Netbooks and Xcas

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Plan

1. Netbooks versus high-end calculators
2. Xcas: computer algebra system, dynamic geometry and spreadsheet

Current high-end calculators

- Price: 150-200$ (TI89, Voyage 200, Nspire CAS, Casio Classpad, HP50G)
- Functionalities: math only (graphs, computer algebra system, geometry (2-d), spreadsheet, required for calculators to be recruited as math teacher in France)
- Hardware: calc keyboard, half A5 size, <320x240 pixels, black and white, ARM 70Mhz, 1M RAM, 16M storage, 4 AA or AAA batteries
- ON/OFF 1s
- marketsize in France: about 50,000 units/year ; world: maybe 300,000/year? Much more sales around 120$ (TI83+).

Low-end netbooks

- Price: 200-250
- Functionalities: like on a laptop, advanced math software not preinstalled
- Hardware: qwerty keyboard, A5 size (folded), >800x480 pixels, color, x86 >1Ghz or ARM ?, 1G RAM, 8G storage, battery 3-6h-8h capacity, network
- ON/OFF: 20-30s.

Replace high-end calculators ?

- Step 1: Price below 200 $, batteries should last one schoolday, wifi should be easy to disable
- Step 2: Math softwares like Xcas should be preinstalled
- Step 3: Demonstrate to math teachers and get approval from educational community
- The idea of one laptop per child is maturing

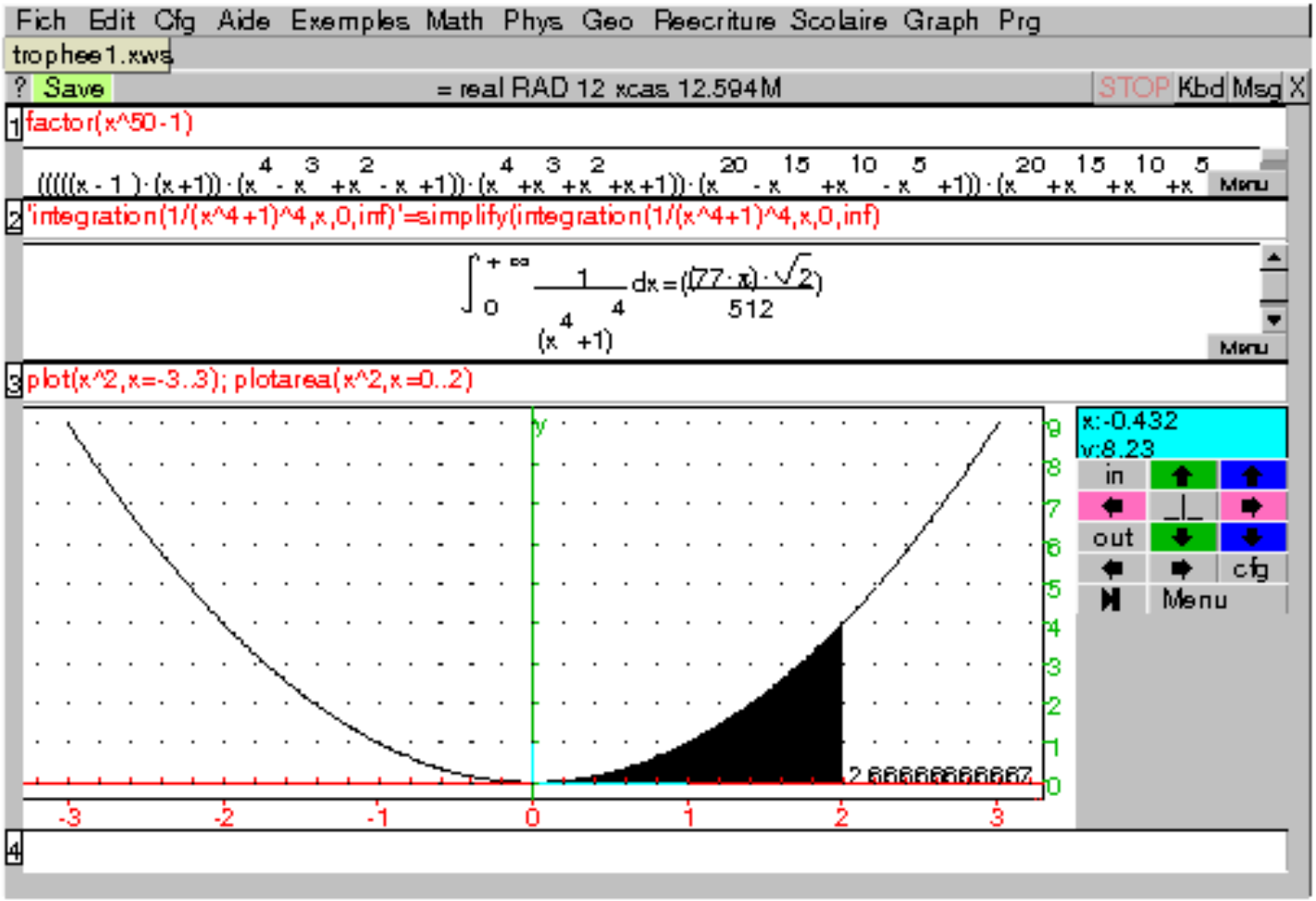
History of Xcas

- 1992-2000: development of the CAS (Computer Algebra System) of the HP calculators (49G, 49G+, 40G, 50G). Not portable and limited.
- 2000-now: development of Xcas, a CAS for PC, portable (Linux, Mac, Windows, Linux ARM and Windows CE), addition of a geometry and spreadsheet module at the request of math teachers.
- 2007: 3rd price awarded at the Trophee du Libre (Free Software Competition) in the scientific software category.

Computer Algebra System

From highschool to university...

- integer arithmetic : primes, GCD, extended GCD, cryptography...
- polynomials: GCD, factorization, fractions, finite fields...
- linear algebra: vectors, matrices, reduction, factorizations
- calculus: derivatives, integration, limits, series, ...
- numeric and symbolic solvers (equations, systems)
- 2-d and 3-d graphs: functions, parametric curves, level curves, ...
- ...


Fich Edit Cfg Aide Exemples Math Phys Geo Reecriture Scolaire Graph Prg
trophee1.xws
? Save
= real RAD 12 xcas 12.594M
STOP Kbd Msg X
1 factor(x^50-1)
Menu
2 'integration(1/(x^4+1)^4,x,0,inf)'=simplify(integration(1/(x^4+1)^4,x,0,inf)
Menu
3 plot(x^2,x=-3..3); plotarea(x^2,x=0..2)
x:-0.432
y:8.23
in
out
cfg
Menu
2.66666666667
4

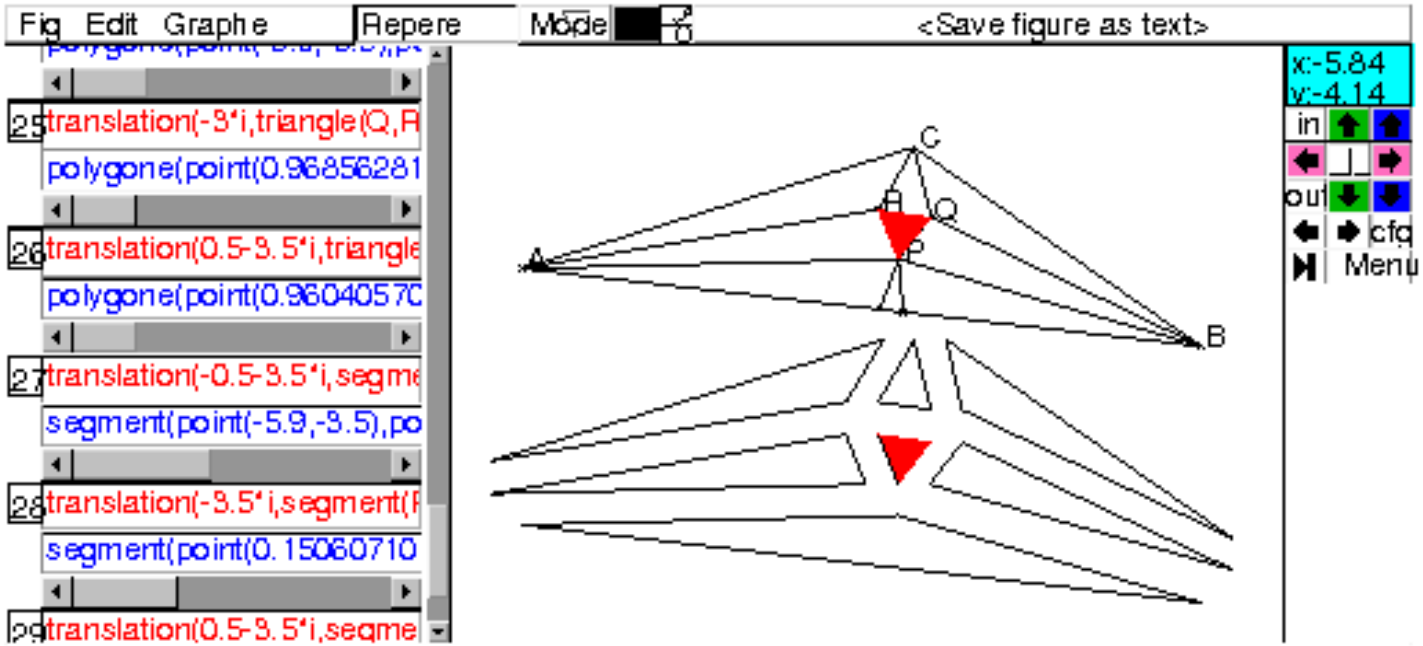
On-line documentation

French and partially in English

- tutorial
- commands by themes in the menus
- command completion
- short help with examples to paste
- more complete help inside the browser
- examples sessions
- exercices
- Internet ressources

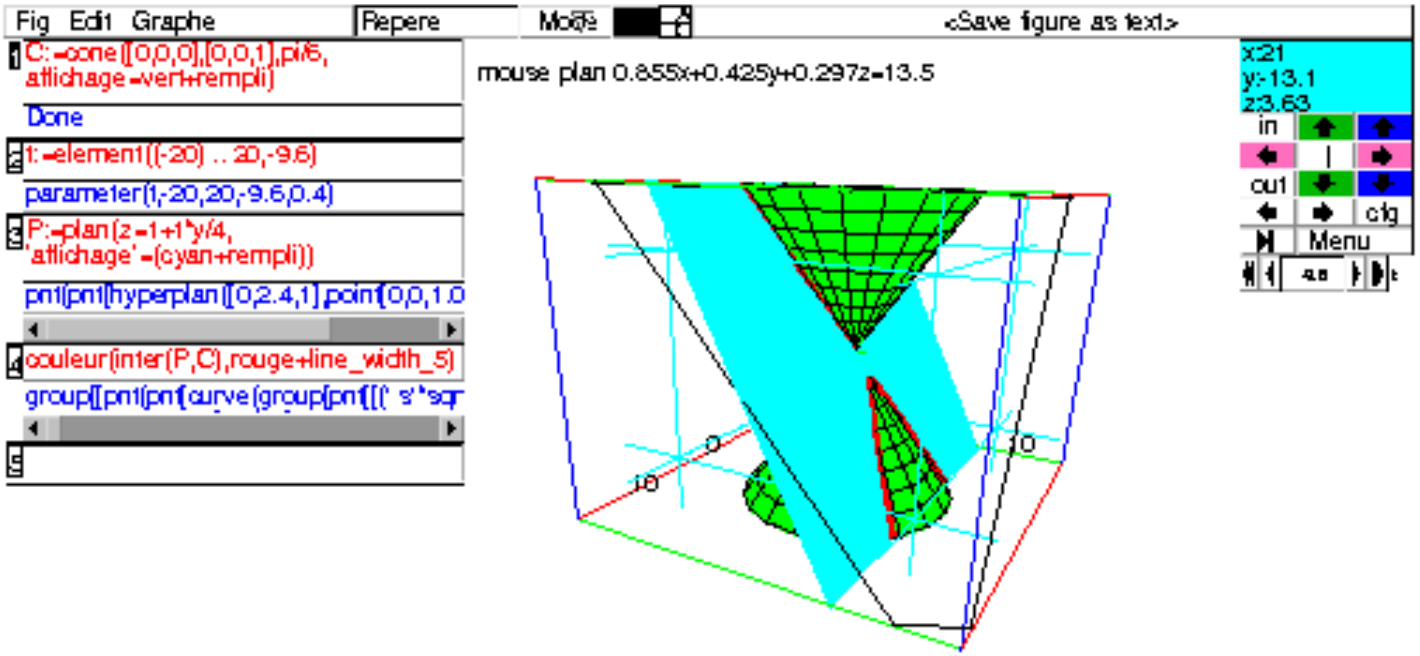
Geometry.

- Make constructions with the mouse or/and by commands
- Interactive figures (pointer mode and parameters)
- In the plane or in the space
- 3-d visualization options inherited from OpenGL
- Analytic proofs of theorems using the CAS



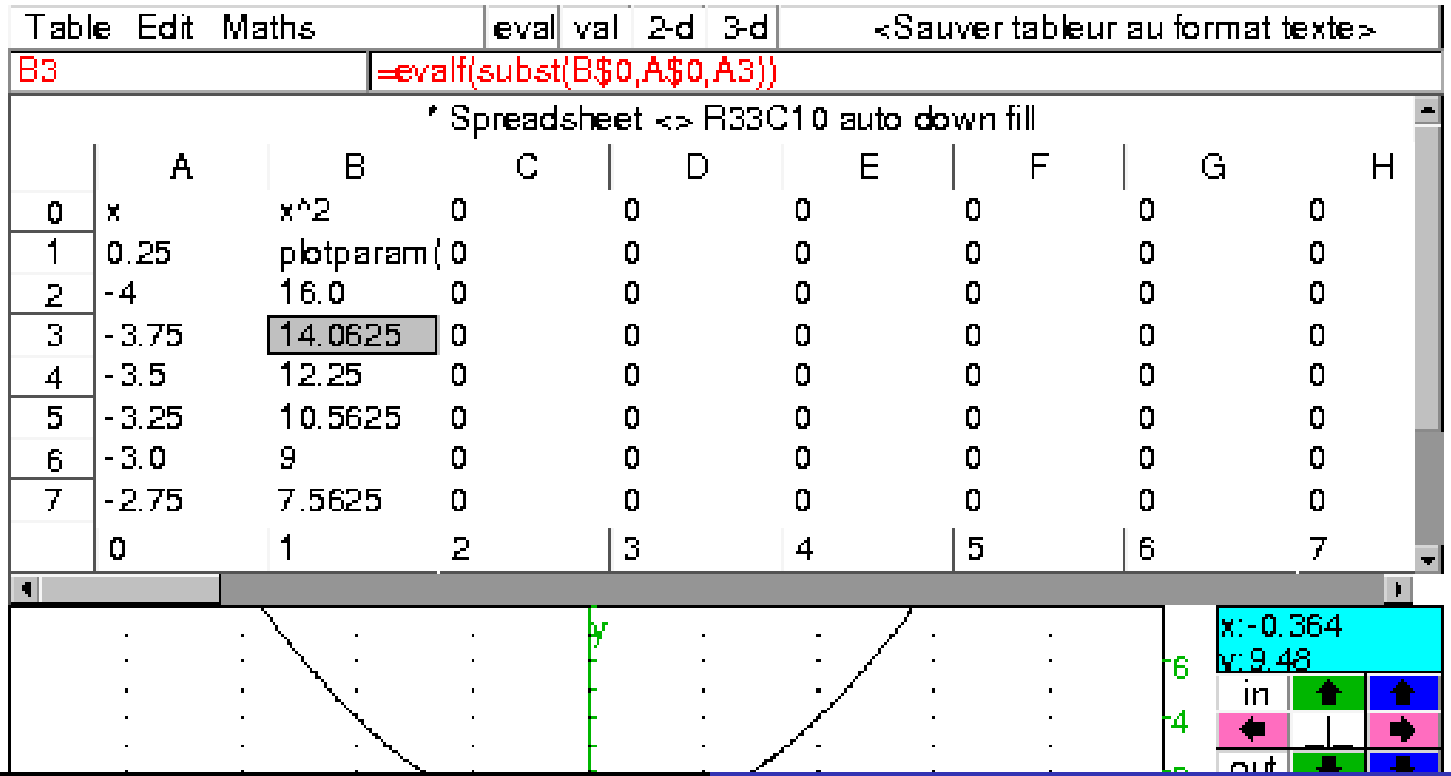
3-d example.

Intersection of a plane and a cone: here an hyperbola



Spreadsheet.

- numeric values for statistics
- cells may have a symbolic value
- cells may have a graphic value
- import/export with other modules



Programmation

- interpreted language, not typed
- syntax choice: Xcas, maple, mupad, TI89.
- interactive debugger