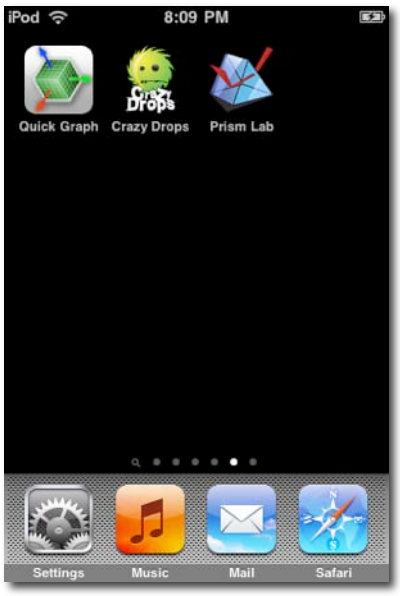
OVERVIEW



Quick Graph plots high quality 2D and 3D mathematical expressions. Graphs can be shaded with custom colors and in 3D the lighting is enabled to demonstrate the depth of the surface.

You can zoom in and out by pinching the image and pan around with one finger (2D) or two (3D). In both 3D and 2D modes, the graph adapts the evaluation limits when the touch gesture ends, allowing you to focus on specific features of the graph.

The 3D view allows for interactive rotation, translation and zooming by simple touch gestures. In addition, you can change from wireframe to solid visualization, with a simple double tap.

Quick Graph includes a wide variety of mathematical features and coordinate systems: Cartesian, Cylindrical and Spherical systems are supported for 3D equations, 2D equations support both Cartesian and Polar.

All graphs are automatically saved / restored whenever the application is closed / open.

Upgrading from version 1.1

This section to the manual is here to help the transition from the previous version of Quick Graph. We left all of the functionality from the previous version free, but there are

some changes to the interface that you need to be aware of. We did these changes to enhance Quick Graph capabilities.

The major change is that we removed the z=|y=|x= buttons and now you have to type these variables explicitly. For example, if before you selected z= and you entered the expression x^2+y^2, now you need to type z=x^2+y^2 to get the same result. Why did we do this? because Quick Graph is capable of much more now, so if you upgrade to the new *"enhanced"* version you will be able to graph expressions like z^2=x^2+y^2. This kind of expressions are called implicit equations, they allow you to make amazing graphs with *Quick Graph!*

Another change is that we removed the "*Cartesian, Spherical, Cylindrical, Evaluate*" buttons, but the functionality is all still there. You can type whatever expression you want and now Quick Graph will detect the type of coordinate system automatically.
Feel free to write us any suggestions or questions you may have with the new version of Quick Graph to support@colombiamug.com

Optional features

Even though all the standard features that made the original Quick Graph a great app are free, you can opt to unlock additional features (via in-app purchase), these features currently include tracing, implicit graphs (2D and 3D), inequalities (2D and 3D), unlimited graphs (*limited by the available device memory*) as well as all other features that will be included in the future. Upgrading Quick Graph's additional features will not only enhance your user experience, but it will also support the developing of ***Quick Graph!***

Quick Graph Features

- ☑ Support for a wide variety of standard mathematical functions.
- ☑ 2D and 3D graphing of explicit equations in all supported coordinate systems, implicit equations(opt) and inequalities(opt).
- ☑ Easy to use interface.
- ☑ Cartesian/Polar coordinates in 2D.
- ☑ Cartesian/Cylindrical/Spherical coordinates in 3D.
- ☑ The coordinate system to use is inferred from the expression, there's no longer need to specify it beforehand.
- ☑ Plot multiple equations (up to 6 in the standard version), unlimited (opt).
- ☑ Send email with the graphs you're working on
- ☑ Built in library with the ability to include custom equations
- ☑ Easily zoom in and out on the graph
- ☑ Copy the current graph to the clipboard
- ☑ Built-in user manual
- ☑ Tracing (trace the coordinates along the graphs) (2D opt)
- ☑ Hyperbolic functions / inverses
- ☑ Landscape and portrait support

Symbols, Variables and functions

The keyboard of **Quick Graph** on the iPhone or the iPad has the following math operators, variables, constants and functions, that can be used to plot 2D and 3D Graphs and calculation:

Operators

+ Plus	**-** Minus	* Multiplication	/ Division	√ Square root
√ nth root	**^** Power	**( )** parentheses	**,** Parameter Separator	**=** Equality and assignation
; Expression Separator	**<** Less than	**>** Greater than		

Note: square root should be typed as 2√x, or as x <operator> √x

Variables:

x, y, z, r, Θ, Φ

Constants:

π, e

Functions:

sin: sine	cos: cosine	tan: tangent
cot: cotangent	sec: secant	csc: cosecant
asin: arc sine	acos: arc cosine	atan: arc tangent
sinh: hyperbolic sine	cosh: hyperbolic cosine	tanh: hyperbolic tangent
coth: hyperbolic cotangen	csch: hyperbolic cosecant	sech: hyperbolic secant
d/dx: x derivative	d/dy: y derivative	d/dz: z derivative
ln: natural logarithm	log: base 10 logarithm	log2: base 2 logarithm
abs: Absolute Value	ceil: next closest integer	floor: previous closest integer
If(condition, true, false)	max	min
mod: remainder function	todeg: to degrees	torad: to radians

Using Quick Graph

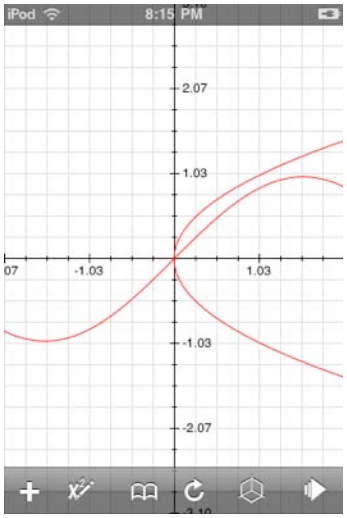


Figure 1: Tool bar

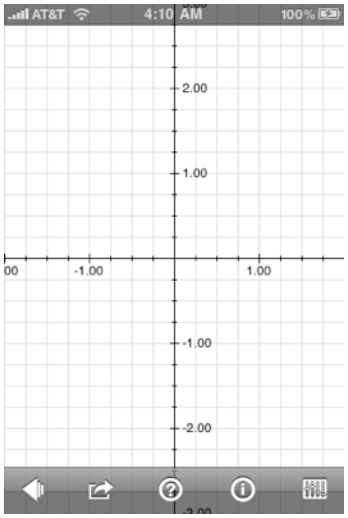


Figure 2: Tool bar

When you first start the application a window similar to this one will appear:

The tool bar:

The application toolbar has the following options, from left to right in figure 1:

Add: presents the application keyboard to start entering a new equation.

Edit: shows a list of the current equations. Here you can change the color of the equation, add or remove one or all of the equations.

Library: displays the current library of expressions. You can then choose one to graph immediately, or add expressions to the library.

Reset: resets the view to its default settings. If you happen to have shakes enabled you can also shake your device to reset the view.

Mode: changes the graphing mode from 2D to 3D and vice versa.

Next: displays a new set of options.

In figure 2, we get:

Previous: displays the previous set of options.

Action: allows you to copy the current graph to the clipboard, save it to your photo library or email the current graph as well as its related equations.

Help: displays this guide.

Info: displays the application's credits, and allows you to email us directly.

Settings: Here you can change various settings in the application.

Now for the fun part, press the add button (the one that looks like a plus sign) and let's start writing our first equation! You should see a keyboard similar to this:

Figure 4: Using the calculator

Figure 3: New equation view

TIP: *You can use Quick Graph as your main calculator. To evaluate an expression, simply enter it as you would on a regular calculator: 5+5*3 (figure 4). The result will appear under the expression!*

If you look carefully in figure 3, next to the field to enter the expression, there is an icon that will allow you to browse the library of prebuilt equations. As you will learn later, **Quick Graph** also has a library that will allow you to save your own equations for future use. If you can't see the icon, simply erase the equation from the field and tap on the library icon. You will see something like figure 5 but with your own library.

You can select or delete any equation from the library.

Figure 5: Library

Evaluating an expression with variables

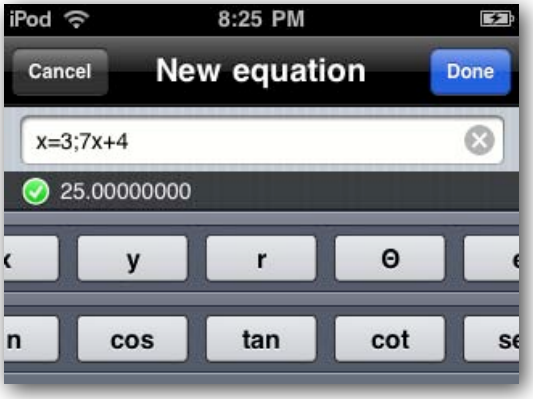


Figure 6: Evaluating

Quick Graph allows you to evaluate mathematical expressions that has variables as part of the expression. With **x=3**, the expression **7x + 4** becomes **7 * 3 + 4** which is equal to **21 + 4** or **25**. Figure 6 shows an example about how to evaluate an expression with a variable using Quick Graph.

Its important to notice that you have to enter the evaluation point first and then the equation, separated by a semicolon (;)

Entering and graphing expressions

An expression is a group of numbers, operators, variables, and functions or a combination of these elements. Now, go back to the new equation view, to plot a function simply enter: **y=x^2** and tap the done button. If the expression contains an error, a message under the expression will appear informing about it.

Figure 7: Entering an equation

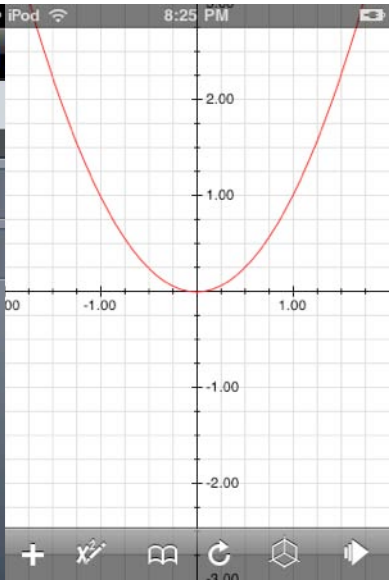


Figure 8: Equation plotted

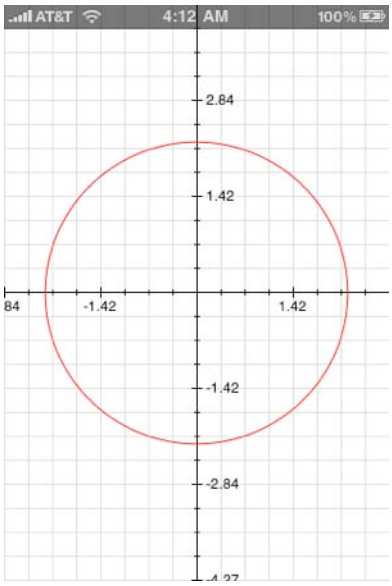


Figure 9: Implicit equation

If you unlock the advanced features you can graph implicit equations like **x^2+y^2-5=0** or simply **x^2+y^2-5** and Quick graph will assume that it is equals to zero (figure 9).

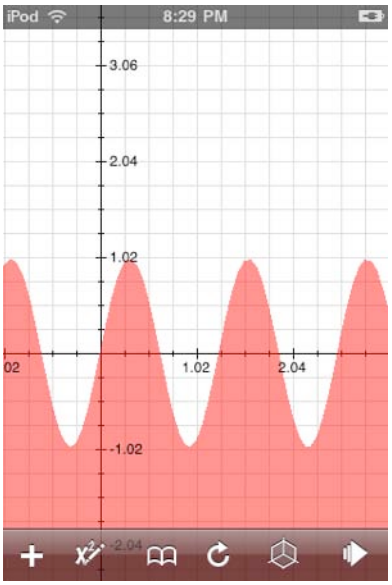


Figure 10: Inequality

You can use trigonometric functions, inequalities, and a set of prebuilt functions that we will explore in depth in subsequent sections, by example **y<sin(5x)** (figure 10).

The enhanced version also allows you to trace the graph by tapping and holding. A line will appear showing the intercepts with the graph (figure 11).

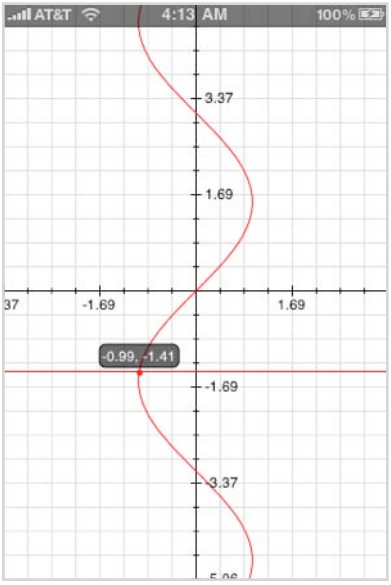


Figure 11: Tracing

You can change the color of the graph by selecting the edit option (*second icon*) and tap on the little color bullet to the right of the expression. (figure 12).

This will show a new view with a color picker and the possibility of turn on/off the equation, via the visible setting on this view.

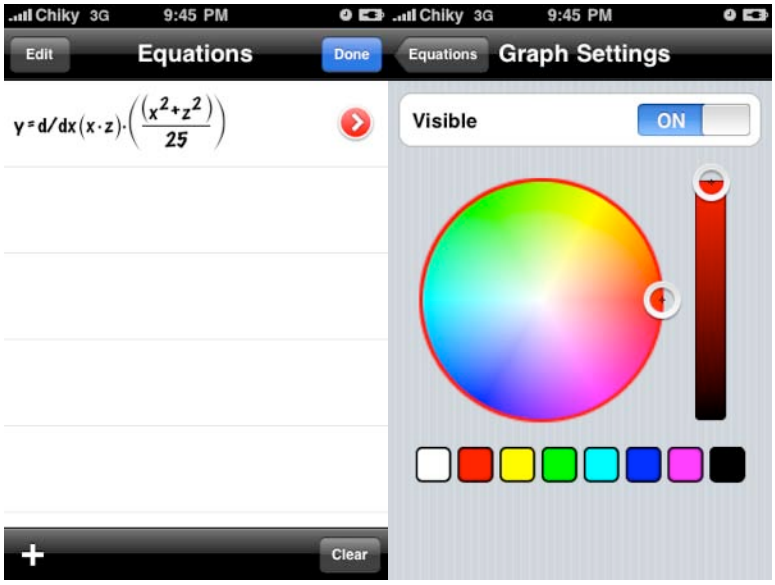


Figure 12: Change color

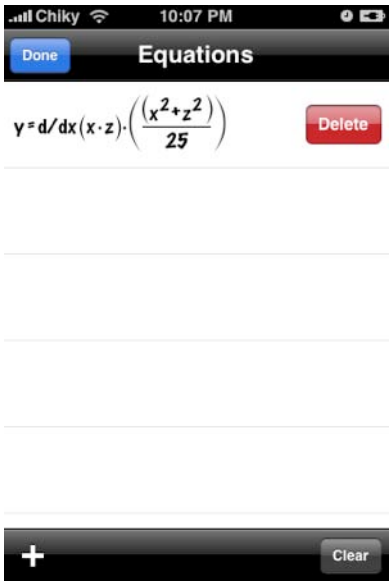


Figure 13: Deleting a graph

Now, to erase equations (graphs), go to the edit view on the iPhone or to the equations view on the iPad, then simply click on the edit button or swipe across the graph you want to delete.

On the iphone, there's also a button to clear all equations. (figure 13).

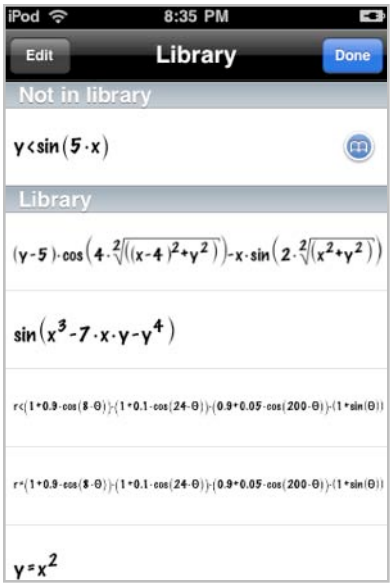


Figure 14: Library

The library button opens a view where you can add your expressions to the library (if not already there) and can delete or select an equation to graph (figure 14)

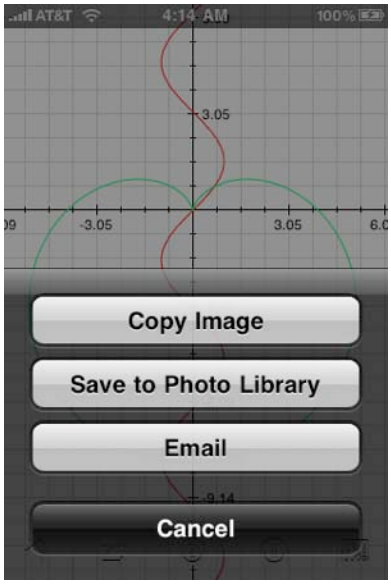


Figure 15: Share

The share button lets you save an image of the current view, send the image to a friend or copy the image to the clipboard to use it in another application (figure 15).

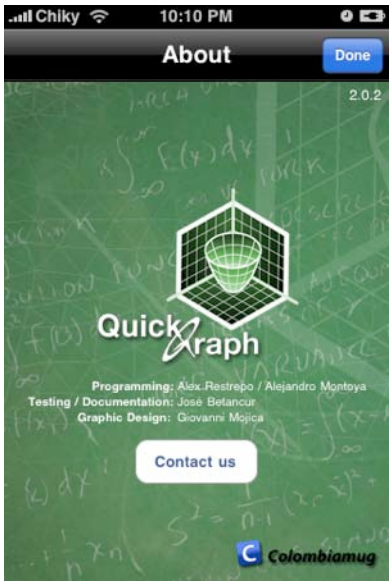
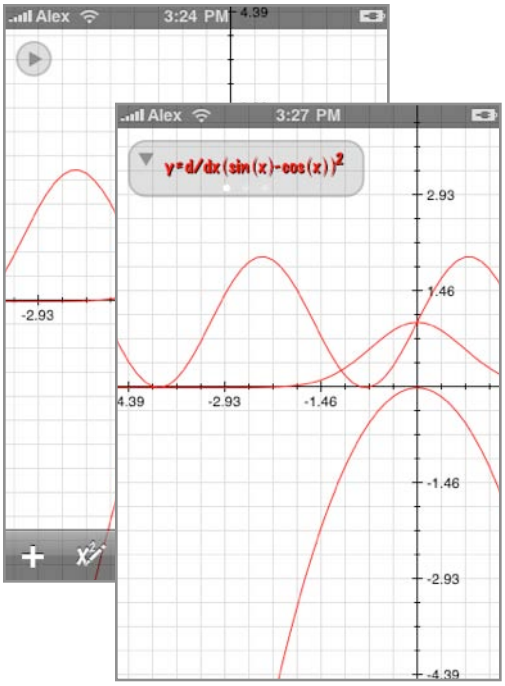


Figure 16: About

The Info displays the application's credits and a way to contact us, for queries or suggestions. (figure 16).



One of the new things you have in the 2D view on the iPhone version is the ability of display the equations you graphed, just press the grey disclosure triangle on the top left of the screen and it would show you the first equation, if you tap in the equation, it would display the next one. To close this just tap in the grey triangle.

Settings

The settings button enables you to personalize Quick Graph for certain functionalities:

General

- Autohide toolbar (iPhone): If you would like to have more room for visualization, the toolbar can be hidden, and it will appear again by tapping the bottom of the screen.
- Keyboard Clicks: Turns on/off the clicking sound of the application keyboard.
- Enable shakes: Allows you to shake your device to reset the view and to clear the text field in the add expression view.
- Default color: The default color for the graphs.
- Reset library: Erases the library (2D and 3D) and restores the original equations.

2D

- Dark background: Sets the background to black.
- Thick Lines: Graphs will be displayed using a thicker 2 pixel line.

3D

- Rotation box: Enable/disable the rotation box.
- Light Background: Change the background color of the 3D view to white.
- Display Values: Displays the current values for the x, y and z axis.
- Faster implicits (only visible after unlocking the advanced features): Turning off faster implicits will allow the use of a more complex algorithm to calculate implicit surfaces. The result will be a smoother surface, but it will require more time to calculate the graph (see graph 29).

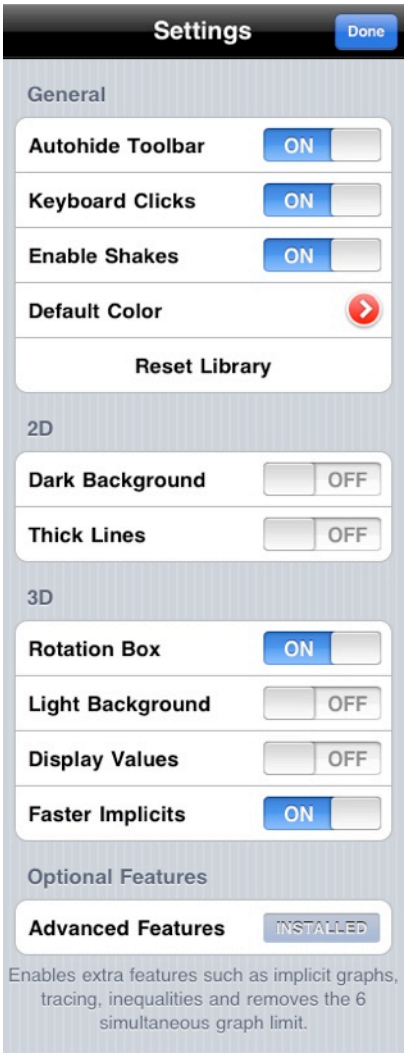


Figure 17: Settings

The last option in settings is the Optional Features, in the Figure 17 are already installed, the Figure 18 shows the option to unlock the advanced options.

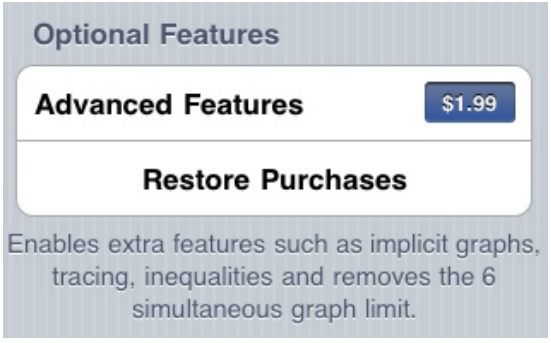


Figure 18: Settings

The 3D view functionality is similar to the 2D view. However, there are some differences. For instance, instead of moving the graph by dragging you can rotate it. Also, if you want to move the graph you will need to drag two fingers.
In figure 19 we can see the basic 3D view with its axis, each tick in the axis represents a unit (1.0), and if you zoom in or zoom out, the equation will be recalculated with the new limits determined by the surrounding box (figure 20).

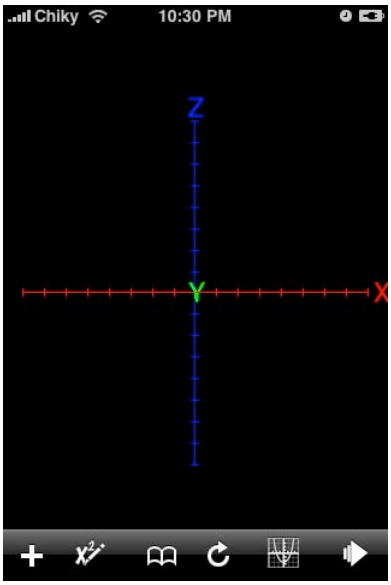


Figure 19: 3D view

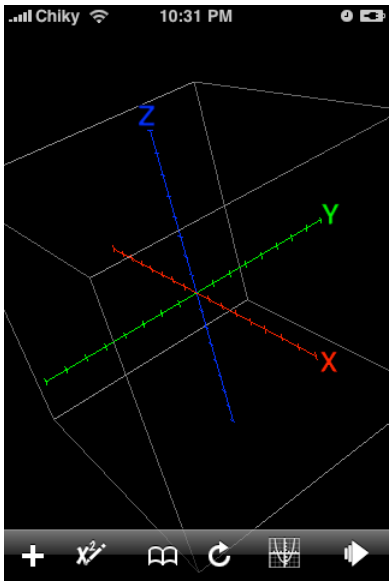


Figure 20: Rotation box

Entering an equation in 3D is the same as in 2D (the same interface figure 21). With Quick Graph chances of an error being unknown are reduced. Quick Graph will automatically give you messages if there is any error in the equation and a little marker will be set where the error can be found (figure 22).

Figure 21: Entering 3D equation

Figure 22: Error message

Figure 23: Symbolic derivate

And one last great functionality is that you can solve symbolic derivatives by tapping the plus button that appear under the equation when it contains a derivative (figure 23).
The visualization of 3D equations is shown in figures 24 to 26. With double tap you can change from wireframe to a cool smooth surface.

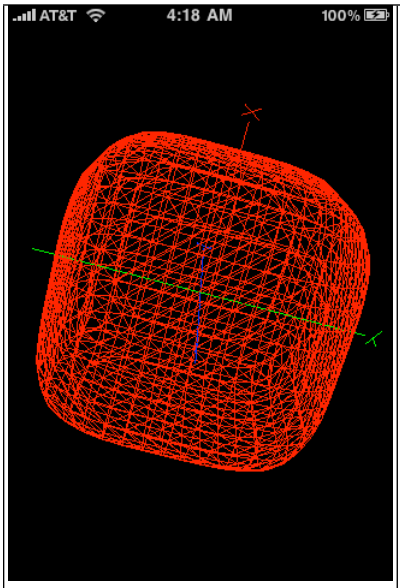


Figure 24: 3D Wireframe

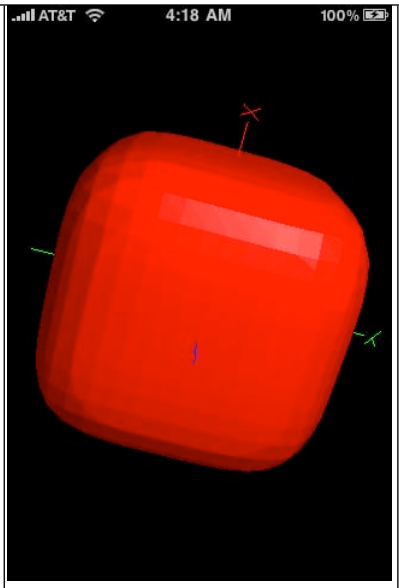


Figure 25: 3D Solid

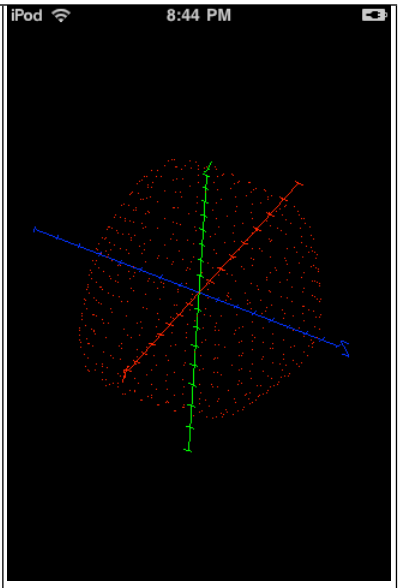


Figure 26: 3D Vertex

The basic version will allow you to graph up to 6 equations. The enhanced version will allow you to graph unlimited equations (*well, except for the limitations imposed by the memory in your device*).

We encourage you to purchase the enhanced version to support the further development of Quick Graph.

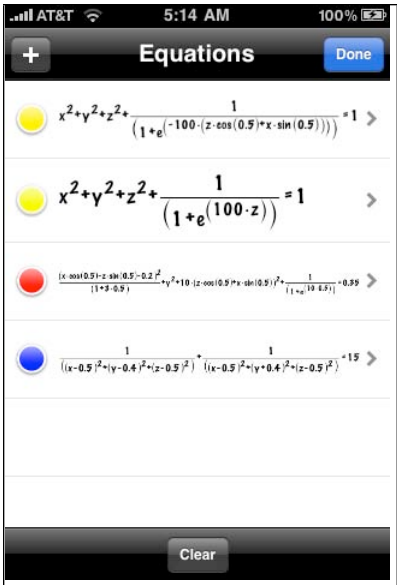


Figure 27: Multiple equations

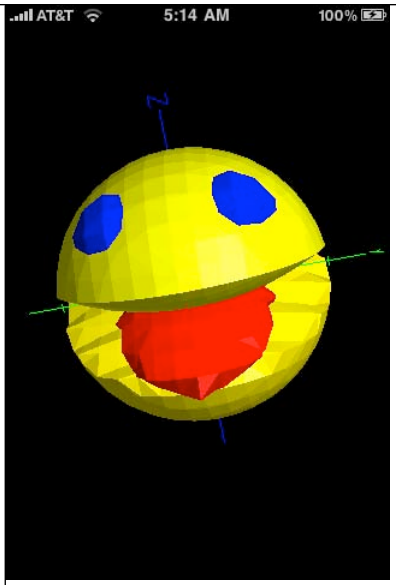


Figure 28: A little tribute to another great graphing calculator!

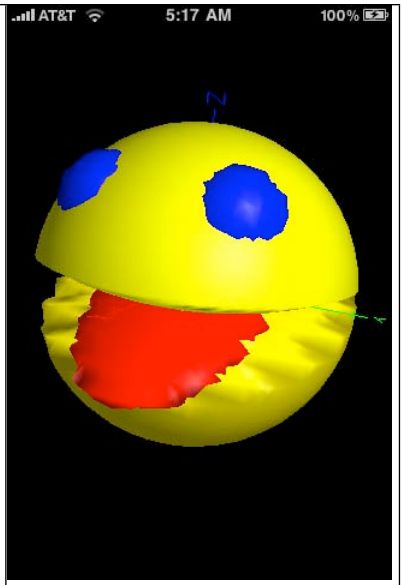
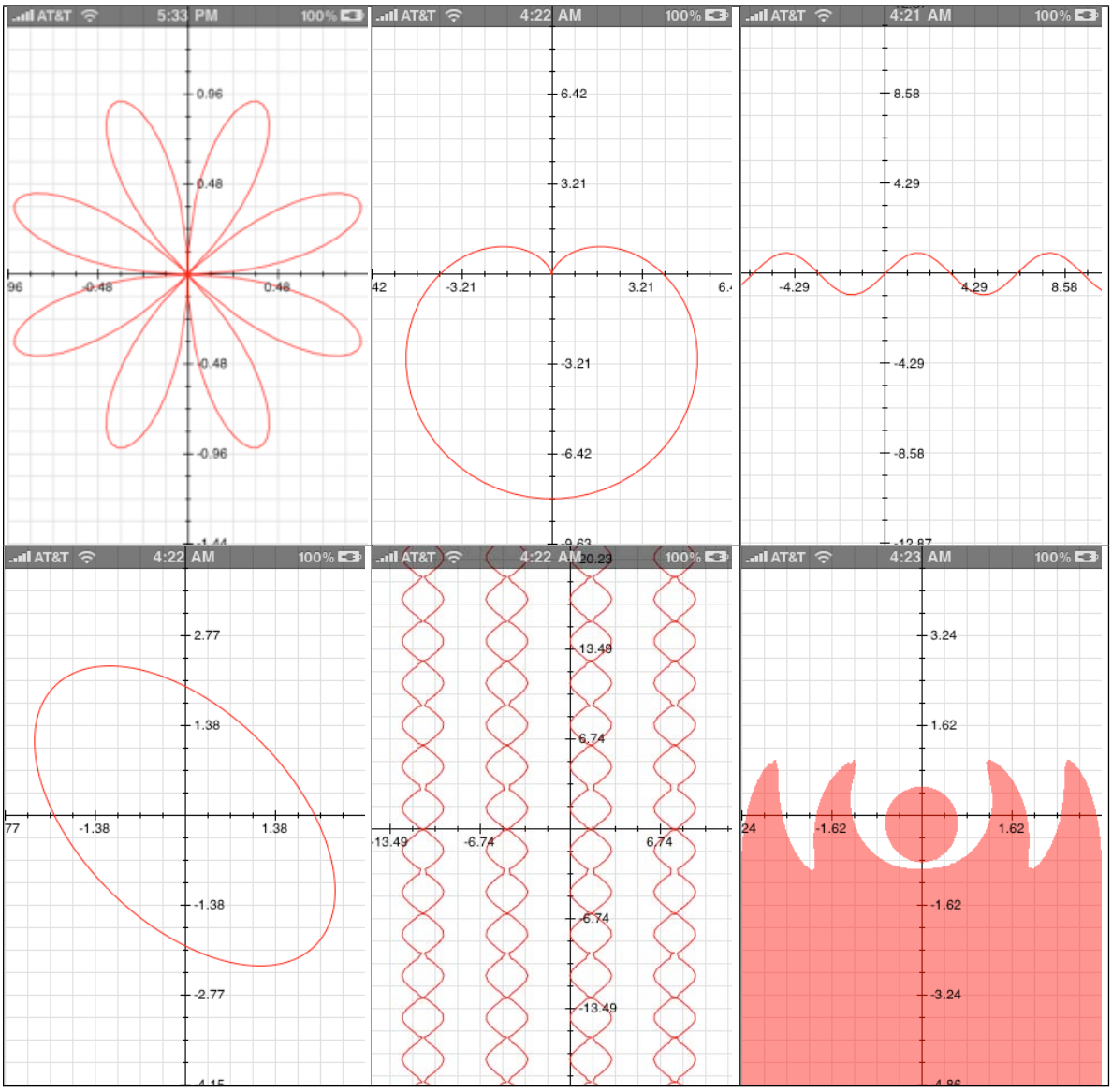
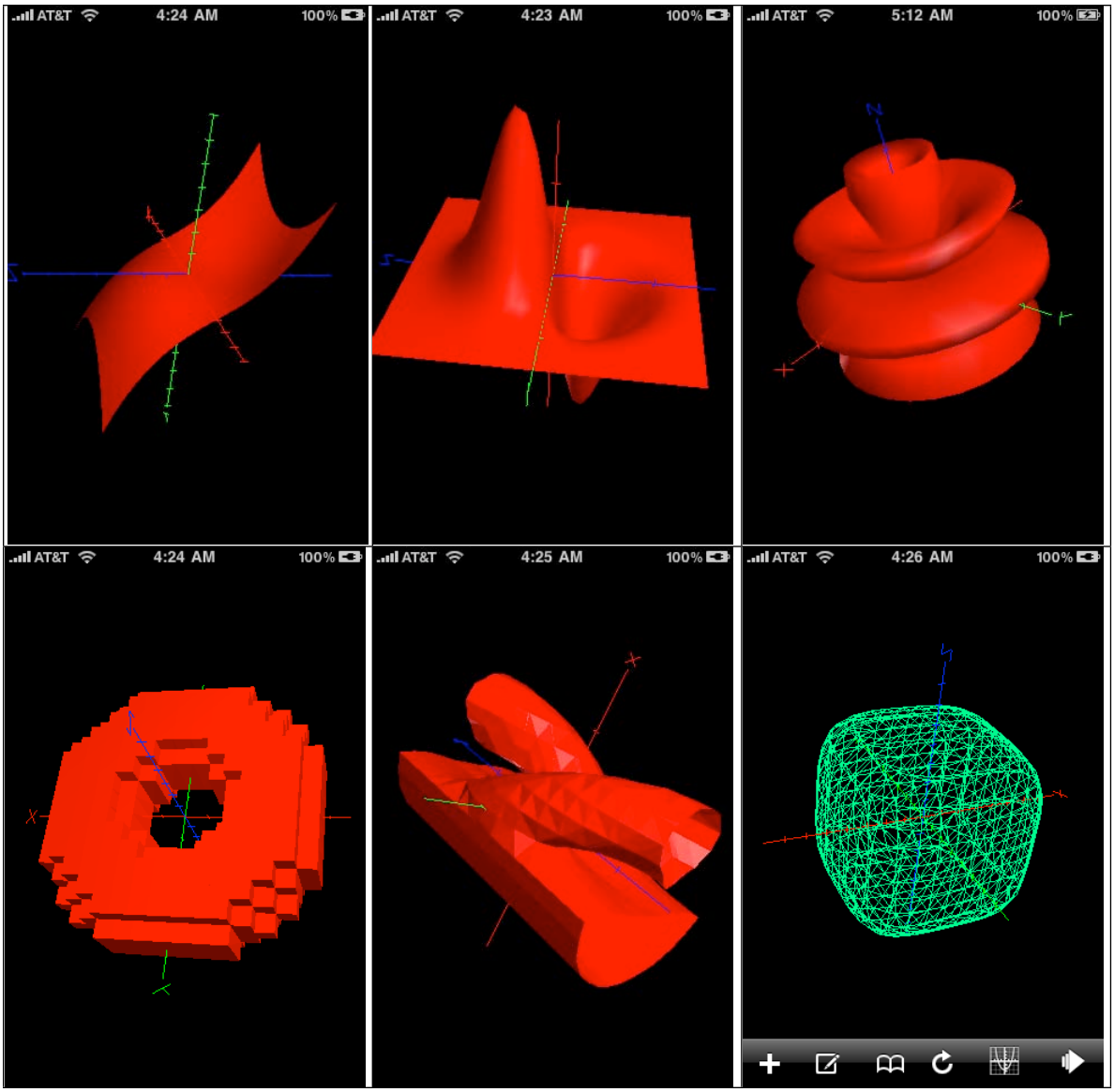


Figure 29: Faster implicits disabled

Sample Graphs





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