

Typesetting Equations Into Keynote Using L^AT_EX

Version 1.0b2

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1 Introduction

In the January 2003 MacWorld Keynote, Steve Jobs announced a new application which took the entire audience by surprise: a high-end presentation software package named "Keynote" for only \$99. At a price already clearly well below PowerPoint's they then further set the beat by lowering the price for students (to \$79) and, finally, offering Keynote bundled with iLife to teachers for \$15—an absolutely amazing deal.

Many others have written absolutely wonderful reviews and feature discussions surrounding what Keynote can and cannot do, however, a lot of discussion has surrounded the scientists, engineers, and mathematicians over the lack of advanced equation support for Keynote. The best equation typesetting system is, of course, \LaTeX and thus it would be a tremendous boon to Keynote if we could easily and simply integrate the two—providing the best in typesetting with the best in presentation software.

Enter a marvelous piece of software called Equation Service that has been written by Doug Rowland¹. This Open Source software will take a snippet of \LaTeX code and typeset it into a PDF with your equations. You can then simply drag—or with the newest version, copy—the equation into your existing Keynote presentation and treat it as a picture there.

¹email: dougrowland@mac.com

There is only one problem: installing and using all of this software together efficiently, while fairly intuitive, can seem to be a fairly daunting task, and typesetting the necessary equations can seem like a hopeless endeavor. I can only hope that this document will ease the transition and help scientists, mathematicians, engineers, students, and any others who need the ability to cleanly integrate equations into their presentations with putting together absolutely beautiful presentations that look professionally made. Introducing a whole new group of MacOS X users to the wonders of L^AT_EX is just icing on the cake.

1.1 What this document is, and what it is not

Simply, this document has been put together for the purpose of easing a transition into using L^AT_EX with Keynote under MacOS X. It is not meant to be a comprehensive guide to writing documents or even equations in L^AT_EX nor in what all of the configuration options can be used for²

This is a guide for those who need the ability to typeset their equations in Keynote, but do not know how. This is a guide for those who have never heard of L^AT_EX and wish to get started.

As always, I disavow all responsibility for what any of this does to your system or your sanity.

2 Installing Proper Software

2.1 Keynote

Quick Link: <http://www.apple.com/keynote>

The first thing you will need for this is a copy of Keynote. Take the CD and double-click on the installer package, answer the questions in the affirmative, kick-back, relax, and enjoy a drink or two while it installs.

It is, of course, possible that you are just reading this document for kicks or because you are considering Keynote in the future. If this is the case, keep reading and feel free to install the remaining software—it does not depend on Keynote.

²For more information and some good reference books, see the appendix.

2.2 T_EX

These steps are easy, but should be done in order.

2.2.1 i-Installer

Quick Download: <ftp://ftp.nluug.nl/pub/comp/macosex/volumes/ii2/II2.dmg>

The simplest method of installing and configuring a working version of T_EX with all of the necessary software is to use a free program called i-Installer—a clean and efficient package-based installer for MacOS X. It can be used to install an array of software, most of it T_EX related in one way or another.

After downloading the i-Installer dmg from the ftp site, simply open up the disk image and copy the resulting application to your hard disk wherever you want it to be.

2.2.2 Using i-Installer and the i-Installer i-Package

First, play with installing i-Packages by updating your i-Installer software. This step is not strictly necessary and everything I am going to describe can be done without doing this step, but an updated version of i-Installer will have fewer bugs, more documentation for later, should you decide to continue using it.

In order to install the new version, just use the following steps as a guide.

- **Open i-Installer by double-clicking it** (make sure that you are connected to the internet when you do this).
- **Select to the menu item "i-Package⇒Known Packages i-Directory..."** A window should pop up listing off a series of packages that you can download.
- **Click in the "i-Installer" package and hit the "Open i-Package button"** This will display a window listing the package contents.
- **Select the "Install and Remove" tab (second tab over).** This will switch you over to the window you can install it from.
- **Press the install button.** This is one of the few times it will not prompt you for your password
- **Wait.** It will take it a minute to finish installing, relax and play Go³ while it does.

³<http://sente.epfl.ch/software/goban/>

- **When it is finished**, it will pop up an alert explaining that it finished without critical errors—simply click okay and close this window.

2.2.3 T_EX Foundation i-Package

Go back to the main window with the list of packages (if you closed it, reselect it from the menu). Scroll down until you see the "T_EX Foundation" i-Package. Repeat the steps above for installing the package. You will be asked several times for your password, i-Installer needs this to install T_EX in the appropriate locations. At the end of the installation will give you a warning about not being able to configure and that you should also install T_EX Programs. Click okay, close this window, and continue on to the next step.

2.2.4 T_EX Programs i-Package

In the main window select the T_EX Programs i-Package and continue through the steps outlined above to install it. When the installation is finished a window will pop up asking you to configure. Lets go through these one at a time.

Packages to Load Leave the default selection and add amstex and pdfamstex, along with any language-based packages you need.

Languages Select those languages you plan on using the features and hyphenation sets for.

Page Size Set the default page size to "letter" if inside of the United States, "A4" if outside (or whatever your preference is, if you know what you are doing).

Command Line Click on "yes."

Enable T_EX Click on "yes."

2.2.5 Ghostscript 7 i-Package

If you already have installed Ghostscript in a standard location for some other application (e.g., GhostView) , you should be able to skip this step. If you do not remember if you have installed it for another app, reinstalling it should not cause any difficulties so long as the other application will play nicely with Ghostscript 7 (see the documentation for installing the other application for details)

If you are uncertain, go ahead with the installation of the other applications, and test out Equation Service to see if you need to install this i-Package.

In order to install: Repeat the installation process described above for the Ghostscript 7 package (if you have MacOS X, otherwise install Ghostscript 6).

It should be noted that I do not believe this package to be necessary for just using Equation Service, however, I am not 100% certain on this point and it *is* necessary for the use of TeXShop.

2.2.6 Other i-Packages (optional)

If you are going to use \LaTeX beyond the capacity of Equation Service you may want to install a few more image libraries. These are installed the same way other packages in i-Installer are, and should be installed in the following order:

- CM Super for \TeX (this is a font package).
- wmf and iconv conversion support (required for ImageMagick).
- Freetype 2 (required for ImageMagick).
- ImageMagick (a command-line tool for converting various graphical formats, among other uses).

2.3 TeX FoG (optional)

Quick Download: http://homepage.mac.com/marco_coisson/TeXFoG/TeXFoG%201.0.dmg

For those who are not familiar with \LaTeX , or who simply wish for a tool that makes typesetting and remembering all of the (occasionally arcane) commands easier, this is a wonderful utility. Simply click on the symbol that you wish to typeset and it will produce the text (in its own application) which can then be copied into Equation Service or into the document of

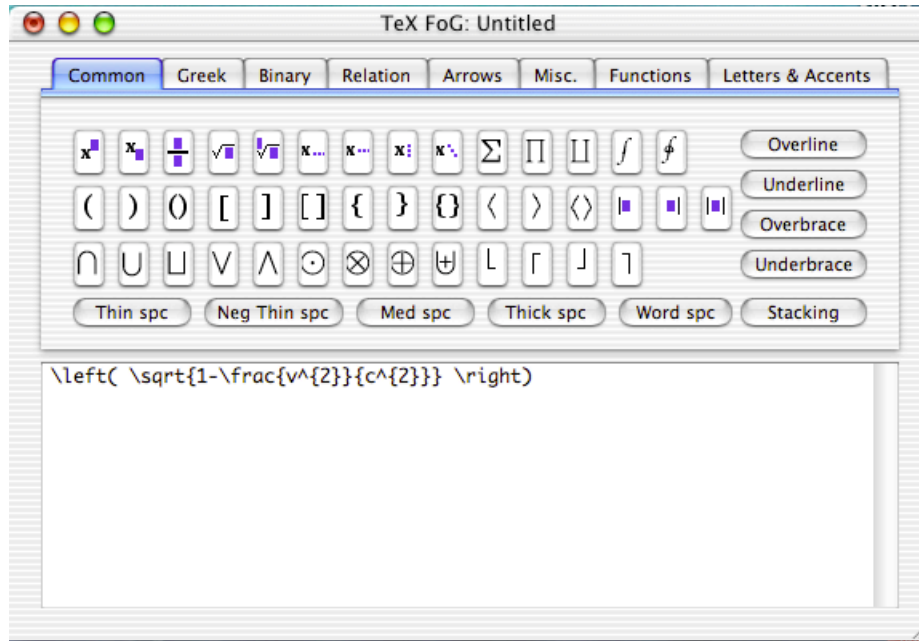


Figure 1: TeX FoG in action.

your choice for typesetting. It provides a quick and easy palette for putting together most equations quickly and easily.

A brief caution: Those who need to typeset more complex equations may find TeX FoG to be lacking, though still a useful tool for laying down some of the basic formatting.

2.4 TeXShop (optional)

Quick Download: <http://www.uoregon.edu/~koch/texshop/texshop.dmg>

If interested in doing full document preparation, I would recommend downloading a copy of TeXShop as well. This is an excellent editor for \LaTeX files and needs no additional software other than what has already been installed.

2.5 Equation Service

Quick Download:

<http://www.esm.psu.edu/mac-tex/EquationService/ESFiles/EquationService0.5B.dmg.gz>

Installing Equation Service 0.5B is trivial, simply download the file, decompress it, and drag a copy to your Applications folder. After this, open it once so that it can set itself up as a

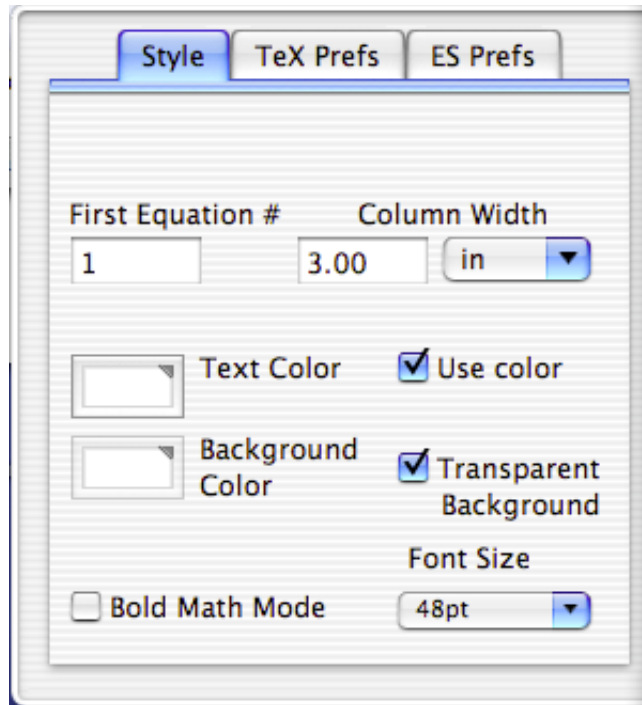


Figure 2: Style Preferences Tab

Service and you are ready to go.

This document will be updated as soon as version 0.7B is released to the public with the web address of the new version. The new version includes greater support for those of us using Keynote—including the ability to typeset equations from inside Keynote itself—and is the version that will be discussed in this document.

3 Features of Equation Service

3.1 Preferences for Equation Service

Equation Service is fairly configurable, and this is not a comprehensive guide on its use, however, there are some major options which bear keeping in mind when you go to typeset your equations. Set up Equation Service before typesetting, since when you are using it as a service it will utilize whatever the last set of preferences were that were used for typesetting.

There are three tabs under the preferences dialogue (found by clicking on the "Preferences" box in the open application).

It should be noted, briefly, that Equation Service has been coded with an excellent tool-tips

system. If you cannot figure out or cannot remember what something does, hold your mouse over it for a few seconds and help will be on the way.

3.1.1 Style

One can immediately see by looking at the Style tab (Figure 2) that there are a lot of options, but that most of them are fairly intuitive. Each will be covered here in turn, just to make sure that their meaning is absolutely clear.

First Equation # The number of the first equation in the list. Many of the templates will automatically number the equations you give them—this lets you specify what you want the first number it uses to be. Therefore, if you are labeling your equations in Keynote numerically, you can specify what the next equation’s number is going to be. Integer values only.

Column Width This is the number of inches wide the equation being typeset will be. If you are having difficulties with the cropping on your equations, one of the first things to try is changing this number.

Use Color When this box is checked, basic \LaTeX color commands (such as `\color{...}{...}`) will function normally and the defaults of Text Color and Background Color will be used. Note that this does not work on all templates.

Transparent Background When this box is checked in conjunction with Use Color, the Background Color will be ignored when typesetting the equation. This is useful for having just the equation imported into Keynote without any kind of white box or edge surrounding it. Unfortunately, this feature does not work in all applications (PowerPoint among them).

Text Color The color of the typeset equation if Use Color is turned on. When enabled, clicking this will bring up the standard MacOS X color-picker to aid in selecting the color of your choice (crayons!).

Background Color The color of the background for the equation if Use Color is turned on *and* Transparent Background is turned off. When enabled, clicking this will bring up the standard MacOS X color-picker to aid in selecting the color of your choice.

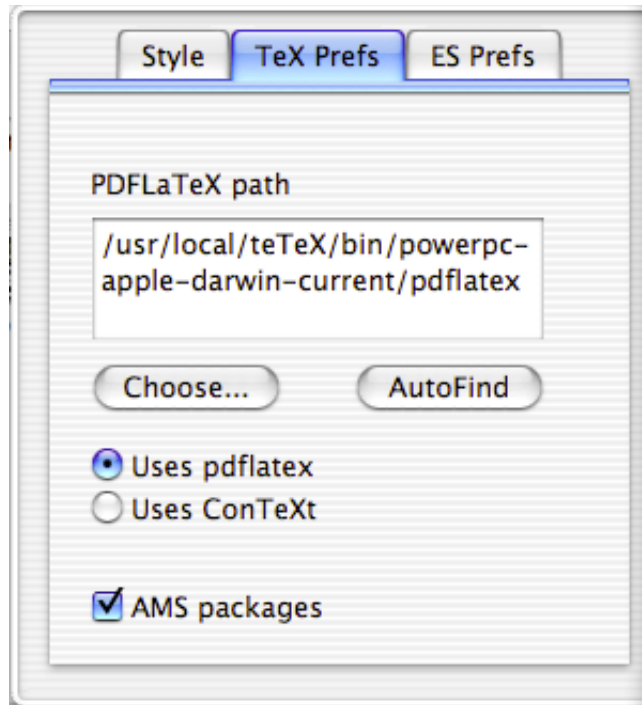


Figure 3: TeX Prefs

Bold Math Mode When selected, Equation Service will typeset the equations in \LaTeX 's bold math mode. Play around with it and see what look's best for what you are doing.

Font Size Exactly what it sounds like: the size of the font that will be used to typeset the equation.

3.1.2 TeX Prefs

This tab has a few more advanced configuration options, most of which is beyond the scope of this document, however, touching on each one may help get a better overall picture of the software.

PDFLaTeX Path The path to the \LaTeX renderer being used.

Choose... Select the file through a standard selection dialogue.

AutoFind Attempts to locate the renderer without assistance.

Uses pdflatex This is the default renderer for Equation Service. It is faster than ConTeXt but not quite as pretty; it also gives the option of using AMS packages.

Uses ConTeXt An alternate renderer for L^AT_EX equations. It is a bit slower than pdflatex, but looks better, however, it does not give options with respect to AMS.

AMS packages Uses the American Mathematical Society packages in those templates that include them. See section 2.2.4 for information on configuring your T_EX install so that you have installed the packages necessary to take advantage of this.

3.1.3 ES Prefs

There are only three checkboxes in the ES Prefs tab.

Show Main Window at Launch The main window will always open when Equation Service is launched. If you close the main window at some point or have this option deselected but wish to use it, the window can be re/opened from within the "Window" menu.

Show Colors in Input/Output fields When Use Color is selected, it will apply the color selections to the window where L^AT_EX commands are typed as well as to the final output. When you do this it will not actually override the "Transparent Background" option, though it will appear that way at first: when you actually drag the equation into the application, it should retain your transparency choice.

Scale Output PDF to fit in view When this option is selected, it will scale the output PDF if it does not fit in the output window so that it does. It is on by default, but will conflict with large text-sizes in some equations, causing them to be smaller than you had originally specified.

3.2 Templates in Equation Service

Equation Service comes with a variety of templates which can be used to typeset equations in different ways. If you are experienced with L^AT_EX you can feel free to create and import your own. Each template includes a brief description of what it is when you select it from the list.

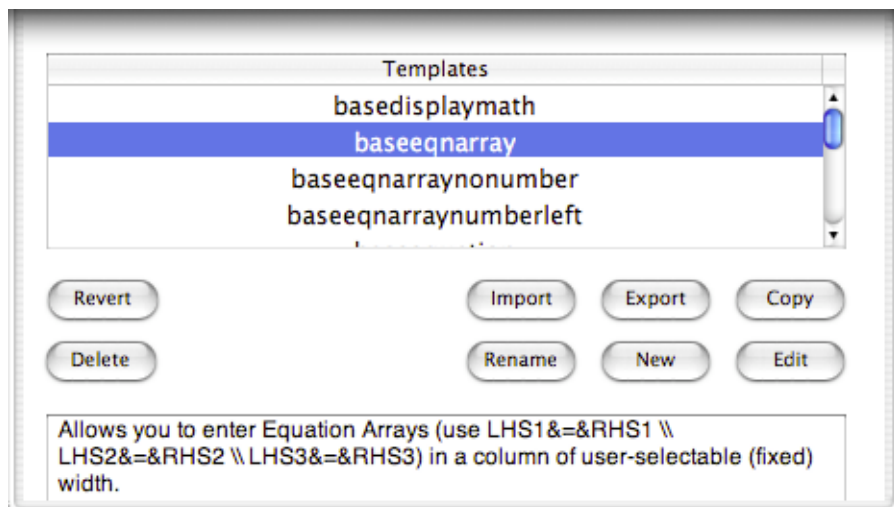


Figure 4: Templates List

basedisplaymath Typesets just the equation at a fixed width (all templates generate equations at a fixed width unless otherwise indicated).

baseeqnarray Typesets the equation(s) (this template multiple equations, separated by a $\backslash\backslash$) and numbers them on the right in a sequential fashion.

baseeqnarraynonnumber Exactly like *basedisplaymath* except that it does not number the equations.

baseeqnarraynumberleft This is another variation on *basedisplaymath*: the numbers are placed on the left of the equation.

baseequation Typesets a numbered equation.

baseequationnumberleft Typesets a numbered equation with the number on the left (use *basedisplaymath* for typesetting an equation without a number).

basemathmode Similar to *basedisplaymath* except that it is of a non-set width.

basetextmode Basic \LaTeX text mode, columns are not of a fixed width.

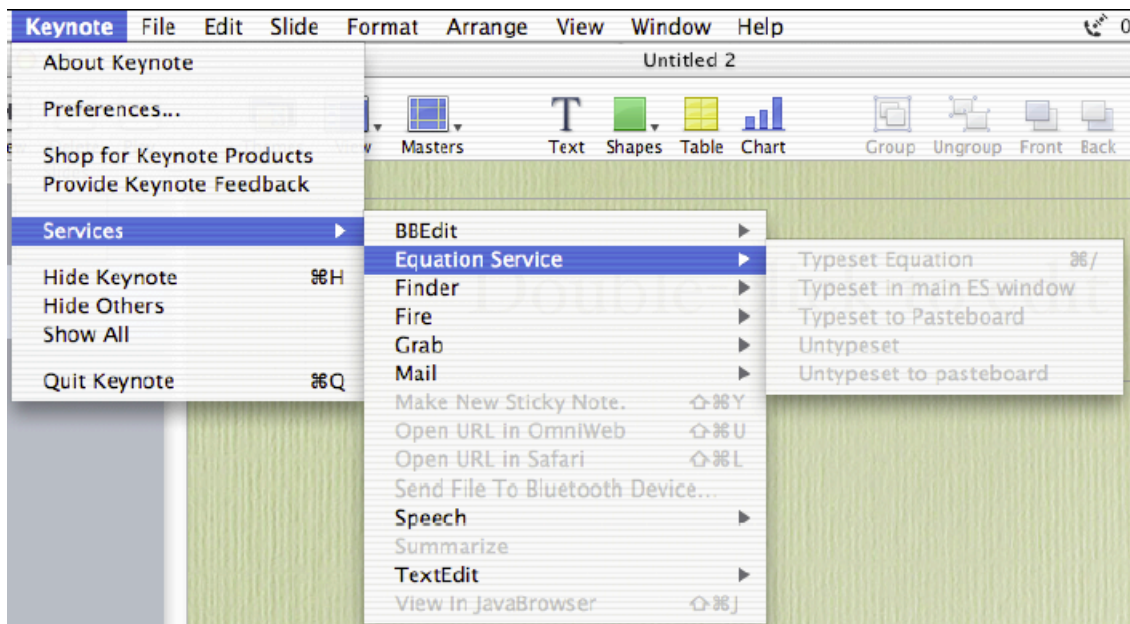


Figure 5: Equation Services Menu

basetextmodecolumn Similar to *basedisplaymath* except that columns are of a fixed width.

blankfullpage A normal \LaTeX document.

blanktemplate A completely blank page, provides nothing for you (therefore, if you use this, you have to begin with $\backslash\text{begin}\{\text{document}\}$ etc.).

3.3 Typesetting the Equation: The Services Menu

3.3.1 Introduction

Equation Service offers a variety of options via the services menu while simply typing in another application (see Figure 5 for what this looks like). To use this feature, highlight the \LaTeX equation that you have written in your favorite application, go under the Application's Menu to "Services" and select "Equation Service." It will then give you a list of available options, not all of which will be available in every application. These options will be discussed in greater detail below.

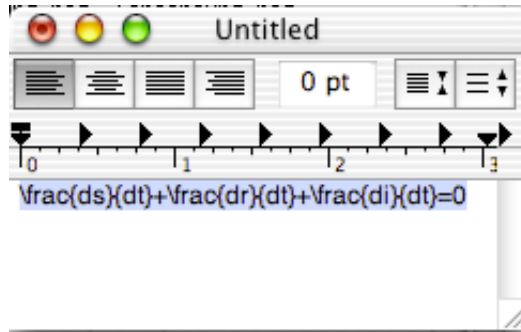


Figure 6: Insert the equation into TextEditor...

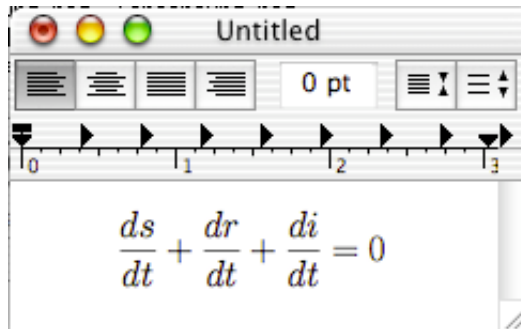


Figure 7: ...and boom!

3.3.2 Typeset Equation

This is the feature provided by the original Equation Service . It allows you to typeset equations directly in most applications that can import PDF files directly—such as TextEdit (Keynote is unfortunately not on the list of applications that can take advantage of this feature).

Using it is simple: Go into an application that supports it (such as Apple’s TextEdit), enter the the text that you wish to typeset and highlight it (as shown in Figure 6), then either select ”Typeset Equation” from the services menu or press Command-\ and Equation Service will do the rest (see Figure 7).

3.3.3 Typeset Equation in Pasteboard

Equation Service 0.7B the ability to typeset to the pasteboard—or the clipboard, as many MacOS users will want to call it—and then paste it into your document wherever you like. This functions the same way as typesetting the equation directly does, except that instead of replacing the text that you have highlighted, it will put what it typesets into the pasteboard so that you then can use the ”Paste” command (generally Command-v) and place it where you like. While not as seamless as using Typeset Equation, Typeset Equation in Pasteboard

offers compatibility with a broader array of applications: including Keynote.

3.3.4 Typeset Equation in ES Window

This is almost identical to the Typeset Equation in Pasteboard option, except that instead of copying it to the pasteboard, it places it into the Equation Services Application Window. From here it can be dragged to the application of your choice. This allows you to use your favorite text editor⁴ or L^AT_EX editing program⁵ with any application that allows you to drag-and-drop PDF files, while still previewing what you have typeset before dropping into the project.

4 Using Equation Service with Keynote

4.1 Through Services

Unfortunately, as the result of a bug in Keynote, you cannot typeset text directly in Keynote. Fortunately, you *can* typeset an equation directly from Keynote into the Pasteboard and then immediately paste it anywhere in your presentation and you can typeset an equation directly from Keynote into Equation Service and then drag-and-drop (or export, or copy) it back into Keynote at your leisure. The process for how to do this is explained in sections 3.3.3 and 3.3.4. These methods will unfortunately only work with Equation Service 0.7B or greater.

4.2 Through the Application

If all else fails, one can use the application directly with Keynote. This has the advantage of being able to write clean text and check your formatting before dropping them into the presentation, though it also has the noted disadvantage of having to constantly switch between two applications (though admittedly no more than when Typesetting to the ES Window). It also has the noted advantage of being usable with Equation Service 0.5B and Keynote.

Simply enter the equation into the Equation Service input box, hit the "Typeset" button, and drag the finished product over into Keynote.

⁴<http://www.barebones.com>

⁵<http://www.uoregon.edu/~koch/texshop/texshop.html>

A Tips and Tricks

This is a list of quick tips and trips with Equation Service to make your experience integrating it with Keynote smoother and more pleasant.

- When you "Typeset to Pasteboard" Equation Service has a tendency to come to the front, requiring you to click on Keynote in order to paste the now-typeset equation there. If you minimize the Equation Service window, however, by clicking on the yellow button in the upper-left of the Equation Service window, then Equation Service will remain in the background and allow you to remain in Keynote, while still typesetting your equation into the pasteboard⁶.
- If you are going to use the transparent background, set the background color in Equation Service to be something that starkly contrasts your text color. That way you can see what the equation is going to look like in the Equation Service main window, tweak it, and then simply select "Transparent Background" before you render it one last time and include it in your document.
- Set the template and preferences in Equation Service to be fairly generic for your own uses—so when you typeset an equation inside of an application, there is a greater chance of it looking like what you wanted it to look like. I recommend the template *baseeqnarraynonumber* for most day-to-day use.
- Disable "Scale Output PDF to fit in view" in the ES Prefs tab.

B References

B.1 Websites

B.1.1 Necessary Software

- **i-Installer** <ftp://ftp.nluug.nl/pub/comp/macosx/volumes/ii2/II2.dmg>
- **Equation Service** <http://www.esm.psu.edu/mac-tex/EquationService/ESFiles/EquationService0.5B.dmg.gz>

⁶Tip courtesy of Doug Rowland

B.1.2 Additional Tools

- **TeX FoG** http://homepage.mac.com/marco_coisson/MacOSXsoftware.html A neat little utility by Marco Coisson that will help you in quickly typesetting mathematical \LaTeX without having to remember the commands.
- **TeXShop** <http://www.uoregon.edu/~koch/texshop/texshop.html> This will cover virtually all of your typesetting and document preparation needs with \LaTeX .
- **\LaTeX 2HTML** <http://www.latex2html.org/> While I have heard reports of people getting this to work on MacOS X, I have never tried it myself. Requires perl.
- **BBEdit** <http://www.barebones.com> The best text editor in existence (or at least for MacOS X), it can easily be adapted for working with \LaTeX .

B.1.3 \LaTeX References and Guides

- **Short Math Guide for \LaTeX (PDF)**
<ftp://ftp.ams.org/pub/tex/doc/amsmath/short-math-guide.pdf> This is the fundamental reference I would recommend everyone reading this document download and at least take a look at. It is not the best guide in the world, nor the easiest to follow, but it is a great reference and covers most everything users of Equation Service will probably want or use.
- **An Introduction to Using \TeX in the Harvard Mathematics Department.**
<http://abel.math.harvard.edu/computing/latex/manual/texman.html> A good, basic guide, though most of it emphasizes things Equation Service users do not need to deal with. This one does go over actually creating documents, however, which is useful if you are going to use TeXShop.
- **Math Symbols.** <http://www.giss.nasa.gov/latex/ltx-117.html> This is a reference to various symbols you might use in your mathematical typesetting, along with a few helpful tips on how they might be used. An excellent quick reference.
- **\LaTeX Math Symbols.**
<http://www.fi.uib.no/Fysisk/Teori/KURS/WRK/TeX/symALL.html> Similar to NASA's, but not as well organized. That being said, this one does show you images of what many of the symbols look like after they have been typeset.
- **Users Guide for the amsmath Package**
<ftp://ftp.ams.org/pub/tex/doc/amsmath/amslldoc.pdf> This document is exactly what it sounds like: a User's Guide for the American Mathematical Society package that was installed earlier.

B.1.4 Keynote Websites

- **Apple's Keynote Website** <http://www.apple.com/keynote>
- **The Keynote Page** <http://www.keynoteuser.com/> An excellent page on keynote filled with tips, tricks, themes, comparisons, tutorials, troubleshooting help, and much much more!
- **Keynote Yahoo Group** <http://groups.yahoo.com/group/applekeynote> It was this yahoo group that the motivation to create this document originally came from.

B.1.5 Other Websites

- **The American Mathematical Society** <http://www.ams.org/>
- **Sen:te Software's Goban** <http://sente.epfl.ch/software/goban/> The best MacOS X Go program available. It makes use of gnugo as the opponent and is completely free.
- **Equation Service** <http://www.esm.psu.edu/mac-tex/EquationService/> This is the homepage for Equation Service.

B.2 Books

- **\LaTeX for Linux** by Bernice Sacks Lipkin. This is an easy-to-use and easy-to-follow general guide for using \LaTeX . The book assumes no prior knowledge and this, more than anything else, makes it a worthwhile book (as the author says in the introduction, most \LaTeX books seem to be written by \LaTeX developers for \LaTeX developers). Do not be fooled by the title: there is almost nothing in this book which is Linux specific.
- **The \LaTeX Companion** by Goossens, Mittelbach, and Samarin. This is one of those books that, when you first read through it, will seem like it is for developers and by developers, but its tables and tables of symbols, along with its section on Higher Mathematics, make it all worthwhile in the end if you are typesetting any kind of equations. It makes a wonderful reference, though there are better guides to teach yourself from.
- **Math Into \LaTeX** by George Gratzer. This is a basic, introductory guide to typesetting equations into \LaTeX and setting them into your document. It is not quite as expansive as many would probably like in its coverage of the field, but it does provide a good, basic reference on the topic.

C L^AT_EX Equation Examples

These are examples to showcase some of the capabilities of L^AT_EX and Equation Service.

$$u_{i+1} = \sum_{k=0}^n p_k (u_i)^k \quad (1)$$

$$\left[\frac{\hbar^2}{2M} \nabla^2 + V(\vec{r}) \right] \varphi_E(\vec{r}) = E \varphi_E(\vec{r}) \quad (2)$$

$$2\pi i f(z_0) = \oint_c \frac{f(z)}{z - z_0} dz \quad (3)$$

$$\frac{\partial u}{\partial t} = D \left[\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} \right] \quad (4)$$

$$\oint_c (P dx + Q dy) = \iint_R \left(\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y} \right) dx dy \quad (5)$$

$$\neg \forall x \exists y P(x, y) \leftrightarrow \exists x \forall y \neg P(x, y) \quad (6)$$

Equation 1 is an example of the population extinction equation in the book *An Introduction to Stochastic Modeling, Third Edition* by Howard M. Taylor and Samuel Karlin.

Equation 2 is the stationary Schrödinger equation.

Equation 3 is the Cauchy Integral Formula.

Equation 4 is the Diffusion Equation in 2-dimensions, with a constant coefficient.

Equation 5 is Green's theorem.

Equation 6 "if it is not true that every person loves someone, then it follows that there is a person who loves no one" (*Standard Mathematical Tables and Formulae*, edited by Daniel Zwillinger)

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PowerPoint is the trademark of Microsoft, Inc.

Keynote is the trademark of Apple, Inc.

E Version History

- **26 February 2003: 1.0b1** First draft released. The formatting on this version of the document has not yet been refined so there are many gremlins and bits of unclean formatting running around. Further, Equation Service 0.7B has not yet been released into the wild, so this document mainly covers using a copy of the software which is not quite public. Most of the features here will work with just 0.5B (including all of the installation information) though some of them are version 0.7B specific. The distinction is not always made in the text which features are for 0.7B only, though I can attest that 0.5B works fine with Keynote, if not as seamlessly. Finally, this copy was finished rather abruptly and all of the explanations are not quite as smooth or as refined as I would like them.
- **1 March 2003: 1.0b2** Did some quick fixes based on feedback from Brian Peat (aka The Keynote Guy, mainly formatting and the direction the document could take) and Doug Rowland (the inventor of Equation Service, useful suggestions for Equation Service and for apps to go with it). I also did a little cleaning up of some of the text and the L^AT_EX code and added the information on TeX FoG at the suggestion of Doug Rowland. A few examples were added to showcase what can be typeset. Finally, I separated the Trademarks and the Copyright sections under Appendix D.