

TI-89 Reference Chart

Editing Features

The TI-89 has editing features much like a word processor. It is normally in insert mode, meaning that if you place the cursor between two characters and type a new character, it will push the existing characters to the right and insert the newly typed one. To put the calculator in overwrite mode press $\boxed{2^{\text{nd}}}$ $\boxed{\leftarrow}$. Pressing $\boxed{2^{\text{nd}}}$ $\boxed{\leftarrow}$ a second time restores the calculator to insert mode.

It can copy and paste an entry from almost anywhere to the Entry line of any screen. First highlight the portion to be copied by holding down the $\boxed{\uparrow}$ shift key while moving the cursor across the portion to be copied. Then press COPY. Move the cursor to the desired new location and press PASTE.

The $\boxed{\leftarrow}$ backspace key deletes one character to the *left* of the cursor on the entry line. If an entry is highlighted, it deletes the entire highlighted portion of the entry. Pressing $\boxed{\blacklozenge}$ $\boxed{\leftarrow}$ will delete one character to the *right* of the cursor.

If the cursor is on the far *right* end of the Entry line, pressing CLEAR will clear the *entire* Entry Line. If the cursor is anywhere else in the Entry Line, pressing CLEAR will clear everything to the *right* of the cursor. If an entry is highlighted, pressing CLEAR will clear the highlighted data only.

When typing text, you can type capital letters by first pressing the shift key $\boxed{\uparrow}$ and then the desired letter.

To select an entry from the Catalog, press CATALOG. Then press the first letter of the item desired. (Do not press *alpha* before the letter.) That will jump the cursor to items in the catalog beginning with that letter (which saves you from scrolling down through a very long list).

Warnings

You must learn to watch for improper results caused by a variable or function being defined by a previous operation or program. A good habit to develop is to press F6 Clear a–z ENTER before beginning a problem solving session on the calculator. That will delete all values previously assigned to variables or functions.

Batteries

The calculator uses four AAA batteries. Before changing batteries, be sure that the calculator is turned off. Open the access panel in the back and remove *one* old battery. Replace it with *one* new battery. Remove the next old battery and replace it with a new battery. Repeat this process until all four batteries are replaced.

To adjust the brightness of the screen, press $\boxed{\blacklozenge}$ $\boxed{-}$ or $\boxed{\blacklozenge}$ $\boxed{+}$. When the batteries get very low, the status line will show the warning *BATT*.

Changing the Settings

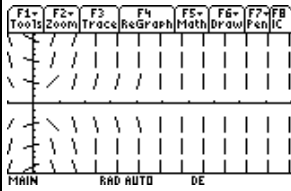
Setting Choice	Menu Location
Decimal/Scientific notation	MODE Exponential Format ▶
Radians/Degrees	MODE Angle ▶
Metric/English units of measure	MODE F3 Unit System ▶
Number of displayed digits	MODE Display digits ▶
Number of entries remembered in the home screen.	F1 Format History Pairs ▶
Function/Polar/Parametric graphs	MODE Graph ▶
Exact/Approximate answers to calculations	MODE Exact/Approx ▶
Full/Split screen	MODE Split Screen ▶
Turn all data plots off	Y= F5 Data Plots Off
Turn all function graphs on/off	Y= F5 Functions On (or off)
Rectangular/Polar coordinates	GRAPH (or Y=) F1 Format ▶ Coordinates ▶
Grid on/off on graph	GRAPH (or Y=) F1 Format ▶ Grid ▶
Axes on/off on graph	GRAPH (or Y=) F1 Format ▶ Axes ▶

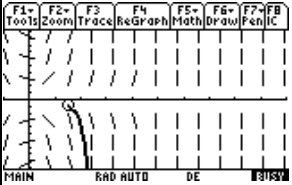
Calculations - Starting from the HOME screen

Action Desired	Example Problem	Example Input	Example Output
Add (or subtract) two algebraic fractions.	Add $\frac{x-2}{x} + \frac{5}{x+3}$.	F2 ComDenom((x-2)÷x+5÷(x+3)) ENTER	$\frac{x^2+6x-6}{x^2+3x}$
Find absolute value of an expression.	Find $ 8^2-100 $.	2 nd 5 (MATH) Number ► Abs(8^2-100) ENTER	36
Approximate an expression.	Approximate $\sqrt{5}$.	$\sqrt{(5)}$ ◆ENTER	2.23607
Clear the home screen <i>history</i> .		F1 Clear Home	
Define a function.	Define $f(x) = 2x^2$.	$f(x) = 2x^2$ ENTER	$f(x) = 2x^2$
Find a definite integral .	Evaluate $\int_1^2 x^2 dx$.	\int $x^2, x, 1, 2)$ ENTER	$\frac{7}{3}$
Delete a <i>variable</i> value.	Suppose that a previous calculation has assigned the value 8 to y. Delete the value assigned to y.	F4 DelVar y	Done
Delete a <i>function</i> .	Suppose that a previous calculation has defined the function $f(x)$ to be $f(x) = 2x^2$. Delete the expression assigned to $f(x)$.	F4 DelVar f	Done
Find derivative of a function with respect to x.	Differentiate $y = 3x \sin x$. Notice the multiplication sign in the entry line.	d (2 nd 8) $3x * \sin(x), x)$ ENTER	$3x \cos(x) + 3 \sin(x)$

Find a derivative of a function with respect to x and evaluate the derivative at a <i>particular point</i> .	Find the derivative of $y = 3x^2$ at the point $(1, 3)$.	d $3x^2, x) x = 1$ ENTER (2 nd 8)	6
Find a derivative of a function y defined <i>implicitly</i> in terms of x .	Find the derivative implicitly of the relation $xy^2 - 4x = 5y$.	d $x*(y(x))^2 - 4x = 5y(x), x) E$ NTER (2 nd 8)	$2y(x) \frac{d}{dx}(y(x))_{x+\triangleright}$ $(y(x))^2 - 4 = 5 \triangleright$ $\frac{d}{dx}(y(x))$
Find a difference quotient of a function over the interval $[x, x + h]$.	Find the difference quotient of $y = x^2$ over the interval $[0.9, 1.1]$.	CATALOG A (do not press alpha) avgRC($x^2, x, 0.2) x = 0.9$ ENTER	2
Factor an expression in terms of x .	Factor $x^2 - 5x + 6$.	F2 factor($x^2 - 5x + 6, x)$ ENTER	$(x - 3)(x - 2)$
Find an indefinite integral .	Find $\int \cos x \, dx$.	\int $\cos(x), x)$ ENTER (2 nd 7)	$\sin(x)$
Find a limit at a <i>finite value</i> .	Find the limit of $\lim_{x \rightarrow 2} \frac{4+x}{3}$.	F3 limit($(4+x) \div 3, x, 2)$ ENTER	2
Find a limit as x goes to <i>infinity</i> .	Find the limit of $\lim_{x \rightarrow \infty} \frac{1+x}{x}$.	F3 limit($(1+x) \div x, x, \infty)$ ENTER	1
Find the x value where a function has an <i>absolute maximum</i> .	Find the x value of the absolute maximum of the function $y = -x^2 + x$.	F3 fMax($-x^2 + x, x)$ ENTER	$x = \frac{1}{2}$
Find the x value where a function has a <i>relative maximum</i> .	Find the x value of the relative maximum of the function $y = x^3 - x$ in the interval $[-1, 1]$.	F3 fMax($x^3 - x^2, x) x > -1$ and $x < 1$ ENTER Note: The "and" is found in the CATALOG.	$x = 0$

Find the x value where a function has an <i>absolute minimum</i> .	Find the x value of the absolute minimum of the function $y = x^2 + x$.	F3 fMax($x^2 + x, x$) ENTER	$x = -\frac{1}{2}$
Find the x value where a function has a <i>relative minimum</i> .	Find the x value of the relative minimum of the function $y = x^3 - x$ in the interval $[0, 3]$.	F3 fMax($x^3 - x^2, x$) $x > 0$ and $x < 3$ E NTER Note: The "and" is found in the CATALOG.	$x = 4/3$
Enter a piecewise defined function.	Enter $y = \begin{cases} x+2 & x \leq 4 \\ x^2 & x > 4. \end{cases}$	CATALOG W (do <i>not</i> press alpha) When($x \leq 4, x+2, x^2$) ENTER	$\begin{cases} x+2, & x \leq 4 \\ x^2, & \text{else} \end{cases}$
Simplify an improper fraction.	Simplify $\frac{x^2 - 4}{x}$.	F2 propFrac($(x^2 - 4) \div x$) ENTER	$x - \frac{4}{x}$
Solve one equation in terms of x for a numerical solution in <i>exact</i> form.	Solve $x^3 - 2x = -1$.	F2 solve($x^3 - 2x = -1, x$) ENTER	$x = \frac{-(\sqrt{5}+1)}{2}$ or $x = \frac{(\sqrt{5}-1)}{2}$ or $x = 1$
Solve one equation in terms of x for a numerical solution in <i>decimal</i> form.	Solve $x^3 - 2x = -1$.	F2 solve($x^3 - 2x = -1, x$) ◆ENTER	$x = 1$ or $x = .618034$ or $x = -1.61803$
Solve one equation with <i>multiple variables</i> for y .	Solve $2xy - y^2 = 8x$. Notice the multiplication sign in the entry line.	F2 solve($2x * y - y^2 = 8x, y$) ENTER	$y = x - \sqrt{x}\sqrt{x-8}$ or $y = \sqrt{x}\sqrt{x-8} + x$
Solve a <i>system</i> of equations.	Solve the system $y - x^2 = -4$ and $2x - y = 1$.	F2 solve($y - x^2 = -4$ and $2x - y = 1, \{x, y\}$) ENTER Note: The "and" is found in the CATALOG.	$x = 3$ and $y = 5$ or \triangleright $x = -1$ and $y = -3$

<p>Solve a differential equation where y is a function of x, to obtain a <i>general</i> solution.</p>	<p>Solve $y' = 5y$.</p> <p>Note: The expression y' is only meaningful when using the deSolve command.</p>	<p>F3 deSolve($y' = 5y, x, y$) ENTER</p>	<p>$y = @1e^{5x}$</p> <p>Note the expression @1 means a constant C_1. Each time it displays a new constant it chooses the next integer value, so it may give you @2, meaning C_2. The numbering of constants is reset to 1 when you use ClrHome.</p>
<p>Solve a differential equation where y is a function of x, to obtain a <i>particular</i> solution.</p>	<p>Solve $y' = 5y$ where $y(2) = 4$.</p> <p>Note: The expression y' is only meaningful when using the deSolve command.</p>	<p>F3 deSolve($y' = 5y$ and $y(2) = 4, x, y$) ENTER</p> <p>Note: The "and" is found in the CATALOG.</p>	<p>$y = 4e^{5x-10}$</p>
<p>Solve a differential equation where y is a function of t to obtain a <i>slopefield</i> only.</p>	<p>Solve $y' = 2yt$</p> <p>Play close attention to the entry form.</p> <p>Note that the independent variable MUST be t. Do not use x.</p>	<p>MODE Graph/DIFF EQUATIONS ENTER Y= (move cursor to y1') ENTER $2y1*t$ ENTER F1 FORMAT Coordinates/RECT Solution Method/RK Fields/SLPFLD ENTER GRAPH</p>	

<p>Solve a differential equation where y is a function of t to obtain a graph of a particular solution and a <i>slopefield</i>.</p>	<p>Solve $y' = 2yt$ with $y(1.5) = -0.8$</p> <p>Play close attention to the entry form.</p> <p>Note that the independent variable must be t. Do not use x.</p>	<p>MODE Graph/DIFF EQUATIONS ENTER Y= Move cursor to $y1'$ ENTER $2y1 * t$ ENTER Move cursor to $t0$ ENTER 1.5 ENTER Move cursor to $y1$ ENTER -0.8 ENTER F1 FORMAT Coordinates/RECT Solution Method/RK Fields/SLPFLD ENTER GRAPH</p>	
<p>Evaluate a summation.</p>	<p>Evaluate $\sum_{x=1}^8 \frac{2}{x}$.</p>	<p>F3 $\Sigma ($ $2 / x, x, 1, 8)$ ENTER</p>	<p>$\frac{761}{140}$</p>

Graphing - Starting from the GRAPHING screen

Action Desired	Example Problem	Example Input	Example Output
View the area under a graphed curve and find the integral over that interval.	View the area under the graphed curve $y = x^3$ and find the integral on $[-1, 1]$.	F5 $\int f(x)dx$ -1 ENTER 1 ENTER	$\int f(x)dx = 0$
Draw a circle .	Draw a circle with center at $(-1, 3)$ and radius 2.	HOME CATALOG C (do <i>not</i> press alpha) Circle -1, 2, 3	Graphs a circle with requested center and radius.
Draw a circle .	Draw a circle with center at approximately $(-1, 3)$ and radius 2.	F7 Circle Move cursor to desired location for center. ENTER Move cursor desired distance for radius. ENTER	Graphs a circle with requested center and radius.
Find an inflection point on a graphed curve.	Find an inflection point on the graph of $y = x^3 - 2x^2$.	F5 Inflection Move cursor to left of point of inflection ENTER Move cursor to right of point of inflection ENTER	$xc = 1.66666667$ $yc = -.5925926$
Find the intersection of two graphed curves.	Find the intersection of the graphed curves $y = x^2 - 4$ and $y = 2x - 1$.	F5 Intersection ENTER to accept indicated 1 st curve ENTER to accept indicated 2 nd curve Move cursor to left of desired point of intersection ENTER Move cursor to right of desired point of intersection ENTER	$xc = 3$ $yx = 5$

Draw the inverse of a function.	Draw the inverse of the function $y = x^2$.	F6 DrawInv x^2 ENTER	Graphs the horizontal parabola $x = y^2$.
Find a relative maximum on a graphed curve.	Find a relative maximum on the graphed curve $y = x^3 - 2x^2$.	F5 Maximum Move cursor to left of zero ENTER Move cursor to right of zero ENTER	$x_c = 0$ $y_c = 0$
Find a relative minimum on a graphed curve.	Find a relative minimum on the graphed curve $y = x^3 - 2x^2$.	F5 Minimum Move cursor to left of zero ENTER Move cursor to right of zero ENTER	$x_c = 1.333333$ $y_c = -1.185185$
Find the slope of a graphed curve at a point.	Find the slope of the graphed curve $y = x^2 - 4$ at $x = 3$.	F5 Derivative ► $\frac{dy}{dx}$ 3 ENTER	$\frac{dy}{dx} = 6$
Find and graph a tangent line to a graphed curve.	Find and graph the line tangent to the graphed curve $y = 3x^2$ at $(1, 3)$.	F5 Tangent 1 ENTER	Tangent line is graphed and its equation, $y = 6x + 3$, is printed at the bottom left corner of the graphing window.
Find a zero on a graphed curve.	Find a zero on the graphed curve $y = x^3 - 2x^2$.	F5 Zero Move cursor to left of zero ENTER Move cursor to right of zero ENTER	$x_c = 2$ $y_c = 0$

Programs - Starting from the HOME screen

Action Desired	Example Problem	Example Input
Delete a program.	Delete the program <i>integrat</i> stored in the CALCULUS folder.	VAR-LINK Move the cursor so that <i>integrat</i> is highlighted F1 Delete ENTER
Edit a program.	Edit the program <i>diffquot</i> stored in the CALCULUS folder.	APPS Program Editor Open Folder: Choose calculus Variable: Choose <i>diffquot</i> ENTER
Begin a new program .	Begin a new program to be named <i>integrat</i> and store it in the CALCULUS folder.	APPS Program Editor New Folder: Choose calculus Variable: type <i>integrat</i> ENTER ENTER
Create a new folder for programs.	Create a new Folder called MATHANAL.	VAR-LINK F1 Create Folder Folder: type <i>mathanal</i> ENTER ENTER
Rename a program.	Rename the program <i>integrat</i> to <i>oldinteg</i> .	VAR-LINK Move the cursor so that <i>integrat</i> is highlighted F1 Rename To: type <i>oldinteg</i> ENTER ENTER
Run a program.	Run the program DIFFQUOT.	VAR-LINK DIFFQUOT ENTER) ENTER
Stop the execution of a program that is in progress.		ON ENTER F5
Toggle back and forth between the Home screen and the Program screen.		F5 F5

