize=50,color=yellow):
  ```

To view all three elements at once:

- At the prompt, type the following and press ENTER.
  ```
  display(mountain, skier, path3d);
  ```

To rotate the surface of the plot to see the path:

1. Click the plot to select it.
2. Place the pointer on the plot, but not directly on the surface of the hill.
3. Drag the plot in any direction. The surface rotates.

Your plot should look similar to that of Figure 2-C. For a list of all the different types of plots, see `?plots` (*Introduction to the plots package*). For overview information on plots, see `?worksheet,plotinterface` (*Overview of Plotting*). For information on different plot options, see `?plot,options` *(plot[options])* and `?plot3d,option` *(plot3d[*option]).

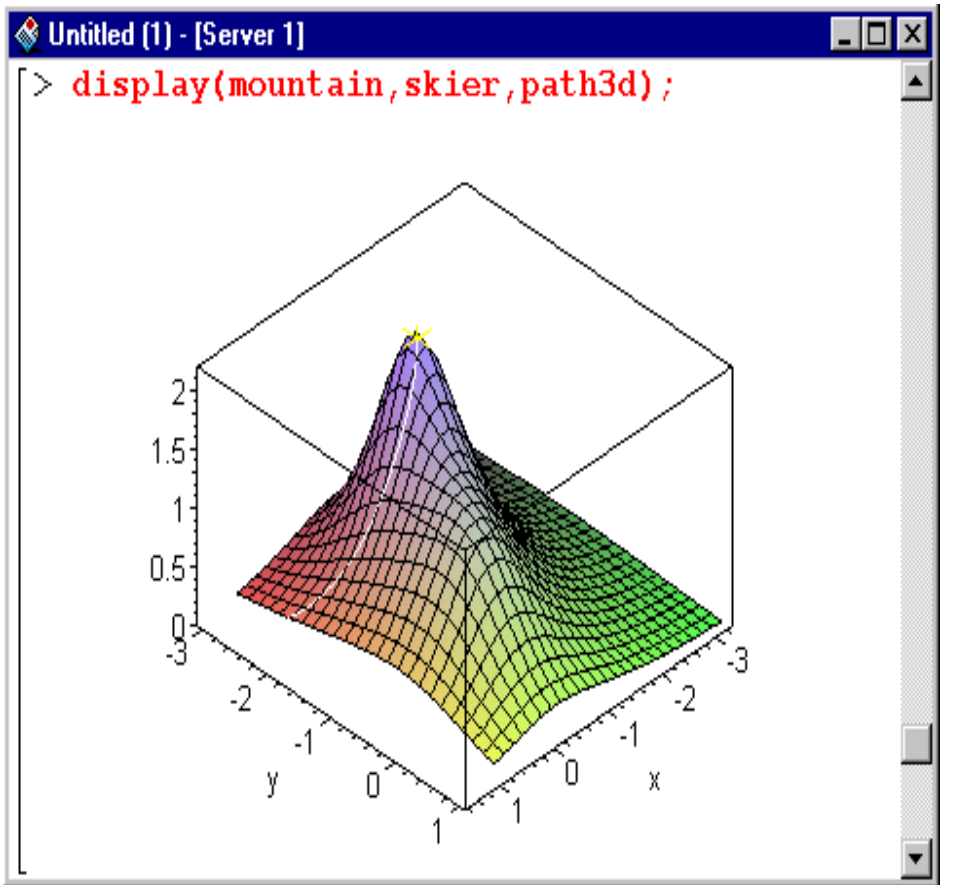

Figure 2-C The skier's starting position, the path, and the hill

Similarly, you could display a contour plot with the skier's path.

2.6 Documenting Your Work

You can document the steps you took to solve a problem by adding some text to your worksheet. You can then format the text using different predefined styles, or you can define your own styles. In addition, you can insert formatted mathematics in your text.

Adding text

Add a title to your worksheet, and add some text to describe the problem that you are solving. You can also add text in other locations in the worksheet to describe how you are solving the problem.

To add a title to your worksheet:

1. Insert a new execution group at the top of the worksheet: place the insertion point on the top line, and from the **Insert** menu, choose **Execution Group**, then **Before Cursor**.
2. Click  to add text rather than a Maple command.
3. Type the following text.
   `The Skier's Path`
4. From the style box (indicated in Figure 2-D), select **Title**.
5. Press ENTER, and type in your name. It is automatically formatted in the **Author** style.

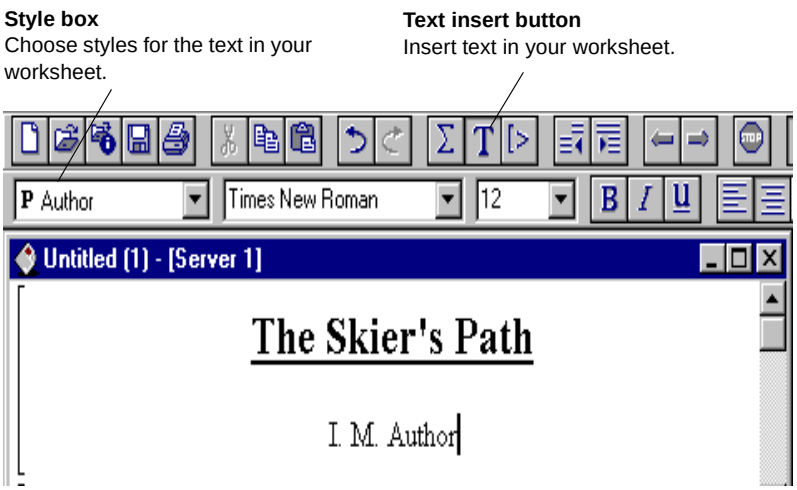

Figure 2-D Worksheet with a title; context bar for text

It is possible to redefine the styles (their font, alignment, underlining, and so on). For more information, see `?worksheet,documenting,styles` (*Overview of Maple Text Styles*).

To add a text description to the worksheet:

1. Place the insertion point on the first input command (the `with` command).
2. From the **Insert** menu, choose **Execution Group**, then **Before Cursor**. A new prompt appears.
3. Click  to add text.
4. Type the following sentences:
   ```
   A skier has made her way to the top of a mountain. She wants to
   take the steepest path down, which she can find by performing
   the calculations outlined in this worksheet.
   ```

To add formatted math to the text:

1. To add another paragraph and an extra space to the worksheet, press ENTER twice.
2. Type the following text.
   ```
   Suppose that the height at a point (x,y) of the hill is given by
   f=12/(1+x^2+y^2)*(1+2*(x+1)^2+(y+2)^2), in thousands of feet.
   ```
3. Highlight the equation.
4. From the **Format** menu, choose **Convert to**, then **Standard Math**. The equation appears in standard math notation.

Your worksheet should look like that in Figure 2-E on page 21.

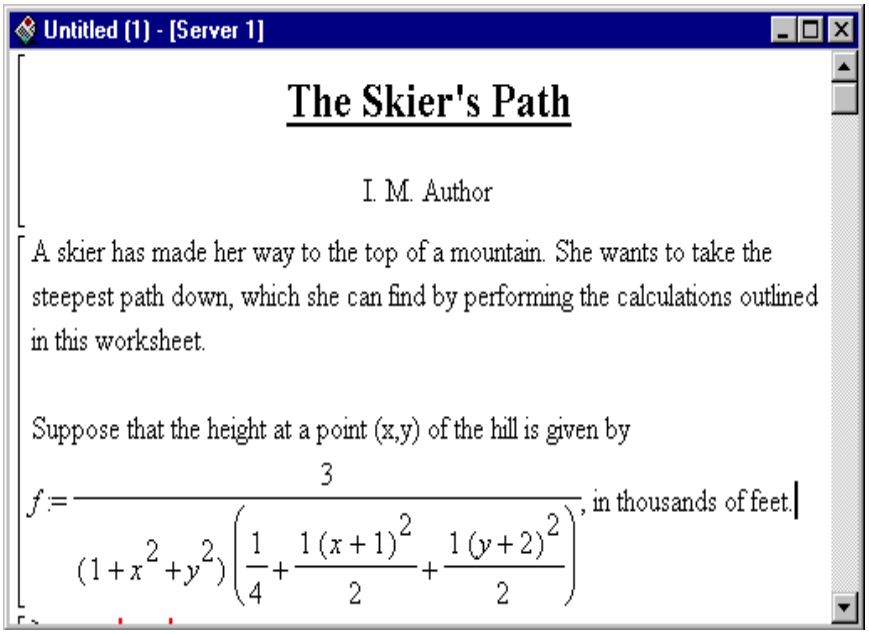

Figure 2-E Text description with formatted math

Structuring the worksheet with sections

You can add sections to your worksheet to group various elements. When you enclose elements in a section (or indent them), Maple automatically adds a place for a section title.

To add and title a section:

1. Select the first two paragraphs in the worksheet. (They begin with “A skier …” and end with “… in thousands of feet.”)
2. Click (Indent) on the toolbar. A large range bracket topped by a little square appears to the left of the two paragraphs you selected.
3. Click next to the box, and type the title of the section:
   `Problem Description`

Compare your worksheet to Figure 2-F on page 22. You can continue to document each step in the problem. For more information about sections, see

`?worksheet,documenting,structuring2` (*Structure Worksheets With Sections*).

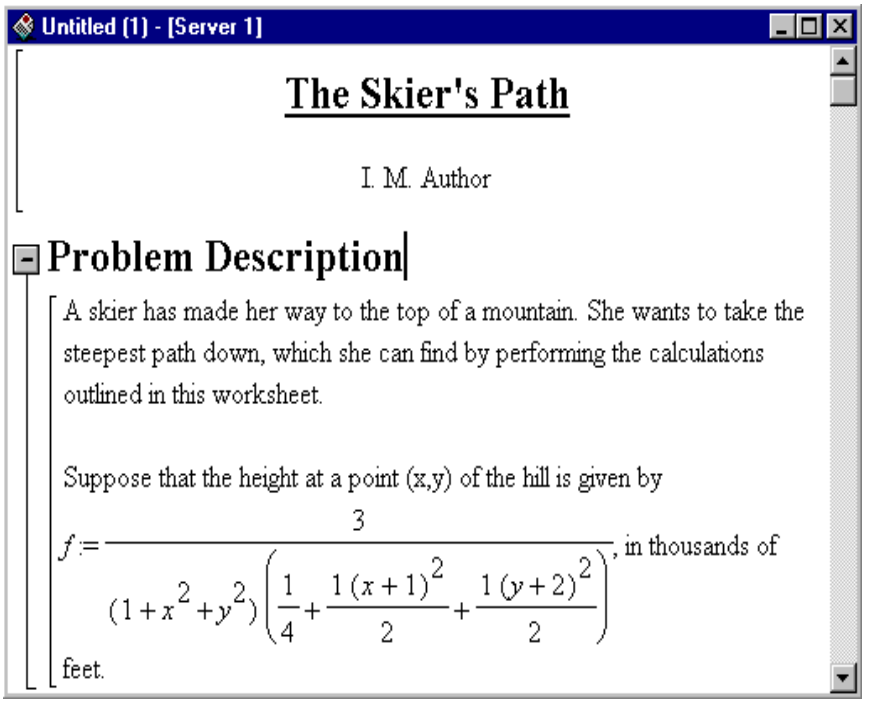

Figure 2-F Worksheet with a titled section

Adding numbers

If you plan to print your worksheet, you may find it useful to add page numbers to the bottom of the page.

To add page numbers (centered at the bottom of the page):

1. From the **Format** menu, choose **Page Numbers**.
2. In the Page Number dialog box:
   a. Select the **Show Page Numbers** check box.
   b. Under **Vertical location**, leave the default selection at **Bottom**.
   c. Under **Horizontal location**, click **Center**.
   d. Click **OK**.

For more information about the page number options, see `?worksheet,documenting,pagenumbers` (*Page Numbers*).

To save your worksheet:

- From the **File** menu, choose **Save**. If you have not saved it previously, you are prompted for a file location and name that ends with .mws (for **M**aple **w**ork **s**heet).

2.7 Exporting to HTML

You can export your worksheet as an HTML file. (Maple worksheets can also be exported to HTML with MathML, LaTeX, Maple text, plain text, and Rich Text Format (RTF). For more information, see `?worksheet,managing,export` (*Export a Worksheet*).)

To export a worksheet as HTML:

1. With the worksheet you want to export open, from the **File** menu, choose **Export As**, then **HTML**.
2. In the Save As dialog box, type the name of the file, and click **Save**.
3. In the HTML Options dialog box, type the name of the folder for the images (plots and formatted math) in your worksheet.
4. The resulting HTML page will include the worksheet file name and all of its sections as links. If you want these links to appears in a left frame, select the **Use Frames** check box. If you prefer that the links be at the top of the page, separated by a horizontal rule, clear the **Use Frames** check box.
5. Click **OK**.

The HTML file is created. You can then open it in your Web browser.

For more information on how to export worksheets, see `?worksheet, managing,exportHTML` (*Export as HTML*). For information on how Maple translates the worksheet to HTML, see `?worksheet,managing,exporttoHTML` (*Translation of Maple Worksheets to HTML*).

3 Getting More Information

This guide is a brief introduction to the Maple program. Maple has many other features, such as spreadsheets, an Excel link, and a MATLAB link. To learn more, you can use the Maple help system, read the Maple 7 manuals, and access other online resources.

3.1 The Help System

Maple provides a custom online help system consisting of over 3000 reference pages. The help system is a convenient resource for determining the syntax of Maple commands and for learning about the features of the Maple program.

Maple help pages

When you invoke a particular help page in Maple, it is displayed in a new window, with the Help Browser at the top. Most help pages in Maple are command reference pages, such as the one in Figure 3-A on page 26.

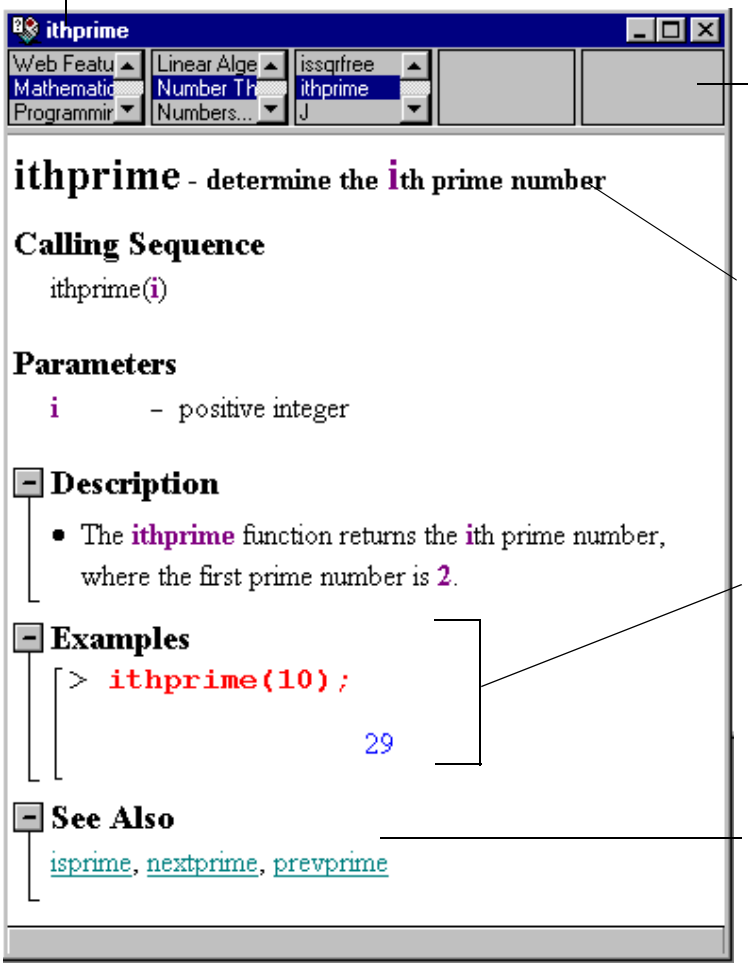

Figure 3-A Sample Help page

Help page toolbar

The help page toolbar provides commands that make it easier for you to use the help system. Some of the commands are shown in Figure 3-B on page 27.

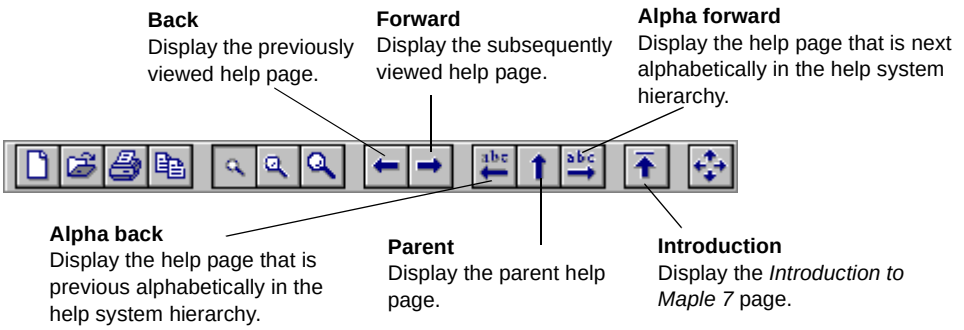

Figure 3-B Help toolbar

Getting help

Maple provides a number of different ways of accessing the information in the help system.

- The *help command* displays the help page of a specified command or topic.
- The *Help Browser* lists the help pages in a hierarchy organized by topic.
- *Topic search* finds a help page that matches a specific topic name.
- *Full text search* finds help pages that contain a particular word or phrase.

Help command If you know, or can guess, the name of a help page, you can access it by using the help command. It is the most direct method of obtaining help. To use the help command, at the prompt, type a question mark followed by the command or topic on which you want help and press ENTER. Note that you do not have to terminate a help command with either a semicolon or a colon. For more information, see `?help` (*help*).

Help Browser The Help Browser is a five-column table of contents that lists the help pages by topic. Some topics are listed in more than one location, to help you more easily find the information you need. For more information, see `?worksheet,reference,browse` (*Use the Help Browser*).

Topic search Topic Search finds the help page that has the specified topic name (for example, “ithprime”). It may find a help page that lists the specified topic name as a synonym or an alternate spelling instead. Note that Topic Search is not case-sensitive. To use Topic Search, from the **Help** menu, choose **Topic Search**. Type your **Topic** word and click **Search**. For more information, see `?worksheet,help,topicsearch` (*Perform a Topic Search*).

Full text search Full Text Search searches all the help pages and returns results based on the frequency with which the text occurs. With this search, you can search on more than one word. However, the results may include pages that contain only one of the words listed in the **Topic** box, and not all of them. Note that Full Text Search is not case-sensitive. To use Full Text Search, from the **Help** menu, choose **Full Text Search**. Type your word or words, and click **Search**. For more information, see `?worksheet,help,fulltextsearch` (*Perform a Full Text Search*).

3.2 Manual Set

The Maple program comes with the following manuals.

Title	Content
Maple 7 Getting Started Guide	This guide contains an introduction to the graphical user interface and a tutorial that outlines using Maple to solve mathematical problems and create technical documents. In it, there is additional information for new users about the online help system, New User's Tour, example worksheets, and Waterloo Maple Web site.
Maple 7 Learning Guide	This guide explains how Maple and the Maple language work. It describes the most important commands and uses them to solve technical problems.
Maple 7 Programming Guide	This guide introduces you to the basic Maple programming concepts, such as looping mechanisms, procedure definitions, and data structures. As well, it covers more advanced topics, such as graphics programming, debugging, creating packages and modules, and connecting to external programs.

3.3 New User's Tour

The New User's Tour is a set of interactive worksheets that you can use to learn about Maple. The worksheets present commands that every user should know. The tour covers many areas of Maple, such as the worksheet environment, numerical calculations, algebraic computations, graphics, calculus, differential equations, linear algebra, finance and statistics, programming, and online help. The New User's Tour is easy to follow. It can take up to two hours to complete if you study all the topics.

To access the New User's Tour:

- From the **Help** menu, choose **New User's Tour**.

3.4 Example Worksheets

The example worksheets (there are about 50) contain examples from the Maple programming language and from ten different areas of mathematics, such as algebra, geometry, discrete mathematics, integration, integral transforms, differential equations, general symbolics, general numerics, and mathematical visualization.

To see the contents of the set of example worksheets:

- At the prompt, type `?examples,index` and press ENTER.

3.5 Web Sites

Waterloo Maple Inc.'s Web site has, among other things, information on products, support, and services.

To visit Waterloo Maple Inc.'s Web site:

- In your Web browser, go to this URL:
  `www.maplesoft.com`

The Maple Application Center, includes a forum for sharing solutions, demonstrations of Maple PowerTools, and an online tutorial.

To visit The Maple Application Center Web site:

- In your Web browser, go to this URL:
  `www.mapleapps.com`

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