Workshops

(in aphabetical order of the presenters)

Josef Böhm (nojo@boehm.pgv.at)

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Make New from Old

We will present a selection of assessment examples which originally generate from traditional "old-fashioned" mathematics teaching. These examples can be changed with little efforts that they become "CAS-compatible", i.e., that they make sense in a CAS-supported teaching and learning environment.

It will be shown that we can transform manipulating centered tasks to problems which demand higher competencies – without being too difficult for the average student.

The participants are invited to use the CAS-platform of their choice (TI-handheld, TI-InterActive or DERIVE – or any other). We will discuss possible pitfalls and problems in preparing and grading the assessments.

boehmws.pdf

Gosia Brothers (gbrothers@ti.com)

Texas Instruments Inc, Dallas
TX, USA
http://education.ti.com/us/product/tech/89ti/features/features.html

New Technology from TI

TI recently began shipping its most powerful graphing calculator: The TI-89 Titanium, which offers new features, preloaded apps and even more versatility. A built-in USB port makes data transfer ultra-convenient. Plus, with three times the memory of the TI-89, you can store more apps data and programs!

The TI-89 Titanium´s advanced functionality and 3-D graphing make problem-solving for AP* advanced mathematics and engineering courses infinitely easier. It is the most powerful TI graphing calculator allowed for use on the AP* Calculus, AP Statistics, AP Physics, AP Chemistry, PSAT/NMSQT**, SAT® I, SAT II, and Math IC and IIC exams. Please come to our workshop to experience this new educational tool.

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MAIN

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Teaching Mathematics by Math-XP

Math-XP is a new and free dynamic geometry system (DGS) with a prover and solver. The prover is a geometry information searching system (GISS). The solver is a computer algebra system (CAS). Unlike the previous software, it can produce the traditional readable proof automatically for a geometry problem or give out the readable solution process for an algebraic problem. It is definite that the readable process is very helpful for the mathematics education in the meaning of pedagogy. This presentation introduces the main functions of Math-XP and demonstrates how to use it in teaching mathematics.

fu.pdf

mathXP-Manual.pdf

Math_XP is in folder \time_soft\mxp-setup. Many thanks to Hongguang Fu and his team to leave this wonderful piece of software for the conference CD. In this folder you can find the Manual as WORD document and as pdf-file as well.

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Exploring Mathematics with the TI-89 Titanium and the Voyage 200

Handheld CAS's now have enough memory combining RAM, archival memory, and flash ram that they now can be loaded with several new tools such as a cell sheet, dynamic geometry, numeric solvers, Symbollic Math Guide, and Calculus Tools. This is in addition to the standard symbollic operations, graphing capabilities, text, list, and data/matrix editors, etc. that already exist on the TI-92 plus and TI-89. In this "hands-on" workshop we will show ways to use this integrated package to assist in the learning of mathematics. We will use the handheld CAS's to demonstrate applications in Elementary and advanced algebra, general interest mathematics, calculus, and statistcs. We will investigate solving polynomial exponential equations, using the Symbollic Math Guide, public key crytography, choosing regression equations, and a symbollic spread sheet.

ellisleinb.pdf

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Programming Line and Multiple Integral with Derive

In this workshop we will use some examples of programming with DERIVE to solve problems of line and multiple integrals. We have developed this kind of workshop with our students of Technical Telecommunication Engineering. After the results obtained we think that programming should be part of the teaching of Mathematics at the undergraduate level.

The main innovative aspect of this way of teaching is that students have an active role. Specifically, they have to elaborate by themselves utility files to solve the typical problems for the different subjects. In our case, this fact implies that the students need to deal with programming in DERIVE, understand the subject and know how to solve typical problems.

The didactical method we will use in the workshop can be resumed in the following two points:

1.- During the first part of the workshop, the conductor will show the participant how to create different macros to solve typical problems of line and multiple integrals, including some graphical utilities to help in the process of resolution.

2.- The second part will be dedicated to help the participants in building additional macros related with this subject. We will give some theoretical aspects in order to make this second part easier to follow.

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The Moore-Penrose Inverse of a Matrix – Computation and Applications

It is well known that the inverse of a matrix A only exists if A is square and nonsingular (i.e. of full rank). However, the unique Moore-Penrose inverse exists for every matrix A, regardless of its dimension and rank.

A DERIVE utility file for the computation of the Moore-Penrose inverse (based on the Greville algorithm) which was presented at the Liverpool DERIVE conference as well as in DNL #50 will be provided to the workshop participants and applied to several numerical examples.

One fundamental application of the Moore-Penrose inverse is its use in solving a system of linear equations Ax = b, where A is an mxn matrix, and b and x are mx1 and nx1 vectors, respectively. If A* denotes the Moore-Penrose inverse of A, the system Ax = b is consistent if and only if AA*b = b. If it is in fact consistent, its general solution can be represented by one simple formula, regardless of the number of solutions.

As a second application, we will show that the Ordinary Least Squares Estimator in the classical Linear Regression Model is simply the product of the Moore-Penrose inverse of the regressor matrix and the vector of observations on the dependent variable.

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