Maplesoft Calculus II Package
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Dear Colleagues:

It is our very great pleasure to offer you this package as an aid to teaching the first semester of an introductory calculus course, interactively and dynamically, using Maple as a foundation.

Contents:

1) Interactive Maple note templates

2) Annotated interactive Maple notes with teaching points and Maple demonstrations

3) Homework Problems from Stewart's Calculus Ed. 7

4) A collection of 10 automatically graded assignments using Möbius Assessment, from DigitalEd

5) A Sample Evaluation folder consisting of three sample midterms (scheduled at weeks 4, 7, and 11 of a 12 week semester), a multiple choice question bank with an answer key, and a sample final exam

This is a theoretical course intended primarily for students who need or expect to pursue further studies in mathematics, physics, chemistry, engineering, or computer science. We have a twelve week semester, with three fifty minute classes and one fifty minute lab per week. These materials have been successfully used with classes ranging in size from 12 to 600 students.

Topics:

- inverse functions
- inverse trigonometric functions
- hyperbolic functions
- L'Hôpital's Rule
- techniques of integration
- applications of integration to volumes and arc length
- parametric equations
- polar coordinates
- Taylor and MacLaurin series
- functions of two or more variables
- partial derivatives

Interactive Maple Note Templates

Our students purchase a course manual with note templates (among other resources) set up for 33 classes. (We have 36 scheduled classes. With notes for 33, we have the leeway to accommodate emergencies such as snow days and topics that require more time.) The Maple files of these notes are also made available as a download from our course website, for students who have Maple. The templates are designed so that the structure of the class is in place, but the instructor and the students *do* the math interactively together, filling in the templates, throughout the class. Blessed with two screens, we simultaneously project the Maple file of the notes. When an example is complete, we can execute the Maple command in the electronic file and discuss the program's answer versus our own. More importantly, we can change the Maple question, dynamically exploring in class various "what if" scenarios.

It is important for you to see on screen the layout of the notes as they appear in print. To this end, expand your Maple 'Palettes' in any class file so the page on screen matches the corresponding page in print. To check this, use the 'Print Preview' in Maple to make sure the word wrap matches on screen with the print preview.

Annotated Interactive Maple Notes

For your eyes only, we have included, in red, annotations of these notes. We have tried to keep our annotations generic so that you can easily see our intent, and yet, tailor your annotations to your class. We have also included, in blue, teaching points throughout the notes that highlight strategies we have found successful in our classes.

You will also find a folder called "Demonstrations". This contains Maple coding and examples for various animations to help students understand and visualize challenging topics, such as the formal definition of a limit. Teaching points highlight appropriate times to use these demonstrations and how to implement each particular file.

Möbius Assessment Course Module

We have created a Möbius Assessment course module which contains questions and tests to accompany the course. This content can be downloaded from the [Free Content section of the DigitalEd web site](). Look for Calculus II from the University of Guelph. Almost all questions are algorithmically generated and almost all of these questions have algorithmically generated solutions provided in the question feedback. **These question banks were prepared with student mastery of the material as our paramount goal** (as opposed to grade generation). Think of these tests as 'enforced homework', with 20% of the student final grade being the motivating 'carrot'. Our underlying belief is that students who use Möbius Assessment as intended will succeed.
We provide our students a set of sample Möbius Assessment tests, with solutions.

Sample Midterms, Multiple Choice Question Bank and Sample Final

Included in the folder "Sample Evaluation Materials", you will find Word documents for three sample midterms, a multiple choice question bank with answer key and a sample final exam. (We used Word rather than Maple because test layout is easier to control in Word and we don't need the Maple math engine for these paper tests.)

What's Missing?

If you have access to Möbius Assessment, we believe that this package provides a complete course, with one caveat. Consider, for example, optimization problems. Möbius Assessment is ideal for creating questions using the derivative to classify relative extremes. However, we do not find it a good fit when we are interested in a student's ability to take a typical optimization word problem from defining the variables to a concluding statement. To ameliorate this, we have included the file "Calculus II Homework from Stewart's Calculus Ed. 7" as a PDF for your convenience and a Word file so you can modify the question selection as you see fit. Our plan is to prepare homework questions to complement the online questions where needed, making any reference to an external text unnecessary.

Final Thoughts

While first year calculus is pretty well standardized worldwide, every institution presenting the course will have some variation in content from what we have provided. Please use content from this package appropriate for your course and, in its spirit, create the extra content you need. We encourage you to tailor what we have provided to your needs, respecting, of course, our and Maplesoft's copyright. We also encourage you to submit additional chapters or classes that you have prepared to the Maplesoft Application Centre.

Finally, we would appreciate constructive criticism, suggestions for improvement including topics we should develop, and feedback from your students.

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