

Symbolic manipulation on the TI-92

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Getting started

Note ON and OFF, ENTER, ESC, 2nd and keys.

Adjust the contrast by holding down and pressing – or + to suit the light.

Editing, using the cursor, CLEAR and the backspace key.

Check the set-up, using MODE. Set Pretty Print ON, and set Exact/Approx to AUTO. Press ENTER to confirm choices.

Accessing commands

Many of the symbolic manipulation capabilities of the TI-92 are located in two pull down menus, the Algebra menu and the Calculus menu. In the HOME screen, these can be accessed using the F2 and F3 function key buttons respectively. There are a number of ways of entering commands into the command line:

1. Press a number key to copy a command into the command line, or move to the command with the cursor and then press ENTER.
2. Commands can be typed directly instead of being accessed from the menus. If you already know the syntax, this can sometimes be efficient.
3. Commands can be accessed from the CATALOG (2nd 2). Use the cursor to move to a command. (You can also press a letter to move to the commands starting with the letter.) Notice that the syntax for a command is given at the bottom left of the screen.

Copy the command into the command line by pressing ENTER.

Results

Once appropriate commands are entered into the command line, the command line can be executed using ENTER. The command is then shown on the left of the home screen and the results on the right.

Note the effects of either pressing the cursor to the right or the left immediately after executing a command.

The cursor key can also be used to retrieve previous results or commands. Move up, highlight and then press ENTER to copy into the command line.

If desired, the Home screen can be cleared with F1 and then 8.

Syntax

Each command has its own syntax, which must be followed strictly. In the syntax statements below, and in the help menu, the following abbreviations are used:

EXPR an expression

VAR a variable

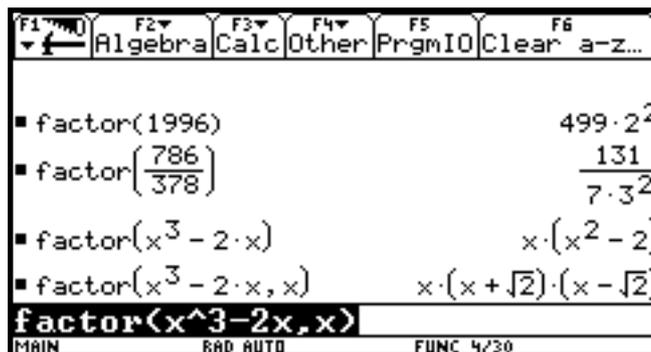
Many commands start with a left parenthesis. Make sure you end with a right parenthesis.

Optional entries are shown in square brackets.

To illustrate, the syntax for **factor** is given as **EXPR[,VAR]**. This should be interpreted as signifying that the syntax for factor commands can be either:

factor(expression) or **factor**(expression,variable)

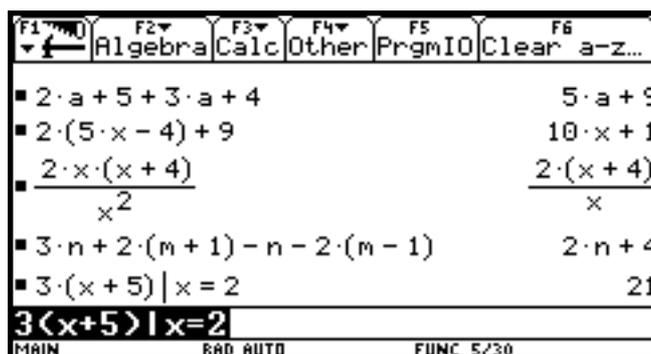
Notice the difference between various uses of the factor command below:



Notice also that an expression can sometimes be a number or even a ratio of numbers. When the optional variable command is included, the TI-92 looks for linear factors with that variable.

Symbolic Commands

Most expressions on the TI-92 will be automatically simplified, with like terms collected and results simplified. The screen below shows some examples of this.



Expressions can also be evaluated by substituting, using the 'with' sign, |, followed by the values to be substituted, as shown above. (The equals sign is just to the right of the spacebar, while the | sign is obtained by 2nd K.) Variables can also be substituted.

The Algebra menu

The screen below shows many of the algebra commands built into the TI-92. The syntax for most commands is shown below, as well as some examples of the effects of using the commands.



solve(EQUATION,VAR)

An equation must have an equals sign, which is next to the space bar. Some inequalities can also be solved.

factor(EXPR[,VAR])

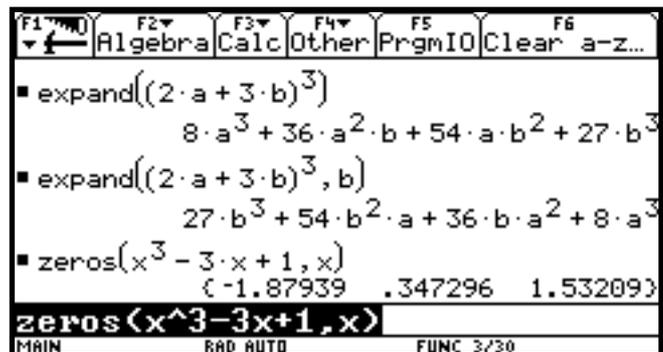
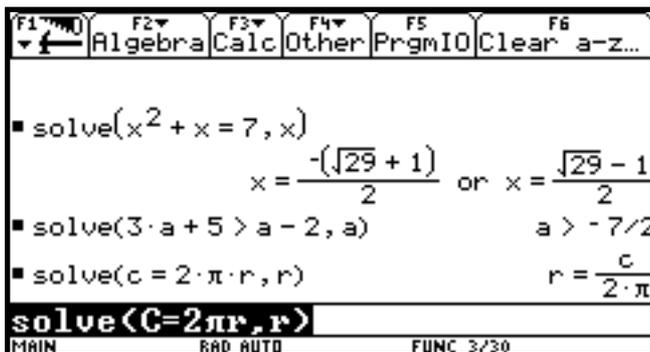
Both expressions and numbers can be factored.

expand(EXPR[,VAR])

Expand and factor are opposite in effect. If a variable is given, the result of the expansion is organised in terms of that particular variable.

zeros(EXPR,VAR)

Finds the set of zeros of an expression, with respect to one of its variables.



comDenom(EXPR[,VAR])

Reorganises an expression to have a common denominator. Opposite to propFrac.

propFrac(EXPR[,VAR][,TOL])

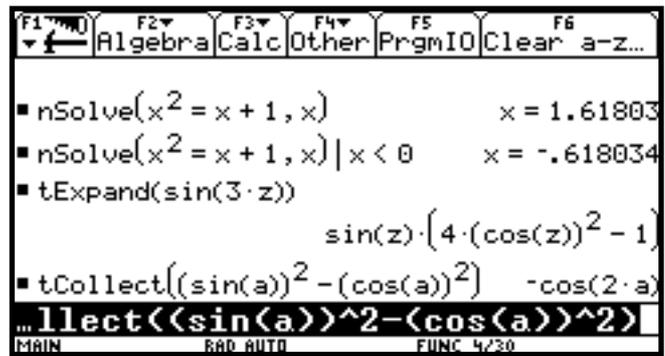
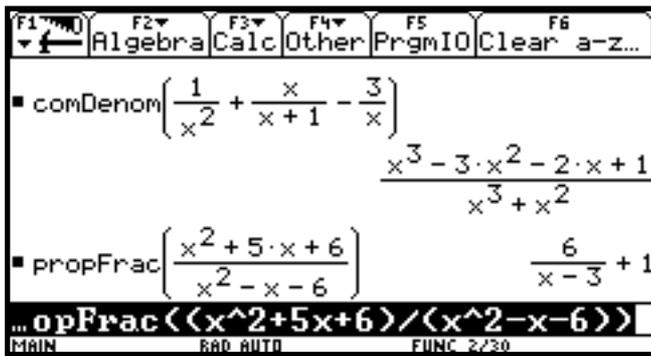
Reorganises a rational expression as a sum of fractions. Opposite to comDenom.

nSolve(EQUATION,VAR)

Finds one approximate solution to an equation.

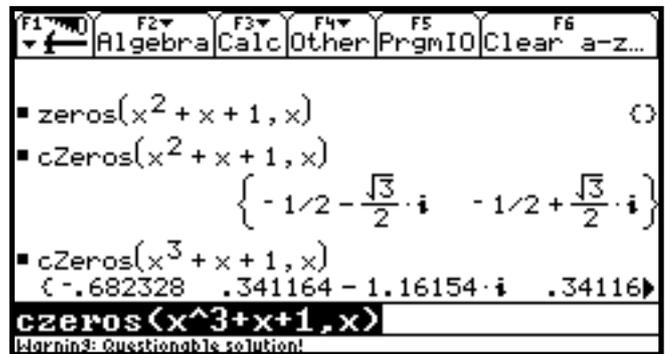
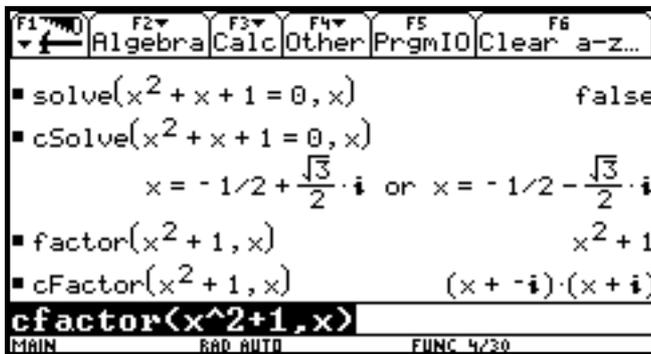
Trig

tExpand(EXPR) and tCollect(EXPR) deal with trigonometric functions, providing results in terms of sines and cosines.



Complex

`cSolve`(EXPR,VAR), `cFactor`(EXPR[,VAR]) and `cZeros`(EXPR,VAR) have similar effects to their real counterparts, but provide results in the complex plane.



The Calculus menu

The screen below shows many of the calculus commands built into the TI-92. The syntax for most commands is shown below, as well as some examples of the effects of using the commands.

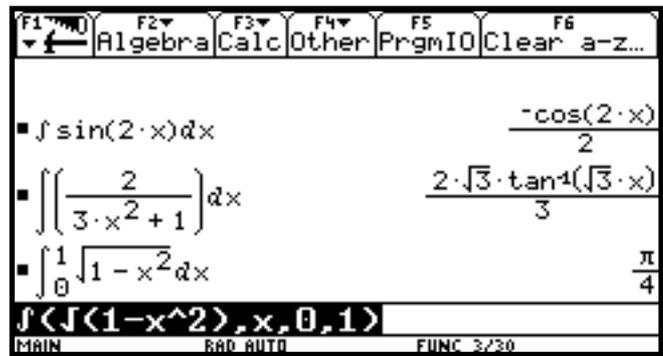
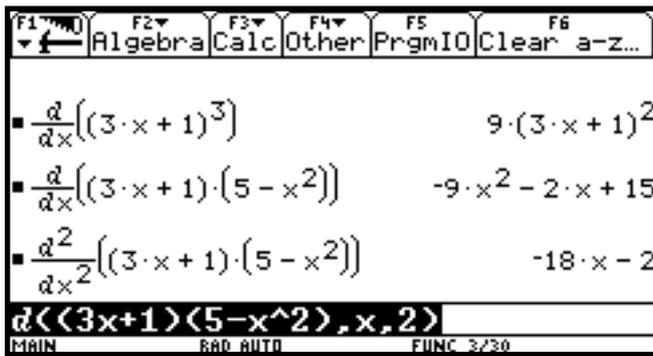


d(differentiate(EXPR,VAR[,ORDER])

Finds the derivative of a function. This command is also available on the main keyboard, with 2nd 8. If the order is omitted, it is assumed to be one.

f(integrate(EXPR,VAR[,LOWER,UPPER])

Finds the integral of a function with respect to a variable. If both limits are omitted, an indefinite integral is given; if only the first limit is given, it is taken to be the constant term.



limit(EXPR,VAR,POINT[,DIRECTION])

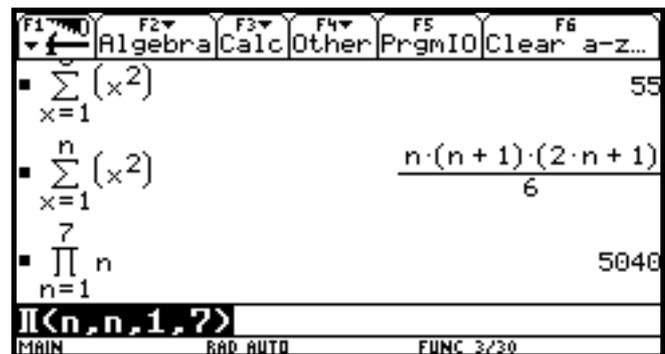
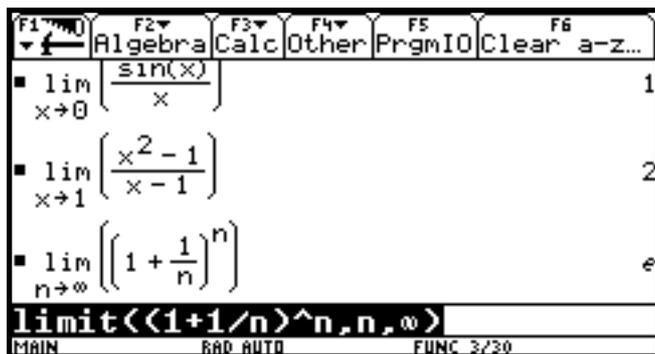
Evaluates limits of functions at particular points. Limits at infinity can be obtained by setting point to be ∞ , using 2nd J. One sided limits can be obtained.

Σ (sum(EXPR,VAR,LOW,HIGH))

Evaluates summations.

Π (product(EXPR,VAR,LOW,HIGH))

Evaluates products.



fMin(EXPR,VAR)

fMax(EXPR,VAR)

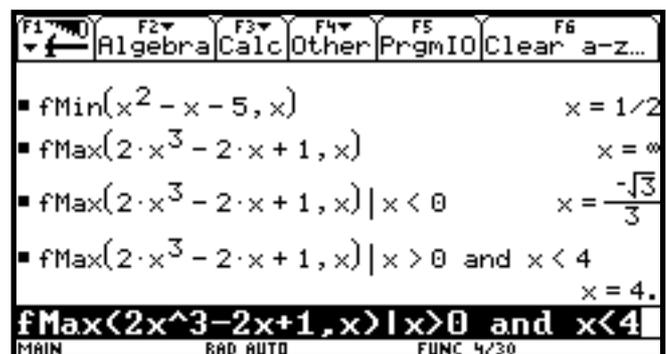
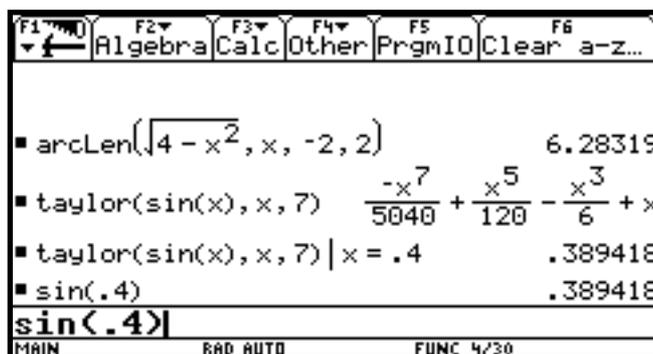
Evaluates the local maximum and minimum values of a function on an interval.

arcLen(EXPR,VAR,START,END)

Finds the arc length along a curve defined by the expression.

taylor(EXPR,VAR,ORDER[,POINT])

Gives a Taylor approximation to an expression using the specified order. If no point is given, it is assumed that the expansion is about zero.



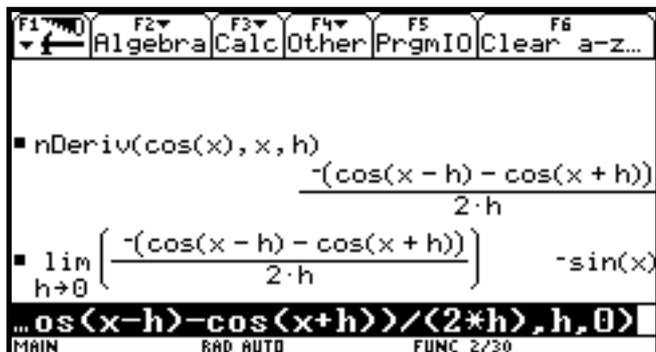
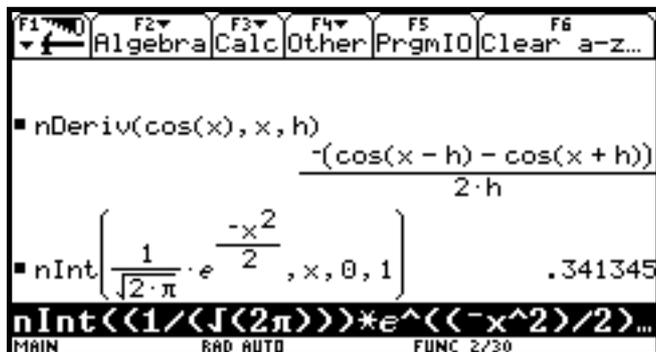
nDeriv(EXPR,VAR[,H])

Gives the numerical derivative as an expression, which can then be manipulated. If the

tolerance H is not specified, it defaults to 0.001.

nInt(EXPR,VAR,LOWER,UPPER

Approximates the value of a numerical integral.



NOTES