# TI-89 Titanium Basics Reference

HOME to return to usual "input" screen from graphing or any other screen.
ESC out of menu choices (or ENTER to choose).

Exact vs. Numeric (approximate decimal)
In the usual mode (AUTO appears at the bottom of the screen),
ENTER will do the computation and simplify in an exact form, with fractions and symbols, if possible.
Green ♦ ENTER will return the decimal value of the computation (displays six digits, computes more).

Input hints
May enter letters (variables) as well as numbers, ENTER will simplify.
Whenever in doubt, use * for multiplication, e.g. x2, x(2) and x(x+1) will cause errors when you mean x*2 and x*(x+1).
    (x2 is a variable name and it thinks that the first x in x(x+1) is a function name)
Use negation, black (−), for one expression; different from subtraction, gray −, between two expressions.
MODE, Angle...... RADIAN        keep it in this mode in calculus (RAD appears at bottom of the screen).
    Compute with degrees by ° (Blue | ) as in sin(30°);  ° converts to radians (so 30° returns $\pi/6$).

Editing input rather than retyping (ease and accuracy)
CLEAR to clear input line.
Up to select any of the last 30 inputs or outputs and press ENTER to put it on input line.
    Full accuracy of all computed digits of a decimal output will show on input line.
Left/Right to move within input line.  Blue 2nd Left/Right to move to beginning/end.
← is backspace erase.
Just type to insert (as long as you don't mess with INS insert setting just as on a computer)

Graphing (just like TI-83 or 84 but look for operations on the F menus at the top)
In the usual mode (FUNC appears at the bottom of the screen),
Y= (Green ♦ F1) allows you to enter & list functions of x; those that are checked will be graphed.
Allows you to define functions y1(x), y2(x),… that can be used anywhere in your calculations, not just for plotting!
WINDOW  (Green ♦ F2) sets plot axes
    ZoomStd to return to the default –10 to 10, -10 to 10.
    ZoomFit to adjust the y scale to show y-values between (manually set) xmin and xmax.
    ZoomSqr to make x and y units the same physical distance (so a circle looks like a circle).
    After zooming, you need to reset  xscl=1 and yscl=1 to put a tick mark every one unit.
GRAPH  (Green ♦ F3) to plot the checked curve(s).
F5 Math menu for max, min, intersection, etc. on a graph.
When tracing points on a graph, Left/Right to move, Blue 2nd Left/Right to move by bigger steps.

Catalog of all functions/operations supplied by TI
CATALOG, press any letter key (look upper right of keys) to go to that letter, while scrolling (Blue Up/Down moves by pages) and immediately after choosing, the bottom of the screen shows the syntax of arguments for the function.

Algebra  on F2 Algebra menu   -- check it out (more on back), for example:
solve(*expr*=*expr*, x) solves for x (where *expr* denotes any expression using x for example, one *expr* may be constant) .
Much algebra simplification doesn't need the menu, just typing in an *expr* and press ENTER.

Calculus  on F3 Calculus menu   -- check it out (more on back), for example:
∫(*expr*, x) will find (symbolic) indefinite integral (where *expr* denotes any expression using x for example).
Remember the comma and variable name before the ending parenthesis on  most commands.

Trouble shooting
Press ON to break out of computation when lower right corner says BUSY too long.
Expect expression and get something crazy?  Maybe x is defined as something when it should be an arbitrary undefined
    variable; try Clear a-z (F6 Clean Up, 1:) and/or make sure you are in MODE, Current Folder, main.
NewProb (F6 Clean Up, 2) will clear home screen, turn off (uncheck) all function and data plots, delete all single-
    character variable names in current folder, and perform a few other clear operations.
Can't figure it out?  Try to keep the steps leading up to it in the history log that keeps the last 30 inputs.  (You can delete
lines you don't want to keep by highlighting them and CLEAR.)  Bring the calculator to your instructor

Some of the useful algebra and calculus commands:

Algebra  on F2 Algebra menu   (below *expr* denotes any expression, using x for example)
Much simplification happens by just typing in an *expr* and pressing ENTER.
factor(*expr*)                        factors
comDenom(*expr*)            forms a common denominator
expand(*epxr*)                    multiplies out or long-divides and does partial fractions (opposite of common denominator)!
solve(*expr=expr*, x)          algebraic solution for x (one *expr* may be constant)
nSolve(*expr=expr*, x=*guess*)         numerical approximation of root nearby the guess
solve(*expr=expr* and *expr=expr* and *expr=expr*, {x,y,z})        CUSTOM (Blue 2$^{nd}$ HOME), F3 menu

Calculus  on F3 Calculus menu   (below *expr* denotes any expression, using x for example)
limit(*expr*, x, a)             limit as x approaches a
d(*expr*, x)                     symbolic derivative
∫(*expr*, x)                      (symbolic) indefinite integral
∫(*expr*, x, *a*, *b*)              exact definite integral (found symbolically if possible)
nInt(*expression*, x, *a*, *b*)   numerical approximation of definite integral

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