

The Maple Reporter

The Newsletter from Maplesoft™

Q1 2003

In This Issue:

- 1 **Cover Story**
Maple T.A. Makes Online
Testing and Assignments Easy
- 3 **Calc I Maplets™**
Bring Calculus to Life
- 4 **Student Linear Algebra**
Available from MaplePrimes™
- 5 **High School PowerTools**
Algebra I&II, Geometry,
Precalculus, and Trigonometry
- 6 **Application Story**
Dynamical Systems are No
Match for This High School Senior
- Maple™ in Japan**
- 8 **Application Center Highlights**
Statics, Warnings, Interval
Arithmetic + 3 apps
- 10 **Tips & Techniques**
Build Your Own
Context-sensitive Menu
- 11 **Four New Books Reviewed**
- 12 **MSW 2003**



maple T.A.™

Maple T.A.™ Makes Online Testing and Assignments Easy

Five thousand freshmen students are coming to your campus this fall. Although you are looking forward to the new wave of eager minds, their arrival bodes a Herculean task for you and your colleagues in the Mathematics Department. In batches of several hundred, you will herd them into auditoriums across campus. There dozens of proctors will administer a paper-and-pencil placement test that decides which math course each freshman should take. Your department will have ordered 5,000 paper copies of the test from a now overjoyed printing company. Faculty will have spent hours creating multiple versions of the test to hinder (they hope) neighboring students from trading answers. After the test, still more staff will have to run 5,000 multiple-choice answer sheets through the scanner.

But many hours and dollars later, the hard questions linger. Will the test place each student

in the right course? How many test takers will guess or cheat their way into multivariable calculus but wouldn't know a cosine from a stop sign? Can a multiple-choice test really gauge a student's grasp of mathematical concepts?

Maple T.A. is about to free schools from the cost, effort and limitations of paper-and-pencil assessment. Maple T.A. is a web-based assessment and teaching software product from Maplesoft, now in pilot stage. With it, instructors can create online mathematics tests, assignments and practice sessions that are graded by the Maple engine. Students take the tests through a standard web browser, while a Maple engine running on the Maple

T.A. server automatically grades the assignment as soon as the student submits it. They can enter their responses either by clicking buttons from a palette of math symbols or by typing scientific-calculator syntax into a text box. ➔



The student environment of an online exam created in Maple T.A. Students can enter their responses from a symbolic math palette.

Maplesoft™
command the brilliance

Waterloo Maple announces the immediate introduction of the name Maplesoft™ as its primary business name

See page 2 for details...



Tom Lee, Ph. D.
Marketing, Vice President

Editor's Column

Guest Editorial

Introducing Maplesoft™

Starting March 3, 2003, Waterloo Maple will consolidate its primary product business under the name Maplesoft™.

What's in a name? Over the past few years, we've worked very hard to make product improvements, offer useful, free resources, and better reflect the realities of our diverse user community. The name Maplesoft is another step in reinforcing our position as the most customer-responsive company in math software.

Maplesoft has its roots in the late 1980s when it was chosen as the domain name for e-mail, and later the URL for the Web site. Through the years as the Internet became more important, our users naturally began using Maplesoft more frequently in reference to the company ... whether we liked it or not. In the final analysis, we decided that we liked it. If the customer is always right about products and services, they are likely going to be right about the name that is easiest to remember, and that has the nicest "ring" to it. In many ways you made the decision.

A business name is still only a part of maintaining customer focus. We will continue to improve our products and services and do all of the other important things to keep our reputation. In this issue, you'll read about some of them. We introduce Maple T.A., an exciting new initiative that harnesses the Maple engine for math testing and assessment; new PowerTools for the ever-broadening user-base; advanced techniques to get the most out of Maple; and several interesting stories on how your peers are using the software in various fields and countries.

The name may have changed but our commitment hasn't ... it just sounds better. Welcome to Maplesoft!

→ (continued from ...) Maple T.A. Makes Online Testing and Assignments Easy

Maple T.A. opens the door to free-form questions like ...

"Find the union of the sets $\{a, b, c, d\}$ and $\{b, e, c, f\}$," or

"Give an example of an increasing function on the interval $[0, 1]$."

In the design of the second question, for example, you can have the Maple server automatically check whether the derivative of the student's response is nonnegative on $[0, 1]$.



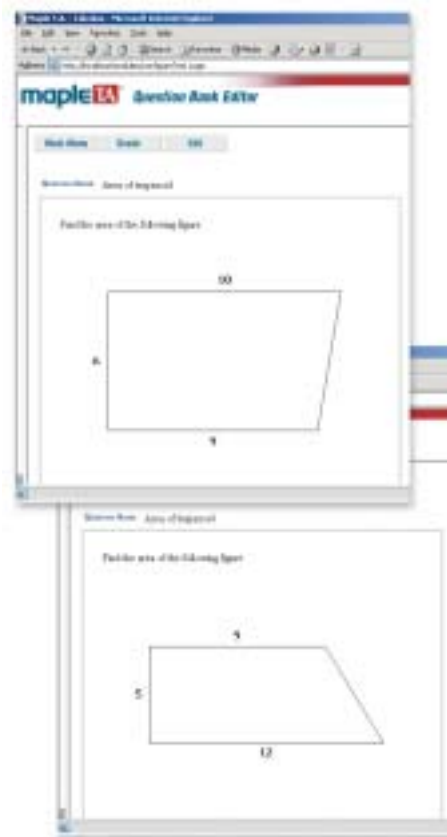
You can enter your own Maple code to grade free-form math questions.

Maple T.A. also allows randomized questions, which obviates the manual creation of multiple versions of a test. In the first example above, you could either have Maple T.A. generate random elements in the sets, pick sets at random from a collection that you specify in advance, or have the Maple server generate random sets of random size. Thus, during an exam, every student would see a slightly different version of the question. During a practice session, a student could repeat an exercise with different parameters.



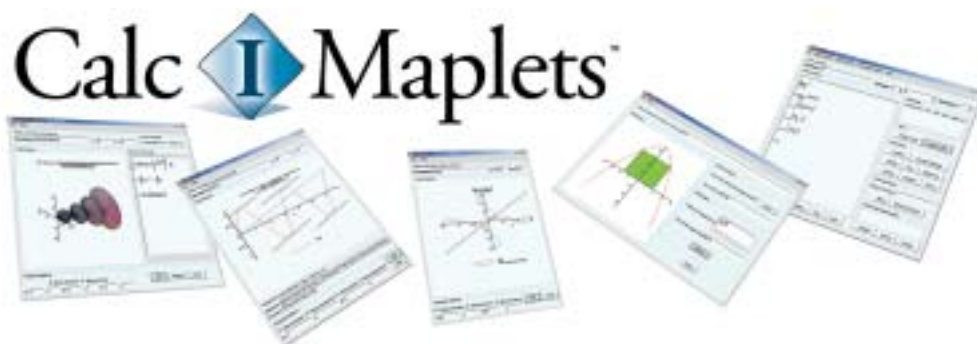
You can include Maple plots inside Maple T.A. questions, even randomly generated ones.

You can also include Maple plots inside Maple T.A. questions. For example, you could give students a 3-D plot of a function $f(x,y)$ and ask them to pick the contour plot that matches it. You can even combine the plotting and randomization features within the same question. A question that asks students to find the area of a given trapezoid could generate random lengths for the sides and then have Maple plot and label the resulting trapezoid. Or you could show the graph of a random polynomial and ask students to infer the polynomial from the picture. To make the task manageable but not trivial, you could tell Maple T.A. to use only integer coefficients and pick the degree between three and five.



You can create randomized math questions inside Maple T.A., so that every student sees a slightly different version of the question.

Maplesoft is now soliciting participation in pilot testing of Maple T.A. If your school would like to pilot this technology, please contact bizdev@maplesoft.com.



Calc I Maplets Bring Calculus to Life

Maplesoft announces the release of **Calc I Maplets**, a revolutionary set of calculus learning activities using the maplets technology of Maple™ 8. Each learning activity is designed to reinforce understanding of a particular idea from calculus. Using a maplet interface to enter functions and parameters, the student can see how the calculus ideas of that lesson apply to the data he or she chose. The maplets give back results in the form of plots, mathematical expressions and numerical answers.



Figure 1. Students can drill themselves on differentiation rules in the **Differentiation** maplet.

With **Calc I Maplets**, students can literally make calculus happen in front of them by pulling on its levers. Since the maplets do the symbolic computations in Maple, students can learn from any example they enter, not just canned examples built into the program. Calculus instructors can use **Calc I Maplets** for in-class demonstrations to enliven a lecture, lab activities or homework explorations. Unlike studying from a book or notes, the student gets instant feedback on his or her understanding.

In the **Differentiation** maplet (Figure 1), for example, the student can differentiate a function step-by-step by choosing differentiation rules from a palette of buttons. The student must decide which rules to apply and in which order, but the Maple engine does all the algebraic bookkeeping. This allows the student to practice the high-level steps of differentiation without becoming entangled in the algebra. At any time, the student can tell the maplet that he or she has understood a particular rule, and the maplet will apply that rule automatically from then on, when appropriate. The **Calc I Maplets** include step-by-step integration and limits tutors, as well. (These tutors serve as graphical interfaces to the **Rule**, **Hint** and **ShowSteps** procedures in the **Student[Calculus1]** package in Maple 8.)

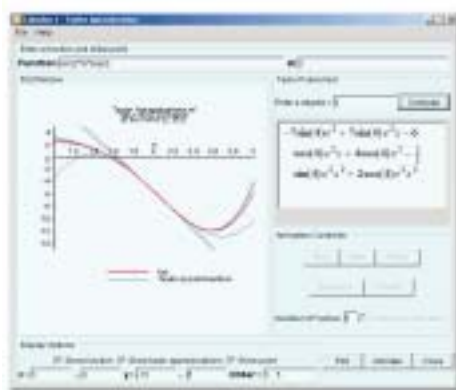


Figure 2. The **ApproximateIntegration** maplet demonstrates Riemann sums and other approximate integration methods interactively.

In the **ApproximateIntegration** maplet (Figure 2), a student can learn the meaning of Riemann sums interactively. The student types in a function and the interval of integration. With slider bars and buttons, he or she sets the number of rectangles in the sum

and the rule for generating the sum (left endpoint, right endpoint, maximum, etc.) The student can view a picture of the Riemann sum for the number of rectangles he or she chose, or an animation of the convergence as the partition becomes finer. This activity demonstrates other definite integral approximations, as well, including Simpson's rule, the Trapezoidal rule and Newton-Cotes. Other maplets in the set reinforce learning of tangent lines, Taylor series (Figure 3) and much more. There are now 17 learning objects in the **Calc I Maplets** set, covering most major topics from a one-year calculus course.

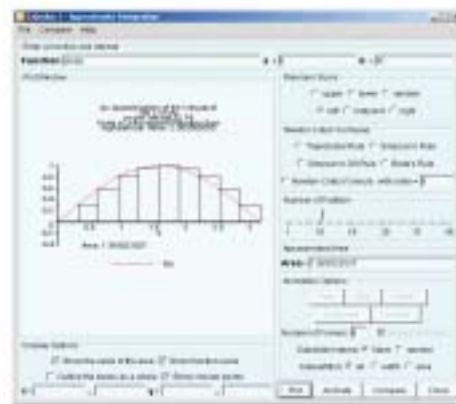


Figure 3. Students can watch a Taylor series converge to a function as an animation in the **TaylorSeries** maplet.

Subscribers to Maplesoft's Extended Maintenance Plan (EMP) can download **Calc I Maplets** for free from the MaplePrimes™ website at <http://www.mapleprimes.com>. A free sample of the **Calc I Maplets**, including the **Differentiation** maplet described above, is available from the Maple Application Center under the Maplets category at <http://www.mapleapps.com>.



Student Linear Algebra

Student Linear Algebra Now Available from MaplePrimes™

Maple is opening the doors for professors and students alike with the release of interactive student packages. These packages encourage a deeper understanding of the concepts presented by allowing you to walk through mathematical problems and visualize concepts using one-step routines. The first of these packages was **Student [Calculus1]**, which lets you single-step through differentiation, integration, and limit problems. Now available from MaplePrimes is the new **Student[Linear Algebra]** package.

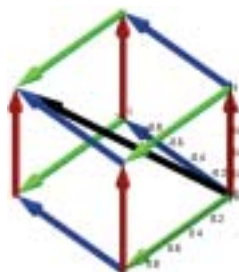
This revolutionary package provides tutors and visualization routines to help present and understand problems in an introductory course in Linear Algebra. Interactive tutors enhance your understanding of linear system problems by applying Gaussian elimination or Gauss-Jordan reduction methods in a step-by-step manner tutorial. Using the **GaussianEliminationTutor** or **GaussJordanEliminationTutor**, once a matrix is in its reduced form, you can query for the rank, nullity, and bases for the row, column, and null spaces. The **InverseTutor** allows you to step through the process of computing the inverse of a matrix by adding, multiplying and swapping rows. To assist you in walking through a problem, you can ask for a hint, undo an operation,

or jump to the final solution. A history of applied methods is continuously displayed to recall your work. Eigenvalue and eigenvector tutors are also available. Each tutor is presented as a maplet allowing users, who may not be familiar with Maple syntax, to easily access the interactive routines in this package.

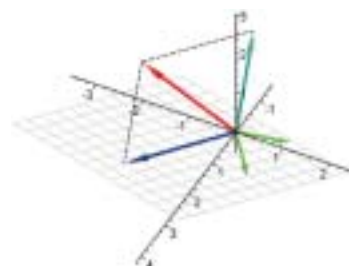


Step-by-step tutor to determine the inverse of a matrix

The visualization routines included in this package heightens comprehension of the concepts presented in an introductory Linear Algebra course. With these routines, you can easily display the cross product of two vectors, plot a system of 2-D or 3-D linear equations, display a least squares fit to a plot of points in 2-D or 3-D, return the projection of a vector onto a subspace, and more. These one-step routines require only the student to enter the appropriate matrix, vector, algebraic expression or system to display the result. Several options are available to customize each graph.



The sum of three vectors



The projection of a vector onto a plane

The computation routines offered in this package are interfaces to the corresponding routines in the **LinearAlgebra** package, but with two fundamental differences. The **Student[LinearAlgebra]** package uses software-point computations as opposed to the default hardware floating-point computations performed in the **LinearAlgebra** package. Secondly, symbols are treated as real values rather than complex values. This flexible package allows you to change the settings mentioned and others to the defaults of the **LinearAlgebra** package.



The **Student[LinearAlgebra]** package is now available from MaplePrimes at <http://www.mapleprimes.com>. 

Maple PowerTools™ go to High School



The problem of how to hold the attention of adolescents during a math lesson has challenged the greatest minds in education for over a century. Greg Moore of Orange Coast College has just offered a modern solution to this ancient puzzle with the first Maple PowerTools for high school mathematics.

Moore's PowerTools emphasize learning through visualization. In Lesson 12 of the **Precalculus PowerTool**, for example, students get a visual, intuitive feel for where the "conic" in "conic sections" comes from (Figure 1). In Lesson 8 of the **Geometry PowerTool**, students see the geometric relationships among the Fibonacci sequence, the Golden Ratio and continued radicals (Figure 2).

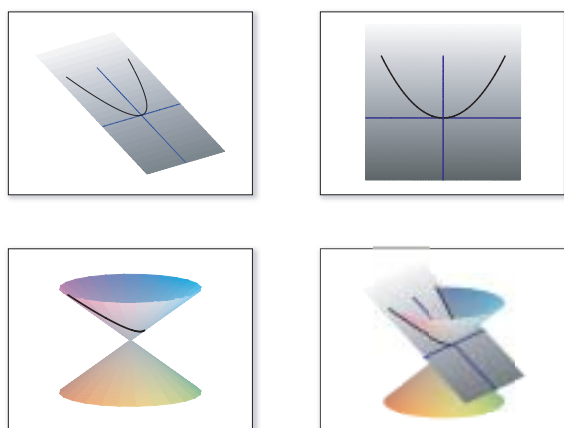


Figure 1: Greg Moore provides tailor-made Maple routines for visualizing conic sections in his **Precalculus PowerTool**

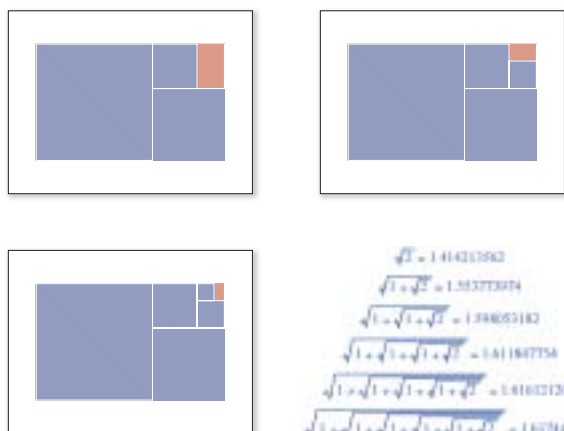


Figure 2: Visualization of the Golden Ratio in the **Geometry PowerTool**

Maple graphics open the door to far more advanced applications than are feasible during blackboard lectures. Moore's lesson on the cosine function in the **Trigonometry PowerTool** shows plots of not only variations of the expression $A \cos(Bx-C)+D$, but also summations such as

$$\sum_{k=1}^{15} \cos(kx) \text{ and } \sum_{k=1}^n \frac{\cos((2k+1)x)}{2k+1}$$

for increasing values of n (Figure 3.)

Moore exploits these opulent pictures as a plug to students for future studies in mathematics. In the text of the lesson, he alludes to the concept of Fourier series and that they can model common phenomena like heart beats.



Figure 3: A nod to Fourier series in the lesson on the cosine function

Moore designed these lessons so that a teacher could use Maple as the presentation medium for the entire lecture. The teacher can instantly generate new examples from old ones by simply changing a few values and pressing Enter. The blackboard is almost never needed during the class. Moore also designed each worksheet so that students do not need to learn or understand Maple syntax.

Every lesson provides tailor-made Maple procedures for showing its particular concepts. The **Algebra I&II PowerTool** has some of the most remarkable procedures in the collection (Figure 4). Moore provides routines that show, for example, how to compute the LCM and GCD of two integers, and how to set up a distance-rate-time word problem, as opposed to just producing the final answers. The procedures for each lesson are tucked away in a collapsible subsection, so that neither teacher nor student must confront scary looking Maple code.

problem	2	3
LCM	$(12)^k (3)^2$	$(12)^k (3)^2$
GCD	$(12)^k (3)$	$(12)^k (3)$

	Rate	Time	Distance
Motorist	2 r	$\frac{2 \text{ r}}{d+2}$	$d+2$
motorist	r	$\frac{r}{d}$	d

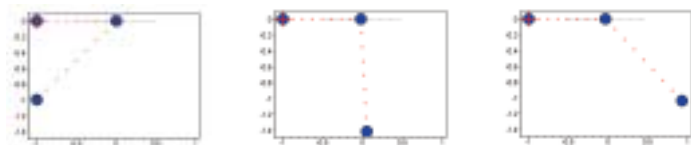
Figure 4: The Algebra I&II PowerTool has routines for showing how to set up word problems

All four high school PowerTools are available for free download from <http://www.mapleapps.com/powertools/MathEducation.shtml>.

Dynamical Systems Are No Match for This High School Senior

In December we received a Maple application from a Mr. Forhad Ahmed, entitled "Analysis and Simulation of Simple Dynamical Systems". At first glance, it appeared to be a typical application by a physics professor to model multibody systems. What was not typical, we learned later, was Mr. Ahmed himself. It turns out Mr. Ahmed is now applying to Princeton and Cornell Universities – as a freshman.

Most physics students learn the mathematics and physics of multibody systems in the 2nd or 3rd year of university. But don't tell that to Mr. Ahmed, who taught himself classical mechanics and differential equations from textbooks as a senior at Columbus Alternative High School in Ohio.

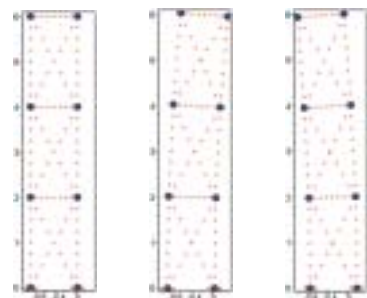


Simulation of three masses joined by springs, created by Forhad Ahmed's Maple application. The lower mass is free to swing, while the upper-right mass is free to slide horizontally.

Age of the author aside, Mr. Ahmed's Maple application is quite impressive in its own right. Not only does it solve the equations of motion of dynamical systems, it provides the user with object-oriented routines to build the physical system and generate the equations. For example, there are routines to add a new particle to the system with a given mass, position and velocity; add a spring with a given stiffness between two particles; and specify along which axes each particle is free to move (e.g., x-axis, y-axis, both or neither). After building the system, the user invokes another of Ahmed's routines to generate the system of equations from Newton's laws and solve them numerically with Maple's `dsolve`.

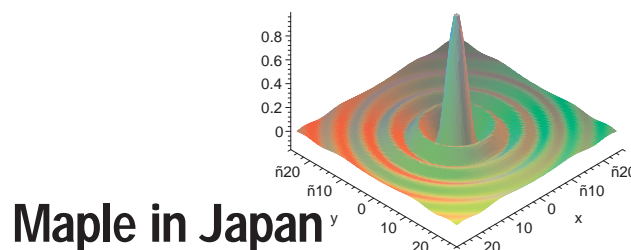
In one example, he demonstrates the motion of a metal tower subjected to vibrations at the base. He models the tower as eight masses bound into a lattice by stiff springs. The two masses at the base are subjected to horizontal vibrations with known amplitude and frequency. The

user can view horizontal-motion plots of each individual mass or an animation of the tower as a whole.



Simulation of the vibration of a metal tower. Eight masses are joined by springs. The lower two are subjected to horizontal vibrations.

If Mr. Ahmed's Maple work is any indication, the physics community should look forward to a productive new member in a few years. 🍁



Maple in Japan

Mr. Yoshiyasu Ueno is a professor of Communications at The University of Electrocommunications in Chofu, Tokyo. In this interview, he describes how he uses the Japanese version of Maple in his research at the NEC Optical Network Institute in Tsukuba. (Translated from the Japanese article published in *PC User magazine*.)

What got you started using Maple?

My area of specialization is the development of various optical devices, more specifically, the structural design of next-generation high-speed optical switching devices, and semiconductor lasers for DVD players. Generally speaking, R&D departments must conduct lots of calculations and experiments under fairly severe time constraints. For this reason, the efficiency of the software is always very important. In the past, there was a software called REDUCE, which was designed for large computers, but not many of us could use it. Later I read an article in a mathematical journal that featured a comparative analysis of Maple and Mathematica®. I started to use Maple because the article ranked Maple higher.

What were the advantages of using Maple in your research?

FORTRAN and BASIC were the languages I was using at that time, but compared to these, Maple was overwhelmingly easy to use. I could produce the same calculations in a much shorter period of time. The same applies to graphics. Graphics is the greatest advantage of using Maple. Fractions and matrices can also be freely expressed, so that it is easy to check the result visually. Matrix operations and calculations with complex numbers are found everywhere in scientific research, but it was tedious to do the programming using other software or programming languages. In this respect I valued the convenience of Maple. I also use Maple for presentations, and its 3-D representations are truly excellent. You can produce an extraordinarily beautiful expression, which cannot be done with Microsoft® Excel.

What are some of the useful features of newer versions of Maple?

Not only the improvement in speed but also the Japanese Balloon Help and Tutorial are very useful. I am planning to offer graduate level courses using Maple, and since the software is user-friendly, it makes the materials more accessible. The time is ripe now, I think, to make a strong appeal to people involved in broader fields, not only to those in numerical analysis, theoretical engineering, or in education. I recommend it as a tool for a variety of needs of engineers involved in all areas of design. Maple is a powerful assistant to people who develop products and technologies, with a minimum effort of programming. 🍁

Cybernet Systems Inc. distributes Maple in Japan. The most recent version, Maple 8 Japanese Edition, was released in October of 2002.

This interview was originally carried in PC USER <http://www.sbpnet.jp/pcuser>
Softbank Publishing Inc. <http://www.sbpnet.jp>

RIGHT ON THE NUMBERS.



ENGINEERING.COM™

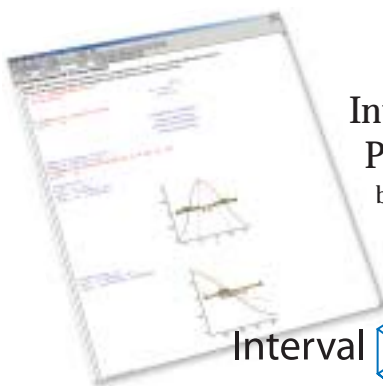
The Engineer's Ultimate Resource Tool.

Application Center™ Highlights



Three New Maple PowerTools™ Have Burst Through the Gates to Assist Fellow Researchers and New Maple Users.

Adding to the suite of Research PowerTools offered from the Maple Application Center are Interval Arithmetic and Statics PowerTools.



Interval Arithmetic PowerTool

by Markus Grimmer
[http://www.mapleapps.com/
powertools/interval/Interval.shtml](http://www.mapleapps.com/powertools/interval/Interval.shtml)

Interval  Arithmetic

The **Interval Arithmetic** package provides the tools to define intervals and easily perform type checking, convert Maple expressions to interval arithmetic and more. You can enclose the ranges of 2-D or 3-D functions using a combination of the following methods: interval evaluation, mean value form, monotony properties and Taylor forms. This PowerTool offers the Interval Newton Method for the computation and enclosure of all zeros of a continuously differentiable real function. Types and procedures for both intervals and complex interval arithmetic are also available.



Statics PowerTool

by Harald Kammerer
[http://www.mapleapps.com/
powertools/statics/statics.shtml](http://www.mapleapps.com/powertools/statics/statics.shtml)

 Statics

Civil engineers will find great use in the new **Statics PowerTool**. This package provides routines to input a basic structure, along with its load and material parameters, and instantly derive the essential properties of the loaded system in either numeric or symbolic form. Deformation functions for 14 classes of bars and beams, principle stresses, strains, and moments of inertia for beam cross-sections, bar forces and more can be calculated with this package.

Helping new users learn Maple syntax is now easier with a new Maple Education PowerTool

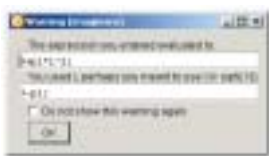
Warnings PowerTool

by Douglas Harder

<http://www.mapleapps.com/powertools/warnings/Warnings.shtml>



Warnings:



The **Warnings PowerTool** is a Maple package that helps new users to learn Maple syntax. When a new user attempts to assign variables, multiply expressions, define matrices and so on, a message box will appear if the syntax

is incorrect. This message box will restate your expression and suggest a correction in a maplet. To prevent new users from being intimidated by the code in this package, a `maple.ini` file was created. By placing this file in Maple's lib directory, the code will automatically be read each time a new user starts Maple.

Applications by Students

The bulk of applications submitted to the Maple Application Center are written by professors, researchers and professionals wanting to present their Maple discoveries. Recently, applications are starting to emerge from student users showing off the skills they've acquired. Here are three recent applications submitted by students.



Design a Ring

by Joanna Yeh,

student at the University of Waterloo

http://www.mapleapps.com/categories/Maplets/html/ringMaplet_pop-up.html

Have you ever wondered how much more it would cost to purchase a ring that's 3 mm instead of 2.5 mm? Or what if you splurge and buy the platinum ring instead of gold, would you still be able to pay next

month's mortgage payment? The **Design a Ring** maplet lets you do just that. This maplet contains procedures to help you calculate how much a custom-sized wedding ring will cost. All you have to do is enter the dimensions of a ring and select from the list of materials of gold, titanium or platinum before the calculated price is returned. If you have no idea what dimensions and other factors you desire but know a price range, the maplet allows you to design a ring based on the price entered.

Animation of the Motion of a Charged Particle Under an Electric Field

by Pauline Hong, student at Duke University

http://www.mapleapps.com/categories/science/physics/html/motion_under_field.html

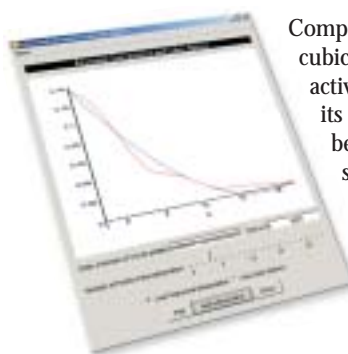


Pauline Hong shares her philosophy on solving problems before diving into the concept she presents. "Gain some intuition about the solution to your problems before you hurry to tackle it." This application shows the animation of a moving particle influenced by one or more stationary charged particles in the plane. The stationary particles produce an electric field exerting a force upon the moving particles, causing it to accelerate. To see this procedure in action, enter parameters such as the mass, charge, position and velocity of the moving particle, the charge and position of the stationary particles and, finally, the time interval.

Comparison of Polynomial Interpolation and Cubic Splines Using Maplets

by Mohammed Moutadayne, student at the University of Waterloo

<http://www.mapleapps.com/categories/mathematics/numerics/html/InterpolationMaplet.html>



Comparing polynomial interpolation with cubic splines is made easy with this interactive maplet. This application requires its users to enter a function and range before plotting the function and chosen interpolation method. Displaying interpolation plots of increasing degrees is possible, and the user can easily compare the accuracy of the two methods of interpolation.

Mohammed Moutadayne is also the author of a series of maplets focusing on topics presented in a Calculus III course.

To see these and other Maple applications submitted by students, visit http://www.maple4students.com/student_contribute.html.

Build Your Own Context-Sensitive Menu

Every new application comes with a learning curve. Maplesoft is going to great lengths to assist novice users in making this learning curve as short as possible. You've seen how easy it is to build a graphical user interface to access the Maple kernel using the **Maplets** package. Do you know that you can build your own context-sensitive menu just as easily using the **context** package? A context-sensitive menu associates Maple output expressions with specific Maple actions. Once an action is selected, not only is the action performed on the expression, but the Maple routine is also displayed to show users the corresponding Maple command. When the full expression is selected the **context** package is used for the creation and maintenance of procedures that generate a context-sensitive menu.

In this article, we will build a simple context-sensitive menu to some of the routines in the **Student[Calculus1]** package. Specifically, this menu will allow users to ask Maple for a hint, undo a rule or apply the product rule to differentiation problems.

```
> with(context);
```

[buildcontext, clearlabels, defaultcontext, display, installcontext, restoredefault, testactions, troubleshoot]

Context-sensitive menus are built using classes. A class requires a unique name for the menu, a Boolean statement that will test expressions for membership in this class, and an explanation of what this class contains. In the following example, the unique name is "Differentiate". The Boolean statement tests if an expression is in the inert differentiation form. This is required to access the routines from within the **Student[Calculus1]** package. A second test is performed to verify if a hint can be applied to the problem. This is needed to invoke the context-sensitive menu on expressions that are incomplete while in the single-stepping process. The description for this menu is, "Interface to Student[Calculus1]".

Once the class has been defined, you need to design the menu items with respective actions, called **CF_ACTION**. **CF_ACTION** definitions require the following entries:

MenuString	The string that appears in the context-sensitive menu.
HelpString	The text that appears in the bubble help.
CodeType	The type of action.
Code	The action that will be invoked once selected.

```
> CMCalc:=
  CF_CLASS(
    "Key" = "Differentiate",
    "Test" = "type(f, specfunc(anything, Diff))
or evalb(Student:-Calculus1:-Hint(f)<>[NULL])",
    "Description" = "Interface to Student[Calculus1]",

    CF_ACTION(
      "MenuString" = "Hint",
      "HelpString" = "Ask for a hint",
      "CodeType" = "complete",
      "Code" = "Student:-Calculus1:-Hint(f)",
```

```
CF_ACTION(
  "MenuString" = "Undo",
  "HelpString" = "Undo the previous rule",
  "CodeType" = "complete",
  "Code" = "Student:-Calculus1:-Undo(f)",

  CF_ACTION(
    "MenuString" = "Product Rule",
    "HelpString" = "Apply the Product Rule",
    "CodeType" = "complete",
    "Code" = "if nops([Student:-Calculus1:-Rule
[product](f), Student:-Calculus1:-GetMessage()])=1 then
Student:-Calculus1:-Rule[product](f)
else
'Product Rule is not applicable' end if;"
  ):
):
```

The last action requires a procedure as the **Code**. This procedure verifies if the product Rule is applicable to this expression. If not, an error message will display.

Now that the context-sensitive menu definition is complete, we need to build the menu.

```
> CM := buildcontext(CMCalc):
```

Install the context-sensitive menu.

```
> installcontext(CM):
```

Now let's try it out. Right click on the output to display the menu.

```
> Diff(sin(x)*cos(x), x);
```

$$\frac{d}{dx} (\sin(x) \cos(x))$$

```
> if nops([Student:-Calculus1:-Rule[product](Diff(sin(x)*x,x)),
Student:-Calculus1:-GetMessage()]) = 1 then Student:-Calculus1:-
Rule[product](Diff(sin(x)*x,x)) else 'Product Rule is not
applicable' end if;
```

$$\frac{d}{dx} (\sin(x)x) = \left(\frac{d}{dx} \sin(x)\right) x + \sin(x) \left(\frac{d}{dx} x\right)$$

```
> R2 := Student:-Calculus1:-Hint(Diff(sin(x)*cos(x),x));
```

R2 := [product]

Installing your context-sensitive menu, temporarily disables the default menus. Restoring the default menus is done with the **restoredefault** command.

```
> restoredefault();
```

For more information, to edit the default context-sensitive menu, or to see the advanced options available in the **context** package, visit Maple's Help page by entering **?context** at the Maple prompt. 🍌

Four New Books Reviewed



Mathematical Computing with Maple

by D. Betounes and M. Redfern

Mathematical Computing with Maple teaches the basic elements of programming and constructing computer programs within Maple. The programming assignments are based on calculus to reinforce the concepts presented in Calculus courses and encourage the development of technical documentation skills. Betounes and Redfern see *Mathematical Computing with Maple* as a substitute for traditional programming courses such as FORTRAN, Pascal, C, etc., since programming experience is gained from the mathematically oriented programming examples.



Example worksheet illustrating Exponential Smoothing provided on CD-ROM

The motivation behind this course is to expose and make relevant the techniques students learn in a calculus sequence. Maple's ease-of-use programming language, especially in the area of calculus, was the obvious choice of computer algebra systems. This book is designed for sophomore and junior level students majoring in math and science. However, no previous knowledge of Maple or programming experience is required. The CD-ROM contains supplementary Maple code along with related materials and optional exercises.



Statistics with Maple

by J. Rafter, M. Abell, and J. Braselton

Statistics with Maple is a handy reference manual for anyone using Maple for applications of statistical methodology. This book addresses all of the topics presented in an introductory Statistics course, such as calculating numerical summaries, creating graphical displays, and performing statistical inferences. Also included are topics presented in a nonparametric statistics course.



Example worksheet illustrating the step function provided on CD-ROM

Even though this book begins with an introduction to Maple, you will find it much easier to follow with a basic knowledge of Maple and statistics, since some information is provided without detail. This comprehensive reference guide contains a detailed table of contents along with a full index of procedures, tables, examples and more. Over 150 procedures are presented in this book and included on an accompanied CD-ROM to extend Maple's current capabilities in this area.



Advanced Mathematical Methods with Maple

by D. Richards

Advanced Mathematical Methods with Maple provides techniques for deriving solutions to linear and nonlinear differential equations and integrals. Richards starts off with an introduction to Maple before delving into advanced techniques. Over 1000 exercises are incorporated with various degrees of difficulty to help students with the concepts presented. *Advanced Mathematical Methods with Maple* is designed for advanced undergraduates and graduate students of mathematics and physical sciences.



Mathematical Modelling with Case Studies: A Differential Equation Approach Using Maple

by B. Barnes and G. Fulford

Mathematical Modelling with Case Studies addresses basic modelling skills using Maple. Topics include models of single populations, numerical solution of differential equations, formulating models, phase-plane analysis, linearization analysis, solving time dependent problems, an introduction to partial differential equations and more. Students who want to develop some basic modeling skills will find this book useful.

MSW 2003

Maple Summer Workshop™



July 13th – 15th | Wilfrid Laurier University | Waterloo, Ontario, Canada

For More Information – Please visit www.maplesoft.com/msw for details on registration, accommodations, program update and more! To be included on our MSW 2003 update list, please send your request to mswinfo2003@maplesoft.com.

Program Highlights

Hands-on Tutorials - Choose from a number of interactive sessions that are designed to meet the needs of beginner or advanced Maple users.

Maple Tutorial topics include:

- Maple in Mathematics Education
- Advanced Maple Programming
- Programming Maplets
- Maple in the Physical Sciences
- Maple in Learning and Online Assessment

Contributed Sessions - Learn about innovative uses of Maple in education, research and industry from members of the community.

Invited Speakers - Internationally renowned guest speakers will share their extensive knowledge of Maple and related fields.

Guest Speakers Include:

Dr. Douglas Meade
University of South Carolina

Dr. Hiroshi Komatsugawa
Chitose Institute of Science and Technology

Dr. Lawrence F. Shampine
Southern Methodist University

Dr. Paul Thagard
University of Waterloo

Learn - Share

Dear MSW Attendee,

We invite you to experience a community second to none...

Maple is more than a product – it's a community, and the Maple Summer Workshop is a wonderful opportunity to meet some of its most active and passionate members. Unlike many technical conferences, MSW draws a diversity of backgrounds and interests that ensure lively, and stimulating meetings. Add to this mix a healthy dose of well-designed, hands-on training and you have the makings of a highly productive and engaging three days.

This year, in addition to traditionally popular themes such as education, applied research, and physical science, we have also included the theme of e-learning. The delivery of knowledge online is quickly becoming one of the most important trends in education today. The MSW program will offer a range of opportunities for you to learn how your peers and Maplesoft are addressing the challenges of this exciting new world. Part of the focus will be new Maple initiatives such as MapleNet for Web-based math education, and Maple T.A. for automatic testing and assessment.

MSW 2003 is shaping up to be a very rich and dynamic meeting. I invite all of you to join us at Wilfrid Laurier University and to experience the best of Maple.

See you in July!

Tom Lee, Ph.D.
Program Chair, MSW 2003


command the brilliance

57 Erb Street West, Waterloo, Ontario, Canada N2L 6C2
t. 519.747.2373 | f. 519.747.5284
US & Canada: 800.267.6583
info@maplesoft.com | www.maplesoft.com

© Maplesoft, a division of Waterloo Maple Inc. 2003. Maplesoft, Maple, Maplets, MapleNet, Maple T.A., MaplePrimes, Maple Application Center, Maple PowerTools, and Maple Summer Workshop are trademarks of Waterloo Maple Inc. All other trademarks are property of their respective owners.

Distributeur officiel en FRANCE :

INTEGRAL SOFTWARE

1, rue Favart

75002 Paris

Tél. 01 42 46 61 29 - Fax 01 42 46 36 38

info@intesoft.com - www.intesoft.com