# SOME INNOVATIVE USES FOR THE IPAD INSIDE THE CLASSROOM AND OUT

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One of the major reasons why we shouldn't mind, and indeed should encourage, our student to use their smart phones/tablets in the classroom is the wealth of *graphing calculator* apps now at their disposal. I will discuss a few of those options here, including my absolutely favorite CAS/graphing app as well as an incredibly powerful *mobile FTP* solution and ultimately two very innovative mathematical apps that just might surprise you!

The first of the apps I will mention is one of my favorite *go to* calculator apps, even before going to the basic one provided by Apple for the iPad. It is named quite simply *Graphing Calculator* by Appcylon LLC. It has a very clean look, is convenient for simple calculations but a surprisingly powerful (yes easy to use) graphing tool:
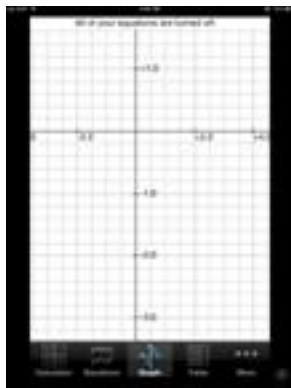
There are many similar utilities available in the iOS world, so why focus on this one? Well, first of all it's free (yes, there are many others that are also free) but one nice feature, especially when using it in the classroom, is the easy graphing interface to plot multiple functions on a single graph in multiple colors:
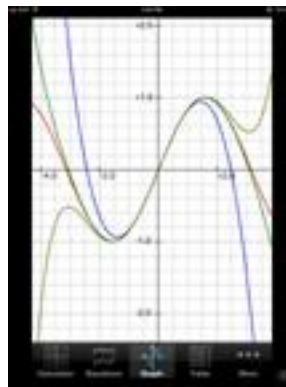
But even beyond that nice convenience, it also does something most graphing utilities can't do (even most handheld graphing utilities!)…and that is graph in multiple different forms: regular/explicit functions, implicit functions, parametric functions and functions in polar coordinates:

I'm sure some of these features are in many different apps, but having these all in one place and in an easy to use interface makes this a definite *must have*. A few drawbacks are: the lack of more than four different graphs/colors at any given time (if you'd like to continue plotting, like in an expanding Taylor series example, you'd have to eliminate one of the first four graphs in order to add a new one to the picture) and the ability to do 3D function plotting.

Another app that I have the pleasure to highlight in this paper is the *crème de la crème* of graphing applications available on the iOS platform. But, it goes above and beyond that as I will attempt to illustrate. I have been in communication with the app's developer, a very nice person and very willing to accept/answer questions and always willing to hear ideas to improve the app. This app was formerly called *SpaceTime* but has since changed its name to *MathStudio* by Pomegranate Apps. There's not a drastic difference in the initial impact of the UI (user interface) but the many user options, examples for all built-in function right on board and ease of use, is a definite step up!
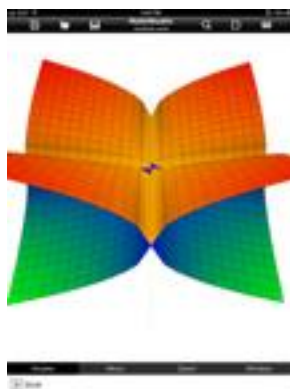

(old version: *SpaceTime*) (new version: *MathStudio*)

Of course, it has a wide variety of graphing types allowed as well as the ability to graph in 3D!!!

…and with one simple double-tap on the minature view, gives you a breathtaking user-adjustable image that is sure to please even the most demanding user:


As someone who teaches a visually-intensive course like Calculus III on a fairly routine basis, I find the ease of use (especially for 3D plots) to be very handy…and exceptional for demonstration purposes or for home-use. With *MathStudio* the ability to *handle* the 3D images and twist them about to view from any angle… there's almost no other way/platform they could do this in such a simple way! Imagine being able to *look down a singularity of a graph so students can **see** the reason a limit fails to exist* or to just look at a 3D plot from almost any angle to see why the answer for a limit problem *as (x,y) -> (a,b)* actually makes sense!

This alone might put the app right at, or near, the top of my graphing utility list, but perhaps not worth its $19.99 price tag. As they say in the used car business, "*but wait, there's more*"… so much more! In my opinion, this has all the functionality of say a TI-89 Titanium Edition… or even most of the use one would get out of a Mathematica program, while making use of a device that so many of them already have! That's right, this is a fully functional CAS… computer algebra system. There are so many uses, I can't possibly name them all here without having a 20+ page paper. But some of the many, many features of this easy to use CAS (with built-in examples…so if you're not quite sure how to enter what you need, you can view an example that is sure to help) are: derivatives, integrals (both definite AND indefinite!), limits, various types of differential equations… and many, many more:

[99]

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While these are just but two of the many, many examples available for use on an iPad/iOS from the AppStore, I hope you can see how powerful these devices are and how incredibly useful the apps being developed have become.

I'd next like to point out what I feel to be the most powerful FTP utility on the iOS platform. The app is called *FTP ON THE GO PRO* by Headlight Software, Inc.   For those that develop for multiple websites, there are presets that you can store to make logging into the particular server a breeze.
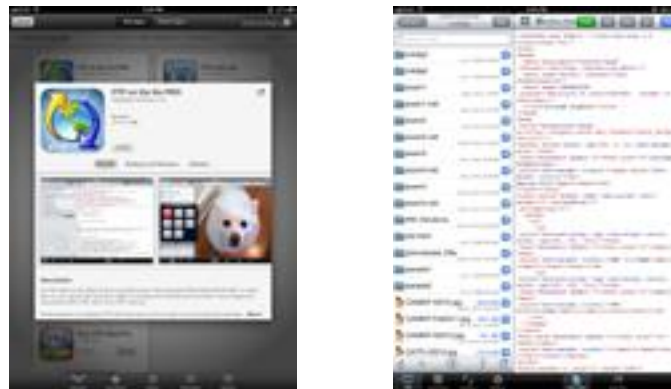
Not only can you get into a remote FTP site and do simple moving or renaming of files, you can even do some simple HTML editing and previewing on the go! A super-powerful resource for any webmaster, and I've found it to be a much better and more stable environment than any other such app currently offered in the AppStore.

The final two apps, while not being the most powerful computing tools available, are really so interesting, and stunning that I had to give them a mention. The first of these is available for free in the AppStore called *iCrosss LITE* by Oleh Yudin. You have a limited choice of polyhedrons available, or you can upgrade to the regular version for just $1.99. The graph of a polyhedron will fill the screen and when you simply touch a few of the faces…it generates an internal/shaded plane!

Definitely something you'd want to at least check out the LITE version, and possibly upgrade if it really interests you:

And finally, one of the coolest new apps I've seen in a long while, it is *MyScript Calculator* by Vision Objects. What is amazing about this app is the user-input device is…your finger! That's right, you draw right on the calculator screen and it converts your work into *pretty type* and if you end your input with an equals sign…it will solve your equation! You can draw an expression and enter it, and maybe add a square root over the whole thing and then even put a denominator underneath…this app keeps up with it all! Definitely one you'll want to spend some time poking around and having tons of fun with:

There are so many amazing graphing and mathematically-relevant apps in the Apple AppStore available today, that I could literally have written volumes on the different option. Jokingly, I stopped short of doing that not just because the ICTCM proceedings have a built-in page limit, but seriously so that you could enjoy the rich *discovery experience* all for yourself. Go out, explore…many times you'll find a free/LITE version so you can explore without the expense, and if you find it a rewarding experience then I highly recommend you upgrading to the *pay-version* to show your support for the app developer's hard work.

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