CAS – What's all the fuss?

John Hanna, Teaneck High School, NJ
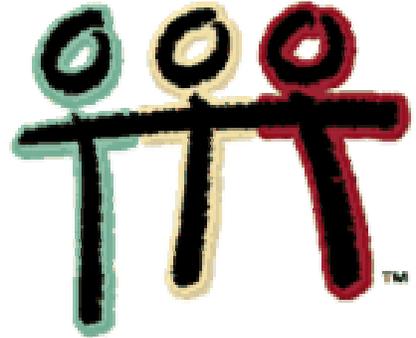jhanna@teaneckschools.org
www.johnhanna.us

MT^2 + T^3 Regional
Ravenwood High School, Brentwood, TN
February 20 - 21, 2004

Getting acquainted:

- TI-83: "think green"
- The **C**omputer **A**lgebra **S**ystem
- **F6**: NewProb
- 'by hand' Algebra
- Close all parentheses ()
- **F2**: Algebra
- **F3**: Calculus
- Use **CATALOG** for *syntax hints*
- Use the **History**
- Editing includes *select, cut, copy, paste, Home, End*
- Save your **Home**work!
- Organize your files

Problems:

- Find, in terms of *m* and *n*, the sum of the reciprocals of the roots of
  $x^2 + mx + n = 0$

- For how many values of *x*, where $10^{-4} < x < 10^4$, is $\log_2(x)$ an integer?

- Solve for *x* to the nearest hundredth: $x^{-1} + x^{-2} = x^2 - 5$

- Solve for x: $\cos(2x) = \sin(x) - 2$ for $0 \le x \le 2\pi$

- Solve for x: $\dfrac{e^x + e^{-x}}{2} = 3, \ x \ge 0$

Web Resources:

- John Hanna: http://www.johnhanna.us
       see 'calculator'
- TI Education: http://education.ti.com
       see Educators' **Classroom Activities (Subscriptions)**
- T^3 – Teachers Teaching with Technology: http://education.ti.com/t3
   see Summer Institutes, Professional Development, and Conferences

Step-by-Step

1. Find, in terms of m and n, the sum of the reciprocals of the roots of $x^2 + mx + n = 0$
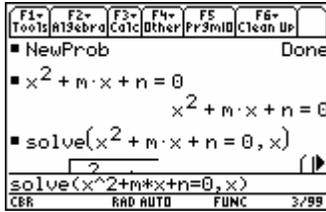
First, start a "NewProb" ([F6] 2:)

Enter the equation to solve *(for later use)*

Use [F2]: **solve(** to solve for *x*: First, put the command down, then go up (⊖)and retrieve ([ENTER]) the equation, then type a *'comma'* and the letter *x*, close parentheses, and press [ENTER] to evaluate the command.
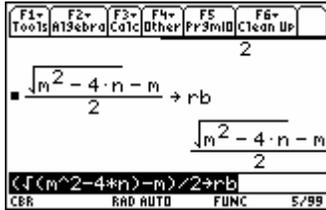
Use copy and editing tools to store the two roots in the variables *ra* and *rb*. Follow the presenter!
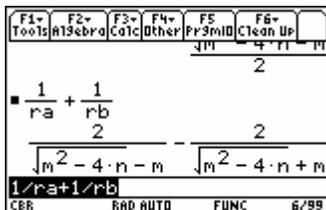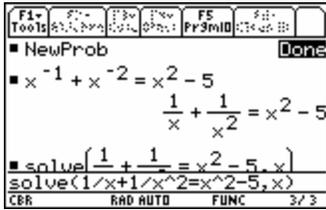
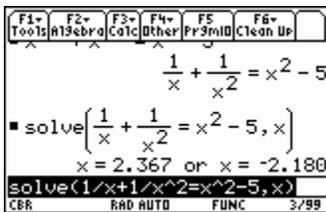Evaluate 1/*ra* + 1/*rb*. Look good? (NO), but it IS right.
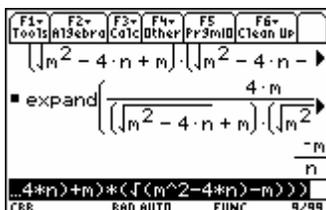
Use [F2]: **expand(** and [F2]:**comDemon(** to simplify the expression. First, put the command down, then go up (⊖)and retrieve ([ENTER]) the last result, then press [ENTER] to evaluate.
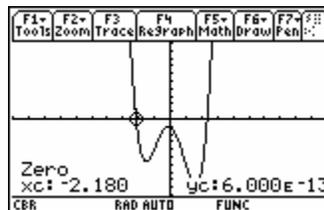
jhanna@teaneckschools.org

2. Solve for x to the nearest hundredth: $x^{-1} + x^{-2} = x^2 - 5$

 F2: Solve(

And the "traditional" method…

jhanna@teaneckschools.org

Miscellaneous screens

1

Numerical

2

Volume of a can

3

Symbolic answers

4

Piecewise graphing

5

Scripting

6

Two graphs

7

Special numbers

8

"simple" algebra

9

"better" algebra

10

More cool algebra tools

11

Simultaneous equations

12

Defining functions

jhanna@teaneckschools.org

Volume of a can:

A tin can is to be constructed in the shape of a cylinder and is to hold 1 liter of chicken noodle soup. Determine the dimensions of the can (radius and height) that minimize the surface area of the cylinder.

`NewProb`

`Define` the formula for the Surface Area of a cylinder (the function to minimize, in terms of *h* and *r*).

Enter the *equation* for the Volume of the cylinder.

`Solve` the Volume *equation* for *h*.

Now replace the *h* in the Surface Area function with its equivalent expression in terms of *r*.

Next…?
　　　　do the math

Prime?

Fermat proposed that $F(x) = 2^{(2^x)} + 1$ is *prime* when x is a *Natural* number. What is the first value of *x* for which this conjecture fails?

Fun stuff

What is the square root of **12345678987654321**?

What is the slope of $y = |x^x|$ at (0, 1)?

Find the area of the largest rectangle that has one side on the positive x-axis and the other two vertices on the function $y = xe^{-x}$

　　　　　　　　　jhanna@teaneckschools.org