

TI-nSpire™ CX CAS Handheld

Damonte Ranch High School

August 9, 2021

Three Keyboard Sections

Navigation Keys

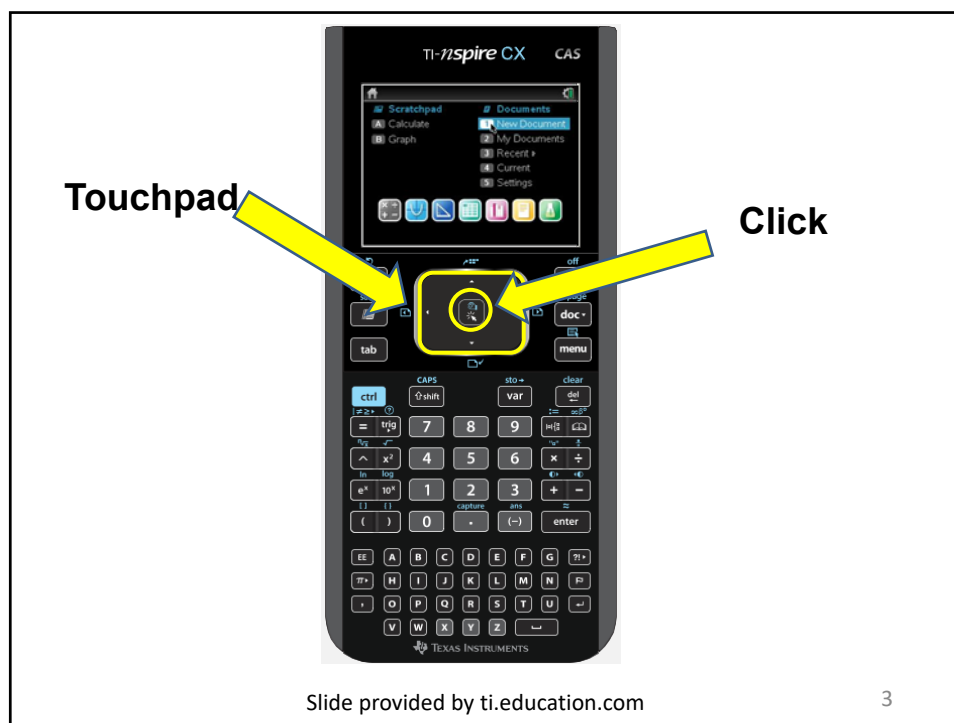
Alphabetic region of the keyboard

Numeric region of the keyboard



Slide provided by ti.education.com

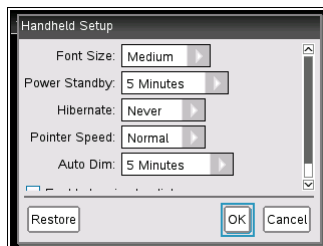
2



Handheld Setup

Type: 5 3

Calculator shows:



Scroll through and adjust the settings to your liking.

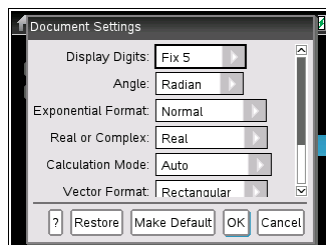
Click on when you are done.




Calculator Settings

Type:  5 2

Calculator shows:





Scroll through and adjust the setting to your liking.

Click on  when you are done.



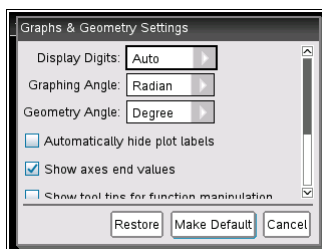
5

Graph (and Geometry) Settings


Go to the Graph Page of the Scratchpad: Hit  

Type:  8

Calculator shows:




Scroll through and adjust the settings to your liking.

Click on  when you are done.

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Some Very Important Keys



 - to turn the handheld on or to go to the home screen

  - to turn the handheld off

 - to get out of a menu or the current screen

  - to undo your latest action

 - often acts like a “right click” does on a PC, bringing up a context menu with options to choose from

  - clear the current input line

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Trigonometric

sin	cos	tan	csc	sec	cot
sin ⁻¹	cos ⁻¹	tan ⁻¹	csc ⁻¹	sec ⁻¹	cot ⁻¹



Slide provided by ti.education.com

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Math Templates

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Symbol Palette (access via **[ctrl]** key)

π	e	i	E	∞	θ	\rightarrow	\leftarrow	\bullet	
r	g	$'$	\angle	$=$	\neq	$<$	\leq	$>$	\geq
$-$	$+$	$-$	$*$	\cdot	x	$/$	\div	\wedge	\pm

$\sqrt{}$	Π	Σ	d	\int	$!$	\odot	$@$	$\#$	
$\$$	$\%$	$\&$	$ $	$"$	$:$	$;$	$,$	$?$	
$($	$)$	$\{$	$\}$	$[$	$]$	\bar{x}	\bar{y}	Σ	μ

Slide provided by ti.education.com

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**Catalog key
(contains all functions
in the nSpire CX CAS)**

Slide provided by ti.education.com

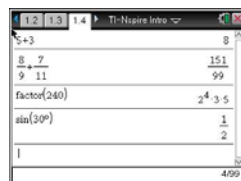
11

Scratchpad

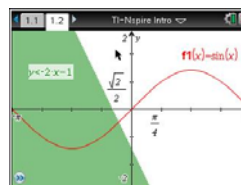


- Two Modes

Calculator




Graphics





- This is what other calculators do (mostly)
- Toggle between modes by pressing the scratchpad key


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A Trip Into Calculus (Using a Document)

Type:  **1 1** to open a new document with a calculator app

Type: $f(x)$  **ctrl**  $\cos x - x$ **enter**

Type: $\text{solve}(f(x) = 0, x)$ **enter**

Calculator shows: $f(x) := \cos(x) - x$ Done
 $\text{solve}(f(x)=0, x)$ $x=0.73909$

To evaluate a function at a given value of the variable:

Type: $f(\pi)$ **enter** $\div 4$ **enter**

Calculator shows: $f\left(\frac{\pi}{4}\right)$ $\frac{\sqrt{2}}{2} - \frac{\pi}{4}$

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A Trip Into Calculus – Continued

To define a new function $g(x)$:

Type: $g(x)$  **ctrl**  x x^2 **enter**

To find the intersection of $f(x)$ and $g(x)$:

Type: $\text{solve}(f(x) = g(x), x)$ **enter**

Calculator shows: $g(x) := x^2$ Done
 $\text{solve}(f(x)=g(x), x)$ $x=-1.25115$ or $x=0.55001$

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A Trip Into Calculus – Continued

To create a function that is the derivative of another:

Type: $fd1(x)$ **ctrl** **:=** **↑shift** **=**

In the denominator, type: x

In the parentheses, type: $f(x)$ **enter**

Type: $fd1(x)$ **enter**

Calculator shows:

$fd1(x) := \frac{d}{dx}(f(x))$	Done
$fd1(x)$	$-\sin(x)-1$

To evaluate that derivative, as a decimal, at $x = 2$:

Type: $fd1(2)$ **ctrl** **enter**

Calculator shows:

$fd1(2)$	-1.90930
----------	----------

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Graphing

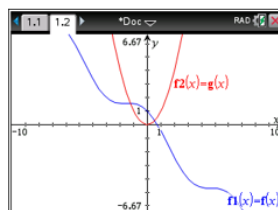
Type: **ctrl** **I** **2** to add a graph page in the current problem

Type: $f(x)$ in the function definition line. Hit **enter**

Type: **ctrl** **G** to add another function to the graph

Type: $g(x)$ in the function definition line. Hit **enter**

Calculator shows:



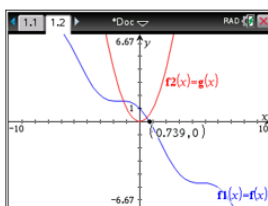
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Graphing – Finding a Zero

To find a zero of a curve on a graph:

- **menu** 6 to “analyze” the graph.
- Select 1 to find a zero.
- (If there are multiple curves, [click](#) on the desired curve.)
- Move the cursor to the left of the desired zero and [click](#).
- Move the cursor to the right of the desired zero and [click](#).
- A label will appear, giving the coordinates of the zero.

Calculator shows:



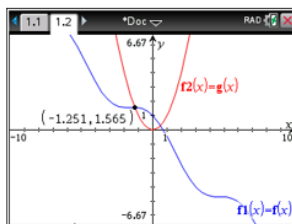
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Graphing – Finding an Intersection Point

To find a point of intersection on a graph:

- **menu** 6 to “analyze” the graph.
- Select 4 to find a point of intersection.
- Move the cursor to the left of the desired point and [click](#).
- Move the cursor to the right of the desired point and [click](#).
- A label will appear, giving the coordinates of the point.

Calculator shows:



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Defining a Tangent Line

Type: **ctrl** **←** to move back to the first page in the document.

Type: $h(x)$ **ctrl** **=** **tan** $\text{tangentLine}(f(x), x = -3)$

Type: $h(x)$ **enter**

Calculator shows: $h(x) := \text{tangentLine}(f(x), x = -3)$ Done

$$h(x) \quad (\sin(3) - 1) \cdot x + \cos(3) + 3 \cdot \sin(3)$$

This shows the equation of the tangent line in slope intercept form. It is an ugly equation, but it is accurate.

Type: $h(x)$ **ctrl** **enter**

Calculator shows: $h(x)$ $-0.85888 \cdot x - 0.56663$

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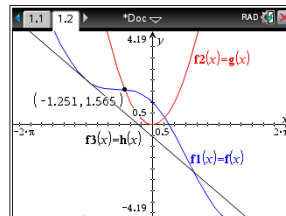
Graphing a Tangent Line

Type: **ctrl** **→** to move back to the second page in the document.

Type: **ctrl** **G** to add another function to the graph.

Type: $h(x)$ in the function definition line. Hit **enter**

Calculator shows:



The tangent line is shown as $f3(x)$ on the graph.

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Graphing – Moving Labels

Move the cursor to the label containing $f1(x)$.

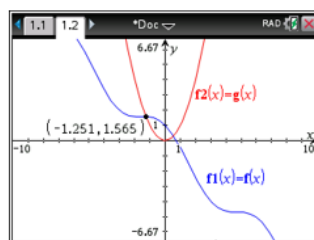
You will see an open hand appear over the label.

ctrl [click] will make the hand grasp the label.

Drag the label to where you want it and hit **enter**

The label will be repositioned where you placed it.

Calculator shows:



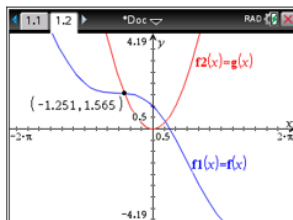
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Graphing – Changing Axis Scale

To label the x -axis in radians:

- Move the cursor so that it is not directly over an object and [click] in that area.
- **ctrl** **menu** 3 or 4 to open the “window” screen.
- Select 8 to label the x -axis in radians.

Calculator shows:



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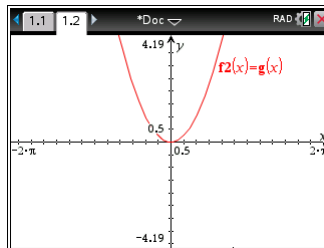
Graphing – Deleting a Curve

To delete a curve:

- Move the cursor to a point on the curve.
- The curve will become highlighted.
- **[Click]** on the curve; it will begin to pulsate.
- Hit the **del** key to delete the curve from the graph.

Calculator Shows:

Note: you can bring the curve back into existence by hitting **ctrl** **esc** .



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Graphing

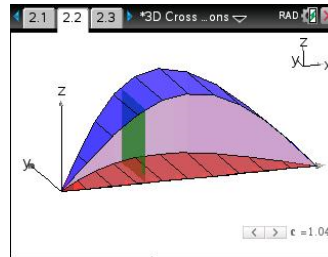
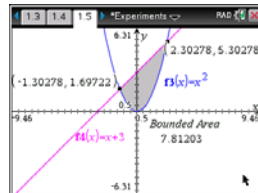
Other things you can do (with **[menu]** or **[ctrl] [menu]**)

- Trace (move along) the curve
- Find local maxima and minima on the curve
- Find the intersection of two curves
- Find the bounded area between two curves
- Add a slider so you can see what happens to the curve as the parameter defined in the slider changes
- Change a curve's attributes – e.g., its thickness or its continuity (solid, dashed or dotted), or its color
- Add labels to the graph
- Graph 3D curves and objects

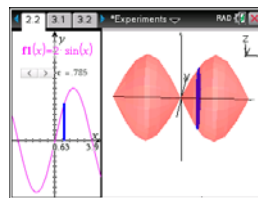
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Graphing

Some graphics created with the nSpire



Can rotate the above 3D graphic and slide the green cross-section along the x -axis to see how it carves out the solid.



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Documents – – What are they?

You will probably want to use them

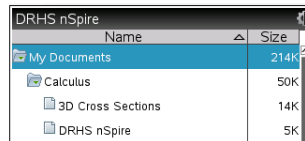
- Like computer files
- Work in documents can be saved on the nSpire
- Work on the scratchpad can be saved in a document
- Documents may contain multiple problems
- Problems may contain multiple pages
- Variables exist across pages in a single problem
- Variables do not transfer between problems
- A single page may contain up to four apps


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Create a Folder for Your Documents


Type:  **on** **2** to enter “My Documents”

Navigate to the Parent Folder in which you wish to create your new folder





Type:  **1** to create a new folder

Type: the name of your folder. I suggest “Calculus”. 

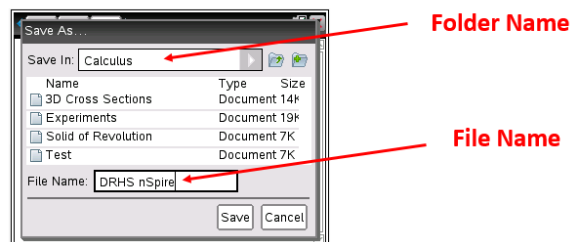
Type:  **on** to get back to the home screen

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Save and Close Your Document

Type:  **1 5** and type a name for your file 

Calculator shows:



Make sure the folder name and file name are correct.

Click 

Type:  **W** to close the file.

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Insert a New Problem in a Document

Press: **doc**

Select: **4 1** to add a problem to the current document

Select: **1** to add a calculator page to the new problem

Calculator shows:



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Split the Page and Define Two Items

Press: **doc**

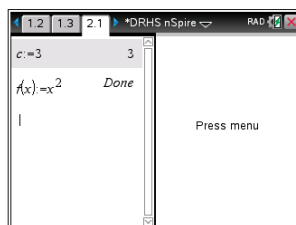
Select: **5 2** to access the Layout Options

Select: **2** to select a screen vertically split in half

Type: **c** **ctrl** **:=** **3** **enter**

Type: **f(x)** **ctrl** **:=** **x** **x²** **enter**

Calculator shows:



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Graph the Function in the Right Pane

Press: **ctrl** **tab** to move to the right-hand pane

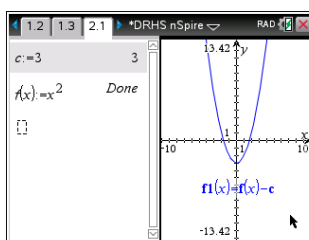
Press: **menu** to bring up the App selection screen

Select: **2** to insert a Graphs App in the right-hand pane

In the function definition line, type: $f(x) - c$ **enter**

Move the text containing the equation for the curve, if desired

Calculator shows:



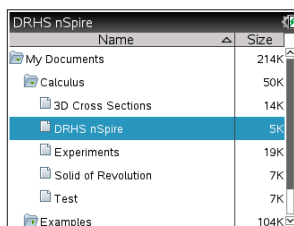
If you now go back to the left pane and change c or $f(x)$, the graph on the right will change automatically.

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Open a Document and Move Around

Type: **on** **2** to enter "My Documents"

Navigate to the Folder and File that you want to open




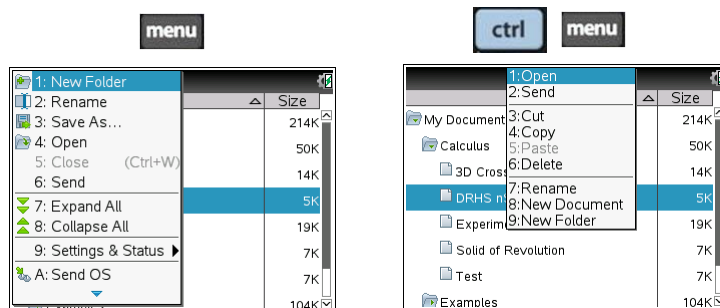
Type: **enter** to open the file.

Type: **ctrl** **right arrow** or **left arrow** to move from page to page

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Document Options – Menus & Shortcuts

Type:  2 to enter “My Documents”



Shortcuts:

[ctrl] → N – New document. [ctrl] → S – Save document.
 [ctrl] → O – Open document. [ctrl] → I – Insert a page.
 [ctrl] → W – Close document. [ctrl] → K – Select an application

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Download the Following Resources

- **nSpire CX CAS manual** (from TI) is available at:
education.ti.com/en/us/guidebook/details/en/502A552F7D6E4756A75BD8482FEB0E26/gettingstartedwiththeti-nspirecxhandheld
- **nSpire CX CAS Reference Guide** (from TI) is at:
education.ti.com/en/us/guidebook/details/en/3F30BA6FDA6F49608C44BB4B5F3746FA/ti-nspirecasreferenceguide-2
- **“Using the TI-nSpire CX CAS”** is available at:
<http://www.mathguy.us/BySubject/nSpire.php>

Note: The TI links can be accessed via the Microsoft Word document “Using the TI nSpire CX CAS Handheld” available at www.mathguy.us

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Online Tutorials and Lessons

- **TI nSpire tutorials** are available at:
 - education.ti.com/en/professional-development/teachers-and-teams/online-learning/product-tutorials
- **TI nSpire lessons** (.tns files) are available at:
 - www.ticalc.org/pub/nspire/basic/math/
 - sites.google.com/site/tinspiregroup/assignments
 - education.ti.com/en/timathnspired/us/home

Note: All of these links can be accessed via the Microsoft Word document "Using the TI nSpire CX CAS Handheld" available at www.mathguy.us