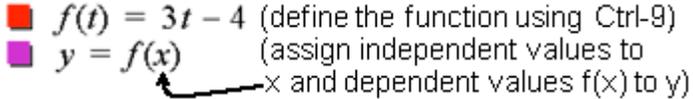
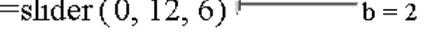


GC (Windows) for Calculus 1

	HOW TO...	KEYS TO PRESS
GRAPHING	Draw graph	Type $y=$ equation, then press Enter
	Display a dot at the point (x, y)	Ctrl-2 & fill in $\begin{bmatrix} x \\ y \end{bmatrix}$
	Graph with function notation	Two lines. Example: 
	View two graphs side by side	Use y and x on one line, and y' and x' on the other
	Graph in polar coordinates	Above instructions, but use r and θ instead of x and y
GRAPH VIEW	Change color or make invisible	Click & hold on colored box, choose color or <input type="checkbox"/> for invisible
	Zoom in or out	 in lower left corner
	Zoom in or out only on x-axis or y-axis	Ctrl-  for x-axis. Shift-  for y-axis.
	Zoom in on a point in the graph	Ctrl-click-drag a rectangle around the point.
	Move graph sideways/up/down manually	Grab x-axis or y-axis and drag (must grab an <u>axis</u>)
	Reset graph to center on origin	Ctrl-r
	Set exact graph size	Graph menu → Set 2D range
	Take axes on or off	Graph menu → Draw axes
SYMBOLS & FUNCTIONS	exponent	Shift-6 or ^
	$\sqrt{\quad}$ (root)	Ctrl-Shift-r
	Get out of exponent or root	Right arrow
	$\sqrt[3]{\quad}$ or $\sqrt[4]{\quad}$ or...	Write as fractional exponent: $\sqrt[3]{x} = (x)^{1/3}$, $\sqrt[4]{x} = (x)^{1/4}$ etc.
	\leq or \geq	Ctrl-Shift-, (comma) or Ctrl-Shift-. (period)
	\neq (not equals)	Ctrl-Shift-n
	π (≈ 3.14) or e (≈ 2.718)	Type "pi" or "e"
	Δ (delta)	Use capital D, like string "Dx" (Can't type Δ on PC)
	θ	Type "theta"
	String (of letters). Example: "Cost"	\Cost\ (both \ will disappear!) [\ is above Enter on keyboard]
	sin, cos, tan, csc, sec, cot...	Type "sin" "cos" "tan" "csc" "sec" "cot" etc. then Shift-9
	\sin^{-1} , \cos^{-1} etc.	Type "asin" "acos" "atan" etc. then Shift-9
	$\lfloor \rfloor$ (floor) or $\lceil \rceil$ (ceiling)	Type "floor" or "ceil" (for ceiling)
	r_i (subscript)	Ctrl-L
\in (is an element of) or ... (an "ellipsis")	Ctrl-Shift-e or Ctrl-; (semicolon)	
Σ (sum) or \int (integral) or $\frac{d}{dx}$ (derivative)	Ctrl-Shift-s or Ctrl-Shift-i or Ctrl-Shift-d	
OTHER	Start a new command line	Ctrl-Enter
	Start a new text (or notes) line	Ctrl-t
	Function notation like $f(x) =$	f Ctrl-9 x =
	Choosing a letter for variable/parameter	Only use x, y, r, θ for graphs, and n for the animation slider. Also t, u, v, w, z, e (≈ 2.718), and i ($\sqrt{-1}$) are for special use.
	Limit domain or range	After $y=$ & comma. Example:  $y = 3x, -2 < x \leq 4$
	Write a piecewise function definition	Ctrl-Shift-a to get { . Type "if" to write if. Example:  $y = \begin{cases} x^2 & \text{if } x < 5 \\ 3x + 10 & \text{if } x \geq 5 \end{cases}$
	Make a slider	Type "=slider(a,b,c)":  $b = \text{slider}(0, 12, 6)$  $b = 2$ Here b varies from 0 to 12 in 6 steps (so 0, 2, 4, 6, 8, 10, 12)
	Set animation  slider options	Click on  in the slider at the bottom
	Make animation  only play forwards	Ctrl-click on  in the slider at the bottom
	Put something typed in () or numerator	Highlight what you want inside, then type (or /

	IF...	TRY...
COMMON PROBLEMS	Error: "A condition after the comma is not appropriate here"	
	Error: "Curve is outside the region shown"	Zoom out (to look at a bigger region)
	Error: "Undefined in the domain shown"	Make sure the lower bound of the domain isn't higher than the upper bound. Example: $3 < x < 2$ means x can't be anything!
	My graph isn't showing!	If you defined a function like $z(g)$, write $y=z(x)$ on another next command line
	I tried to graph with function notation, and it is not working! Or it's just a flat line!	Make sure you <u>always</u> set x as the independent variable in the parentheses: $y = f(x)$ even if the dep. value is $f(k)$.
	My domain restriction isn't showing on graph!	If it's on the function definition line, move it to the $y=$ line. Don't forget to change the variables to all x and y !
	It says my variable equals 1!	That's okay, if you haven't given your variable a value it assumes 1. Ignore that and go on!
	When I press  on the  slider, the animation goes too fast/slow!	Click on  and change "Number of Steps" to be a much bigger number (to slow it down) or a much smaller number (to speed it up).
	I want to type a fraction but it's messing up! Ex: I want $\frac{4+6}{3}$ but I get $4 + \frac{6}{3}$!!	Highlight what you want in the numerator, then type $/$.
I'm not sure I understand GC well enough for the test.	<p>The point of our class is NOT to learn GC, but to use GC to help us explore and learn ideas of <i>calculus</i>!</p> <p>We use GC because it uses mathematical language exactly the same as what we write on paper (especially function notation).</p> <p>This way we can avoid having to learn a "programming language" but still have the benefits of computer displays and animation.</p>	

*Anything in red is different between Apple & Windows