The standard Greek package `xstdgreek, ver 2.1`

http://xstdgreek.sourceforge.net

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This package provides a bug-free, idiot-proof, Greek language environment for Unicode enabled LaTeX like XeLaTeX and LuaLaTeX.

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Chapter 1

Goals

THIS package provides a bug-free, idiot-proof, Greek language environment for Unicode enabled LaTeX like XeLaTeX and LuaLaTeX. We try to offer everything that is needed to type Greek modern, polytonic and ancient, include special symbols like tricolon and chi-rho. We are open to any suggestion or to find solution to any related problem. We are also provide a few utilities that are useful to us or to you.

```
\documentclass[a4paper,10pt]{report}
\usepackage{xstdgreek}
\begin{document}
Ω τι όμορφος ο κόσμος του \LaTeX αν δεν χρειάζεται να ψάξεις
και να διαβάσεις 20 πακέτα, 30 γραμματοσειρές και 60 μηνύματα
στις συζητήσεις του διαδίκτυου απλά για να γράψεις ένα κείμενο
με ελληνικά.
\end{document}
```

The above example had to works in any case.

- The project is free under Apache License 2.0.

> *“Δημιουργήθηκε από το Apache Foundation και είναι η άδεια υπό την οποία διανέμεται ο εξυπηρετητής HTTP Apache. Είναι μια πολύ αναλυτικά διατυπωμένη άδεια, που ενώ επιτρέπει την αναδιανομή και τροποποίηση του λογισμικού, απαιτεί αυτή να γίνεται υπό την ίδια άδεια, να δείχνονται αναλυτικά ποια αρχεία του πηγαίου κώδικα πείραξε ο χρήστης και απαγορεύει τη χρήση υλικού που σχετίζεται με πατέντες λογισμικού καθώς και τη χρήση ονομάτων και συμβόλων του αρχικού συγγραφέα για διαφημιστικούς σκοπούς. Τέλος, απαλλάσσει το δημιουργό από κάθε ευθύνη σχετική με τη χρήση του προγράμματος”*
>
> — Κοινότητα Ελεύθερου Λογισμικού ΕΜΠ

- The project intents to be supported and controlled by its members as a typical FSF project at sourceforge. This project it must be not “mine”. This is job for a team of users that care about Greek support in their texts.
- Any person that can help, in anything, even just beta tester, can be member of the team.
- This project intents to standardize the Greek macros and Greek usage in Unicode enabled LaTeX.
  For example: the ‘ano teleia’ is the Greek ‘semi colon’ but there is no standard macro! There is a standard character in Unicode standard, but isn’t sure that is alright.
- Priority is solutions to any Greek related problem. Our goal is to fix any such problem. You use the package, you have the environment .-
- Checked GPL’ ed or other free-license fonts for Greek compatibility, and provide relative macros. Those helping macros actually just declares that the font is *approved by us*. It has all the necessary symbols, or can fixed with our macros.

- Fixes ‹***hyperref***› for perfect PDFs WITH perfect contents sidebar.
- An improvement set of Greek symbols commands, that works in almost anywhere and does not have problems with PDFs.
- Greek enumeration without any 'special' symbols, except Greek that works.
- Absolute support of a) LiveTeX, b) MikTeX and c) MacTeX.
- Default fonts, GPL' ed, OpenType with Greek. Any font can be added by its type (serif, sans serif, monospace) but it must be some kind free licensed and pass our test page. The monospace family it does not needed to support all symbols but monotonic.
- This project does not use ‹***polyglossia***›[14], ‹***babel***›[13], ‹***xgreek***›[15] or any other language specific package. It will try to support them as secondary packages mostly for non-Greek texts and users.

1.1 Why another one Greek package

This is simple. Because I want to use just a Greek package and start writing my manual, report or article. I got sick so many years to have partially support in *TEX, searching fonts, packages and the rest. There is actually no support, and the changes in the whole TEX community is slower than a ZX48 when loading from cassette tape.

After 37 years still has no stack (real one) and no script language (it has preprocessor, not script language, that is why the hell of 'expanding'). Well at least it is not the "troff".

This package written by me just to solve PDF problems with Greek letters. Now, it has full Greek and English support. It is lighter and better. More languages can be added easily.

I use libertine package/fonts in case that there are no fonts specified. To avoid this, use '*fontset=none*' or simple just use your fonts with ‹***fontspec***› as you did without this package.

Chapter 2

The manual

2.1 Requirements

This package requires XeLaTeX or LuaLaTeX.

Recommented:

Libertine Package†
Use Linux Libertine and Biolinum Fonts with LaTeX: CTAN:Libertine. It is our default font.

UMTyperwriter Package†
Linux Libertine Mono has no Greek support, so, we need this good font: CTAN:UMTyperwriter. It is our default monospace font.

GNU Free Fonts Package
Well, has almost all symbols that required by this package and it is GNU! CTAN:GNU-freefont.

Cardo Font
A few symbols that are missing from GNU fonts can be found in Cardo free font. Cardo Home Page.

All required packages are exists in the three major distributions, LiveTeX, MikTeX, and MacTeX; and CTAN. This package supports the last Unicode standard (version 7.0), but fonts does not. Give them some time and they will do it.

† Both fonts are no actually needed if you use another '*fontset*' or the '*fontset=none*' option. Both fonts are selected because have good quality, the licenses, the majority of required Greek symbols and how much close are to default TeX fonts (the old Greek version). More about fonts at A′ appendix.

- ▷ Try to have always updated your TeX distribution; things changes and we check this with the latests versions.
- ▷ For non-greek users, I suggest to use with the ‹***alphabeta***›[12] by Günter Milde. This package offers Unicode support with accent macros.

2.2 How to use the xstdgreek

Just copy the '`xstdgreek.sty`' file in the same directory with your '`.tex`' file and load it with '**\usepackage{***xstdgreek***}**'.

- It must be of the firsts packages that you load since it loads ‹***fontspec***› **if it is not loaded**.
- You don't need to change anything.
- You can use our macros only if you wanted to.
- You can use both style together, standard XeLaTeX and our macros.

- If you encounter problem please report it. If you have to suggest a solution, this is even better. We will fix it or we will note it with the solution at the FAQ chapter.
- You don't have to load any other language package.

2.2.1 Using xstdgreek with polyglossia

The xstdgreek does not need any language package but it is designed to allow the use of other language packages. If you like to use ‹***polyglossia***›[14] just load it after ‹***xstdgreek***›. You can use both ways to type your text, it will work together. In any case I have to say it is not wise; it is better to ask us to add what capability is missing.

▷ Do not set Greek as default language. That will have result to cancel some of the fixes of this package.

```
\documentclass[a4paper,10pt]{article}
\usepackage[language=german]{xstdgreek}

% loading polyglossia
\usepackage{polyglossia}
\setdefaultlanguage{german}
...
```

2.2.2 Using xstdgreek with babel

The xstdgreek does not need any language package but it is designed to allow the use of other language packages. If you like to use ‹***babel***›[13] just load it after ‹***xstdgreek***›. You can use both ways to type your text, it will work together. In any case I have to say it is not wise; it is better to ask us to add what capability is missing.

▷ Do not set Greek as main language. That will have result to cancel some of the fixes of this package.

```
\documentclass[a4paper,10pt]{article}
\usepackage[language=spanish]{xstdgreek}

% loading babel
\usepackage[spanish]{babel}
...
```

2.2.3 Using mathematical package with xstdgreek

The ‹***xstdgreek***› redefines the Greek letters, to not do so, use the option '*no-math*'. Load the package before xstdgreek to avoid any more conflicts (like redefinition of '**\digamma**'). Our package also checks if a known math package loaded before it and set automatically the '*no-math*', to enable the Greek letters use '*math*'.

The best case is to select a package that use a prefix for mathematical Greek letters. For example: \mathAlpha instead of \Alpha.

```
\documentclass[a4paper,10pt]{article}
\usepackage{libgreek}
\usepackage[no-math]{xstdgreek}
...
```

▷ The AMS 'contains-as-member' ('**\ni**') will automatically moved to the command '**\amsni**' (∋).

2.2.4 Loading fontspec package before xstdgreek

The xstdgreek redefines the Greek letters; use the option '*no-math*' with ‹***fontspec***›[1] or with ‹***xstdgreek***› or with both.

```
\documentclass[a4paper,10pt]{article}
\usepackage{fontspec}
\usepackage[no-math]{xstdgreek}
...
```

2.2.5 Loading hyperref

One of the primary targets of this package is the best compatibility with the ‹***hyperref***›[3]. We could load it inside the package but the best case is to load it last.

We suggest to load it with those parameters, which actually are all that can support:

```
\usepackage[unicode=true,backref=page,linkcolor=blue,urlcolor=blue,colorlinks=true,
        bookmarks=true,bookmarksopen=true,bookmarksnumbered=true,hyperindex=true,
        pdfstartview=FitH,pdfview=FitH,pdfpagemode=UseOutlines,naturalnames=true]%
        {hyperref}

\hypersetup{pdfauthor=My Name, pdftitle=My Document Title}
```

2.3 Package and Options

To load the package you need to use the ‘**\usepackage**’.

There are some rules about naming macros:

1. All command names are using capital letter at begin or in middle if word is changed.
2. All symbol or letter macros are with lower characters, if the symbol is upper case one then the first letter of the macro is upper case too.

Syntax `\usepackage[[option [, ... ]]]{xstdgreek}`

Description Load the package after the ‘**\documentclass**’ command. This package loads ‹***fontspec***›[1], ‹***ifthen***›, ‹***etex***›, ‹***etextools***›[2], ‹***adjcalc***›[3] and ‹***xkeyval***›[4] packages.

Parameters

‘*language=lng*’ Select the default language as defined in ‘`language.def`’.

All languages are supported since are defined in ‹***hyph-utf8***›[2]. The ‘*lng*’ is the language code and it is the same. You can load babel, polyglossia or other package after the xstdgreek and use another language as main. The last packages are no need in Unicode environment except for hyphenation, but hyphenation is loaded at the beginning for all languages and handled by ‹***xstdgreek***› too. Except Greek and English; for other languages need only to redefine the translation of LaTeX constants, such as the preface-name and the chapter-name. You can copy them from the package, redefine, and send them to us back for officially support, or just send me the translation.

‘*monotonic*’ Select as default language the standard Greek monotonic system. This is same as ‘*language=monogreek*’. This is the default if no option are given.

‘*polytonic*’ Select as default language the standard Greek polytonic system. This is same as ‘*language=polygreek*’.

[1] ‹***fontspec***› loads a lot: ‹***xunicode***›, ‹***e-tex***›, ‹***expl3***›, ‹***xparse***› and ‹***graphicx***›!

[2] XeLaTeX / LuaLaTeX has ε-tex extensions by default. The e-tex is the most significant upgrade of TeX, I suggest to activate it always in any document.

[3] This package is like ‹***calc***› but based on ε-TeX extentions

'*greek*' — ″ —

'*ancient*' Select as default language the ancient Greek system (well, whatever is supported). This is same as '*language=ancientgreek*'.

'*english*' Select as default language the British English. This is same as '*language=british*'.

'*sans-serif*' Makes default the sans-serif font family. In all TEX environments the Roman family is always the default text family.

'*grsix=sid*' Defines the 6th symbol of Greek rumerical system. The values of '*sid*' can be 'alpha', 'stigma' or 'digamma'.

'*keraia=sym*' Uses '*sym*' for Greek upper [right] numeral sign. The symbol is relative new in Unicode Standard and it does not exists in many fonts. Also, it had issues with ‹***hyperref***› and PDFs until the beginning of 2015.

'*math*' Defines Greek letters.

'*no-math*' Does not defines Greek letters. This should solve any problem with mathematical packages. If not just report it.

'*slzero*' Set the slashed zero as default font option before load the fonts.

'*swano*' Swap '**\anoteleia**' / '**\ano**' macros with '**\varano**'.

'*quiet*' Stop print debug messages.

'*old-calc*' Compatibility issue: Load the ‹***calc***› instead of ‹***adjcalc***› which based on ε-TEX number expression.

'*fakesc*' Replaces '**\textsc**' with '**\FakeSC**'. This is needed if we want to use small cap but the font does not support it as usual.

'*scale=f*' Scaling factor of font size. 1.0 = no scaling.

'*fontset=fs*' Optionally you can select a font set that we prepared for you or none. Those fontsets just guaranty that have all the necessary Greek symbols (monotonic) and they are Free (free as liberty). Also I tried to fit the different styles to be close the one to other (for example, the selected serif [Roman] looks close to the sans serif font).

If the '*fs*' is none then no font will be load; otherwise it loads the fontset. If no fontset specified, it loads the libertine package[8] and uses the *UM Typewriter* for mono space font since the *libertine mono* has no Greek letters yet.

If the '*fs*' ends with '!' then the fonts will be loaded without tried to be match with the default TEX font. However, except the Roman the sans-serif and the monospace font will scale to match with Roman font.

Table 2.1: Predefined fontsets

Name	P[4]	Roman	SansSerif	Teletype
none	-	-	-	-
libertine	1	Linux Libertine O	Linux Biolinum O	UMTypewriter
gnu	1	FreeSerif	FreeSans	Free Mono
cmu	1	CMU Serif	CMU Sans Serif	CMU Typewriter Text
dejavu	1	DejaVu Serif	DejaVu Sans	DejaVu Sans Mono
croscore	1	Tinos	Arimo	Cousine
kerkis	1	Kerkis	KerkisSans	UMTypewriter
windows	0	Times New Roman	Arial	Lucida Console
liberation	0	Liberation Serif	Liberation Sans	Liberation Mono
roboto	0	Roboto Slab	Roboto	DejaVu Sans Mono

[4]Supports polytoniko.

Example

```
\documentclass[a4paper,11pt]{report}
\usepackage[polygreek]{xstdgreek}
...
\begin{document}
...
\end{document}
```

2.4 Commands

You can use everything as you already know. ‹***fontspec***› is already loaded and you can use it as you know. All commands are optional.

2.4.1 \NewFontSet

Syntax `\NewFontSet{roman}{sans}{mono}`

Description Loads a new fontset and tries to fix the sizes with 'MatchLowercase' option to original Computer Roman, with the additional parameters that we had speficied for fonts. This is the way we are control the fonts in XeLaTeX. Of course you can use '**\fontspec**' and '**\newfontfamily**' as described[1] in their manual.

Parameters

'*roman*' The Roman fontname family

'*sans*' The Sans Serif fontname family

'*mono*' The monospace fontname family

Example

```
\NewFontSet{GFS Didot}{GFS Neohellenic}{UM Typewriter}
```

2.4.2 \IndFontSet

Syntax `\IndFontSet{roman}{sans}{mono}`

Description Loads a new fontset and tries to fix the sizes with 'MatchLowercase' option to first font ('*roman*'), with the additional parameters that we had speficied for fonts. This is different than '**\NewFontSet**' since does not match the font with original Computer Modern font. Of course you can use '**\fontspec**' and '**\newfontfamily**' as described[1] in their manual.

Parameters

'*roman*' The Roman fontname family

'*sans*' The Sans Serif fontname family

'*mono*' The monospace fontname family

Example

```
\IndFontSet{GFS Didot}{GFS Neohellenic}{UM Typewriter}
```

2.4.3 \FakeSC

Syntax `\FakeSC{text}`

Description Drawing capital letters in small size like '**\textsc**'.

Parameters

'*text*' The '*text*' to be printed in small-caps.

Example

```
1 \FakeSC{This is an example of FakeSC.}
```

THIS IS AN EXAMPLE OF FAKESC.

2.4.4 \FirstCap

Syntax `\FirstCap{text}`

Description Makes the first letter of each word, upper-case.

Parameters

'*text*' The '*text*' to be printed.

Example

```
1 \FirstCap{my song title that i love}
```

My Song Title That I Love

2.4.5 \DropCap

Syntax `\DropCap{lines}{scale}{text}`

Description Makes the first letter of paragraph, big.

Parameters

'*lines*' The '*lines*' of paragraphs text that will be used for the text.

'*scale*' The overal '*scale*' of the text.

'*text*' The '*text*' to be printed.

Example

```
1 \DropCap{3}{4.5}{T}HIS is the story...
```

2.4.6 Numbering

The Greek numeral algorithm copied from ‹***xgreek***›[15] and fixed. There was a bug with expanded and '**\MakeUppercase**', another one with Greek numeric sign[5], I couldn't fix, at least the first, without change the package.

\GreekNum{*int***}**
Prints an integer number in Greek numeral system.

[5] For a reason it does not accepted nor by XeTeX, but also not by ‹***hyperref***›, probably PDF issue.

\GreekNumCap{*int***}**
Same as '**\GreekNum**' but prints the number in upper-case.

\LatinNum{*int***}**
Prints an integer number in Latin "numeral" system, actually the letters a-z.

\LatinNumCap{*int***}**
Same as '**\LatinNum**' but prints the characters in upper-case.

\SetAlphaStyle{Greek|Roman|Arabic|Latin**}**
Selects the type of alphabetic enumeration. The xstdgreek by default assigns 'Greek' style.

2.4.7 \textsubsuperscript

Syntax `\textsubsuperscript[align]{text-sup}{text-sub}`

Description Displays superscript and subscript text together. This is especially useful in physics and chemistry.

Parameters

'*align*' This optional parameter defines the align of the super and sub script. It can be '*l*' for left align, this is the default, '*c*' for center and '*r*' for right-align.

'*text-sup*' The text for superscript.

'*text-sub*' The text for subscript.

Example

```
1 \textsubsuperscript[c]{εκθέτης}{δείκτης}...
2 ... U\textsubsuperscript[r]{unstable}{235} ...
```

εκθέτης
δείκτης... ... U$^{\text{unstable}}_{235}$ ...

2.4.8 Quoted text

\sq{*text***}**
Prints the '*text*' inside of single quotes. The quotes depended by the current language.

\dq{*text***}**
Prints the '*text*' inside of double quotes. The quotes depended by the current language.

2.4.9 Date macros

\GreekMonth{*month***}**
The name of the month. The '*month*' parameter can take values 1 to 12.

\GreekShortMonth{*month***}**
The short name of the month. The '*month*' parameter can take values 1 to 12.

\GreekMonthU{*month***}**
The name of the month with -ou suffix. The '*month*' parameter can take values 1 to 12.

\PolyGreekMonthU{*month***}**
The name of the month in polytoniko with -ou suffix. The '*month*' parameter can take values 1 to 12.

\GreekWeekday{*weekday***}**
The name of the day of the week. The '*weekday*' parameter can take values 1 to 7.

\GreekShortWeekday{*weekday***}**
The short name of the day of the week. The '*weekday*' parameter can take values 1 to 7.

2.4.10 Hyphenation

The following macros controls hyphenation and the quotes in '**\sq**' and '**\dq**' commands. The ‹***xstdgreek***› does not use ‹***babel***›[13] or ‹***polyglossia***›[14], that is why is so fast and correct but it uses low-level the ‹***hyph-utf8***›[2] package which is always loaded in any latex environment. After all, except the hyphenations patterns and the redefinition of standard language constants[6] there is no any use in UTF-8 for those packages.

The following commands are used to switch hyphenation:

\UseLanguage{*langcode***}**
Enable '*langcode*' hyphenation.

\UseGreek *or* **\UsePolyGreek**
Enable polytoniko hyphenation.

\UseAncientGreek
Enable the "ancient" hyphenation; whatever that means.

\UseEnglish *or* **\UseBritish**
Use British hyphenation.

\UseAmerican
Use American hyphenation.

- ▷ **The above** commands are not needed if you switch language by ‹***polyglossia***› or ‹***babel***›.
- ▷ **All languages** of ‹***hyph-utf8***› are supported. The '*langcode*' are the same since it is the package that creates the hyphenations in XeLaTeX and LuaLaTeX.
- ▷ **Environments** are exists for Greek, PolyGreek, AncientGreek, English, British and American.

```
\begin{Greek}
Απόγονοι, ελέγξετε καλά τα λεξικά σας:
μες απ' τη Λήθη θ' αναδυθούν
φάσματα, λέξεις σαν αυτές:
«πορνεία», «φυματίωση», «αποκλεισμός», όχι άλλες.
\end{Greek} --- Владимир Маяковский
```

[6] Translations of words like 'page', 'contents', 'chapter' etc

2.5 Symbols

Those symbols are provided or redefined in this package. With exception the '**\ano**' the aliases are used for compatibility with other and/or older packages.

About the "ancient" and "archaic" symbols and macros, **they defined in Unicode standard**[11], that does not means they are correct nor we agree with them, but we had to support whatever it offers, (see Greek and Coptic, and Extended Greek character sets[10]).

Command	Symbol	Alias	Comment
Basic			
\tonos	ʹ	\oxia	
\keraia	ʹ		Numeral sign
\ariskeraia	ʽ		Left numeral sign
\anoteleia	·	\ano or	Semi-colon. It is defined in the Unicode standard as «Greek Ano Teleia». The height is defined by the font.
		\anwteleia	"Test ano· teleia" - bad
\anox	˙	\varano	Alternative Ano Teleia. U+0307 "Combining Dot Above" mixed with space. "Test ano˙ teleia" - good
\anokatoteleia	:	\colon or \anwkatwteleia	Colon
\areis	«	\glqm	Greek Left Quotation Mark
\dxeis	»	\grqm	Greek Right Quotation Mark
\paula	–	\gdqm	Greek Direct Quotation Mark
\q{text}	«text»	\eis{text}	Short text in quotes[7]
\omoiomatika	»		Ditto marks
\omoios	— » —		Long ditto marks
\omoiosx	— ″ —		Long ditto marks (Classic 2x Keraia)
\ellipsis	…	\aposiop	Αποσιωπητικά
Common			
\varcolon	∴		Alternative Colon[8]
\tricolon	⋮		Tricolon[9]
\Sigmalunate	Ϲ		Greek Sigma Lunate[10]
\sigmalunate	ϲ		Greek Sigma Lunate Small
\OY	Ȣ		Greek monograph of 'OY'[11].
\ou	ȣ		Greek monograph of 'OY' small
\Kai	Ϗ	\Kae	Greek ampersand[12]
\kai	ϗ	\kae	Greek ampersand; small
\dia	÷		
\synpl	±		Use this instead of $\pm$
\peripou	≈		approx - text
\deg	°		
\Celsius	℃		
\euro	€	\Euro	
\permill	‰		

[7] HTML 4.01, see also lq and dq commands

[8] Suitable for uppercase letters; see Nestor's cup p19.

[9] Epidaurian tricolon; see Acropolis p19.

[10] «In handwritten Greek during the Hellenistic period (4th and 3rd centuries BC), the epigraphic form of Σ was simplified into a C-like shape. It is also found on coins from the fourth century BC onward. This became the universal standard form of sigma during late antiquity and the Middle Ages. It is today known as lunate sigma (upper-case C, lower-case c), because of its crescent-like shape. It is still widely used in decorative typefaces in Greece, especially in religious and church contexts, as well as in some modern print editions of classical Greek texts.» — Wikipedia

[11] This is a temporary solution: The 'OY' monograph does not exists in Unicode standard, but in Extended Latin B character set and also in Cyrillic alphabet, all with name 'ou' or 'ouk'. This monograph is used even today.

[12] You can see it in original text p21, 4nd line (title not included), 3rd word.

\perthou	‰		
Byzantine and Aristarchean (200 BC) symbols			
\asteriskos	※		Asteriskos. Aristarchean sign[13].
\Antisigma	Ↄ		Antisigma. Aristarchean sign[14].
\Sigmaps	Ϲ		Sigma Periestigmenon. Aristarchean sign.
\sigmaps	ϲ		Sigma Periestigmenon Small. Aristarchean sign.
\Antisigmaps	Ↄ		Antisigma Periestigmenon. Aristarchean sign[15].
\diple	>		Aristarchean sign.
\dipleps	⸖		Diple Periestigmene. Aristarchean sign.
\obelos	–		Aristarchean sign.
\esti	⁒	\dottedobelos	(shape similar to '%') In Byzantine used for the word 'εστί'[16].
\bullet	•		Aristarchean sign[17].
\colophon	⁖		Textual highlighter or colophon, used e.g. by Michael Attaleiates (1022-1080 AD).
\dottedcross	⁜		No actual meaning. Used often in Byzantine texts.
\XR	⸓	\ChiRho	Christ's monogram[18]. Still used in religion texts and pictures.
\artabe	⏗	\varouden	The Zero[9], in Byzantine era $\bar{o}$ and late Byzantine just 'o'. Depended on the font, if it is an 'o' with a fancy bar over it, then it is the zero.
\ptouden	⏓	\ouden	Zero (Ptolemy)[19]. This is the officially Greek Zero in Unicode standard; but it depended by the font if it is the astronomical zero or the «artabe».
Ancient and Archaic, 800-300 BC			
\Koppa	Ϟ		Koppa, No.90
\koppa	ϟ		Koppa Small
\Sampi	Ͱ		Sampi, No.900
\sampi	ͱ		Sampi Small
\Digamma	Ϝ		Digamma, No.6
\digamma	ϝ		Digamma Small
\Stigma	Ϛ		Stigma, No.6
\stigma	ϛ		Stigma Small
\San	Ϻ		San
\san	ϻ		San Small
\Sho	Ϸ		Sho
\sho	ϸ		Sho Small
\Pamdigamma	Ͷ		Pamphylian Digamma[20]
\pamdigamma	ͷ		Pamphylian Digamma Small
\Misoeta	Ⱶ		Half Eta[21]

[13] Meaning: Swap the location of this line with the line marked by obelus.
[14] Meaning: this line is out of place.
[15] Meaning: Move the line(s) after the antisigma periestigmenon to the spot marked with sigma periestigmenon.
[16] This sign has many glyph variants, including '÷' (which is why the official name of the division sign '÷' is obelus).
[17] Meaning: This line is suspect.
[18] Some coins of Ptolemy III Euergetes (r. 246–222 BC) were marked with a ⸓! — Wikipedia
[19] Symbol for Zero. U+1018A greek zero sign occurs whenever a sexagesimal notation is used in historical astronomical texts to record degrees, minutes and seconds, or hours, minutes and seconds. The most common form of zero in the papyri is a small circle with a horizontal stroke above it, but many variations exist. These are taken to be scribal variations and are considered glyph variants[11].
[20] «In the highly divergent dialect of Pamphylia, the letter digamma (F) existed side by side with another distinctive form Greek Sigma Ͷ.» — Wikipedia. Also, «The Arcado-Cypriot dialect of Mantineia, in one attested document, used an innovative letter similar to 'Ͷ', probably derived from a variant of san, to denote what was probably a [ts]-like sound in environments reflecting etymological Proto-Greek.» – Wikipedia
[21] I need help with this. I think was Attic...

\misoeta	ϧ	Half Eta Small
\Arckoppa	Ϙ	Archaic Koppa
\arckoppa	ϙ	Archaic Koppa Small
\Arcsampi	Ͳ	Archaic Sampi[22]
\arcsampi	ͳ	Archaic Sampi Small

Archaic and Before the Archaic

use the TEI Λάρισας fonts, and/or the 'archaic', the 'linearb' and the 'phaistos' package

Note: Since Greeks in the beginning does not used 'space' and other diacritics to separate words, there are actually a lot number of symbols they used... 3 dots, 4 dots in diamond and square position, 5 dots, asterism '⁂', etc.

More about Greek Symbols in Unicode and Fonts: Test fonts at Wazu's page.

The rest of symbols are defined because are used... Normally there will be no conflict with other packages. This definitions are different by default LaTeX package which in most cases we use the math-font to produce those symbols. In xstdgreek it is just the Unicode of the same font as the text. That is why the \u prefix (means Unicode version of the symbol).

Command	Symbol	Command	Symbol
Ερμηνευτικά			
\uuparrowhead	⌃	\udnarrowhead	⌄
\usqleft	‹	\usqright	›
\ulangle	⟨	\urangle	⟩
\uldangle	⟪	\urdangle	⟫
\uangle	∠	\umangle	∡
Παραπομπή/Σήμανση			
\dag	†	\ddag	‡
\asterism	⁂		
\S	§	\iozenge	◊
\dotstar	✻	\bstar	★
Arrows			
\uup	↑	\udown	↓
\uleft	←	\uright	→
Technical			
\uenter	↵	\utenter	⏎
\uucut	✁	\udcut	✁
ASCII Technical			
\uESC	ᴱˢᶜ	\uNUL	ᴺᵁᴸ
\uCR	ᶜᴿ	\uLF	ᴸᶠ
\aAND	&	\aNOT	~
\aOR	|	\aVOR	¦
\aXOR	^	\aMOD	%
\aBS	\		
Geometric [*f=filled, l=left, r=right, sm=small, md=medium*]			
\ucircle	○	\ufcircle	●
\upihalf	◔	\upi	◑
\usquare	□	\ufsquare	■
\urombos	◇	\ufrombos	◆
\umdsquare	□	\ufmdsquare	■

[22] «Some Ionian cities used a special letter Greek 'Ͳ', alphabetically ordered behind 'Ω', for a sibilant sound in positions where other dialects had either 'ΣΣ' or 'TT' (e.g. "τέϽαρες" 'four', cf. normal spelling Ionic "τέσσαρες" vs. Attic τέτταρες).» — Wikipedia

\umssquare	▫	\ufmssquare	▪
\usmsquare	▫	\ufsmsquare	▪
\utrig	△	\uftrig	▲
\ultrig	◁	\ufltrig	◀
\urtrig	▷	\ufrtrig	▶
Politics & Economy			
\anarchy	Ⓐ	\snh	🕭
		\sfyrodrep	🕭
Drawing			
\uulcorner	⌜	\uurcorner	⌝
\ullcorner	⌞	\ulrcorner	⌟

Further reading:
Wikipedia: Greek alphabet
Wikipedia: Greek ligatures
Punctuation

2.6 Greek letters

Command	Symbol	Command	Symbol	Command	Symbol
Small					
\alpha	α	\beta	β	\varbeta	$\varbeta$
\gamma	γ	\delta	δ		
\epsilon	ϵ	\varepsilon	ε		
\zeta	ζ	\eta	η		
\theta	θ	\vartheta	ϑ		
\iota	ι				
\kappa	κ	\varkappa	$\varkappa$	\lambda	λ
\mi	μ	\mu	μ^*		
\micro	μ[23]				
\ni	ν	\nu	ν^*		
\xi	ξ	\omicron	o		
\pi	π	\varpi	ϖ		
\rho	ρ	\varrho	ϱ		
\sigma	σ	\sigmafinal	ς	\sigmateliko	ς
\tau	τ†	\ypsilon	υ	\upsilon	υ‡
\phi	φ	\varphi	ϕ		
\chi	χ	\psi	ψ	\omega	ω
Capital					
\Alpha	A	\Beta	B		
\Gamma	Γ	\Delta	Δ		
\Epsilon	E	\Zeta	Z	\Eta	H
\Theta	Θ	\varTheta	Θ		
\Iota	I	\Kappa	K	\Lambda	Λ
\Mi	M	\Mu	M^*		
\Ni	N	\Nu	N^*		
\Xi	Ξ	\Omicron	O	\Pi	Π
\Rho	P	\Sigma	Σ		
\Tau	T†	\Ypsilon	Y	\Upsilon	Y‡
\Phi	Φ	\Chi	X		
\Psi	Ψ	\Omega	Ω		
\Ohm	Ω[24]				

Usage in mathematics and other sciences: here.

---

†It is called ‘Taf’ the ‘αυ’ and ‘ευ’ are sounds af/ef or av/ev depended on the next letters. The letter ‘T’ written ‘Ταυ’ and sounds ‘Taf’. Example “Ταύρος” = tavros = bull, “Αυτόματο” = aftomato = automatic.

‡There was no ‘u’ letter, not even in Archaic variations. It is ‘Ypsilon’. Y-ψιλον witch means ‘Y’ short. The ‘U’ means ‘ou’ not ‘hy’. The small Ypsilon, the ‘υ’, is used a millennium after the Classic era like all lower letters[25].

*‘Mu’ [sounds ‘myoo’] is the English name for the Greek letter ‘Μι’. The letter ‘M’ written ‘mi’ in modern or ‘my’ (‘μῦ’) in “ancient” and sounds ‘me’ in both versions[26].

[23] This is the ‘µ’ from Latin-1 set (ASCII/DOS), use it for the SI’s micro.

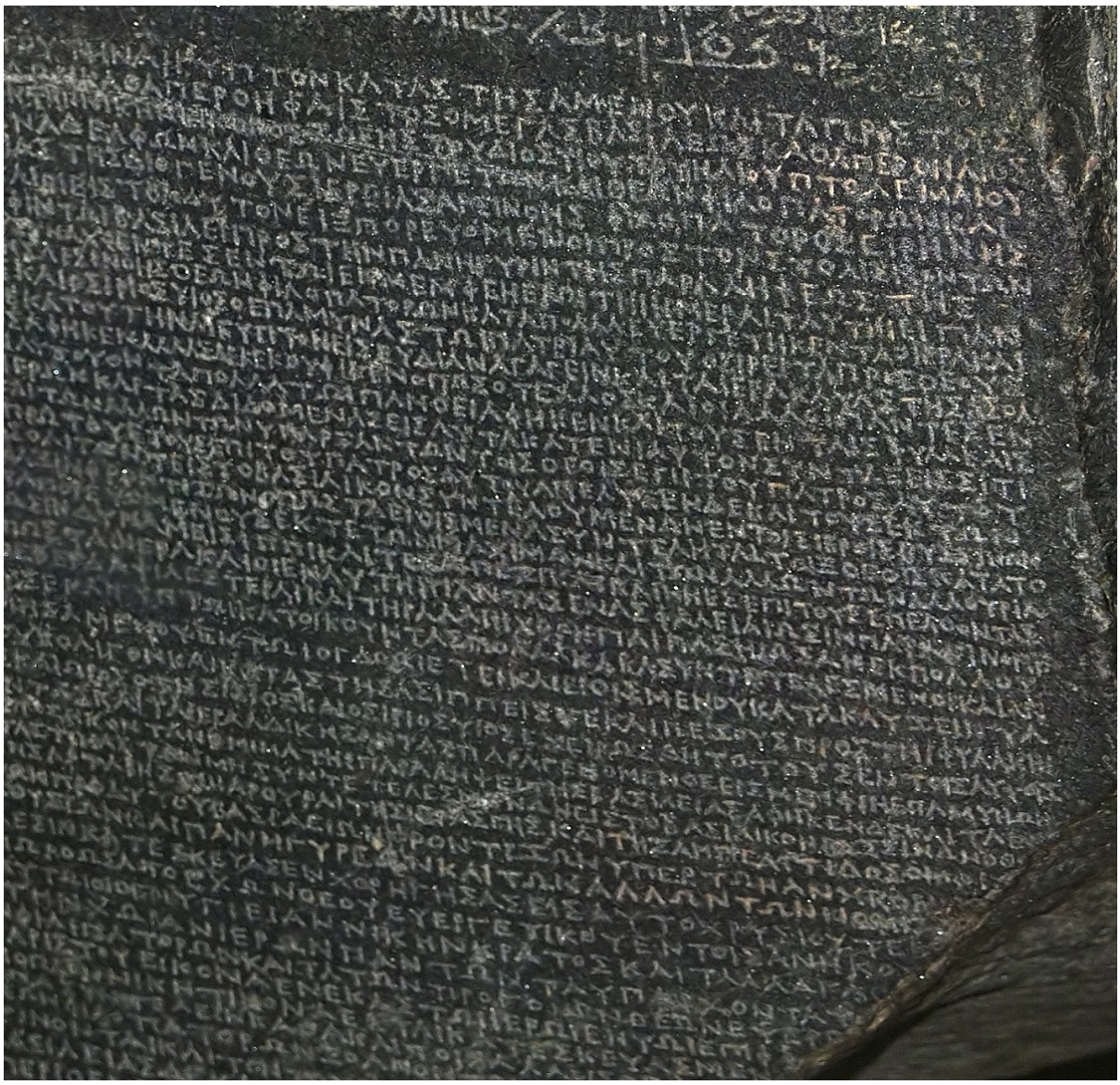
[24] This is the officially Ohm Sign (U+2126).

[25] There is possible that the archaic ‘Y’ to had the ‘U’ sound, but the ‘Upsilon’ as word is from Greek to Latin to English mess. The usage in English shows it too: psychology, hypnotist, physique, typical, lyric, martyr, system, gymnastics, etc. The German, Portuguese, Brasil etc are using the word Ypsilon or Ipsilon.

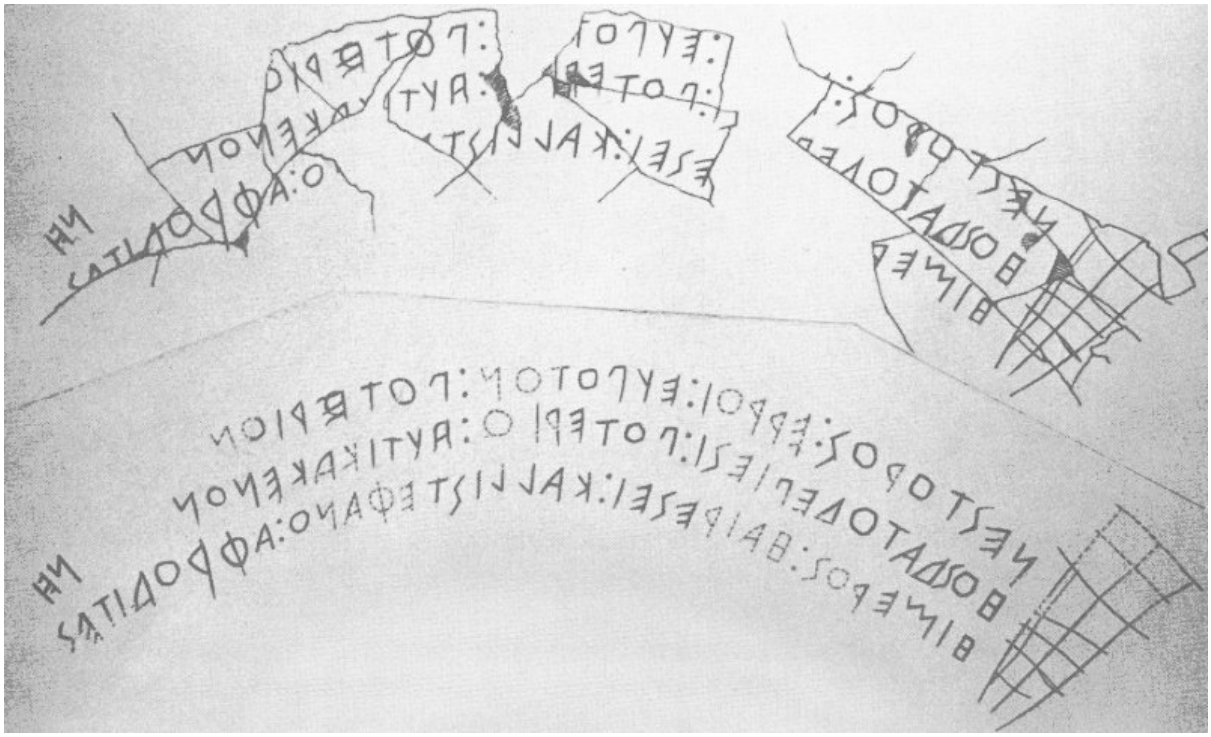
[26] The words “music” (“μουσική”) and “museum” (“μουσείο”) are products of “muse” (“μοῦσα” p27). In Latin the ‘mu’ sounds ‘mou’, also the suffix ‘um’ shows that are Latinized. The word “mule” it is Latin only (“mullus”) but it has the same issues. In Spanish, which had close relations with both, Greeks and Latins, are correct. In Russian which had only Greek influence, also almost correct.

Chapter 3

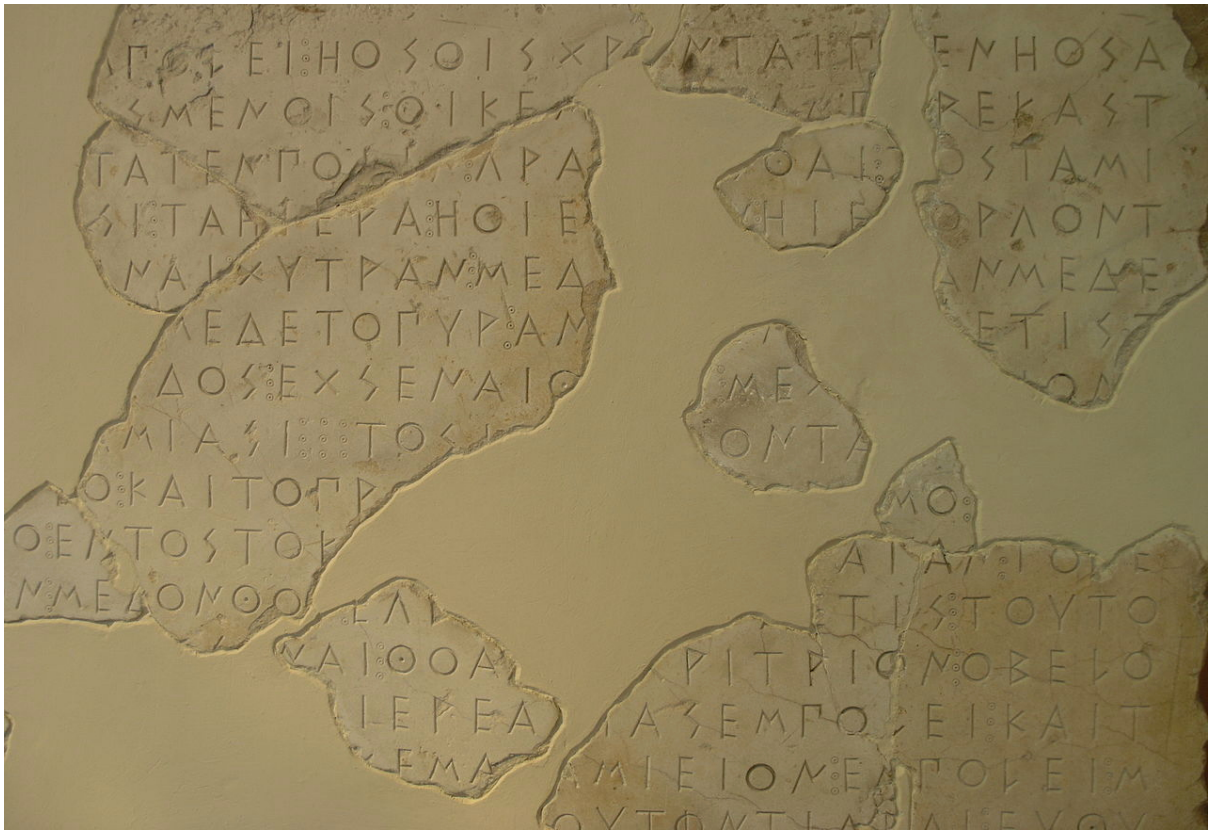
A few words about alphabet



The Rosetta Stone - Koine 196 BC



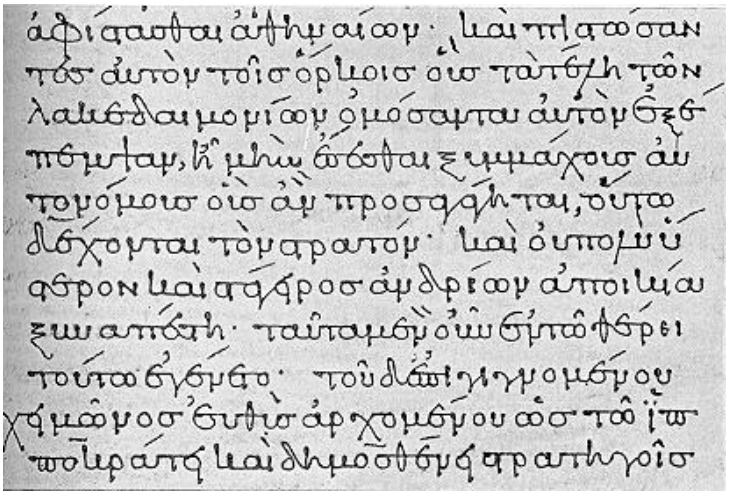
The so-called Cup of Nestor from Pithekoussai. Geometric Period (c.750-700 BC).



Athenian Acropolis, Sacred Law, 485 BC.

Koine around 100 BC

Byzantine (uncial) 4th c. AD

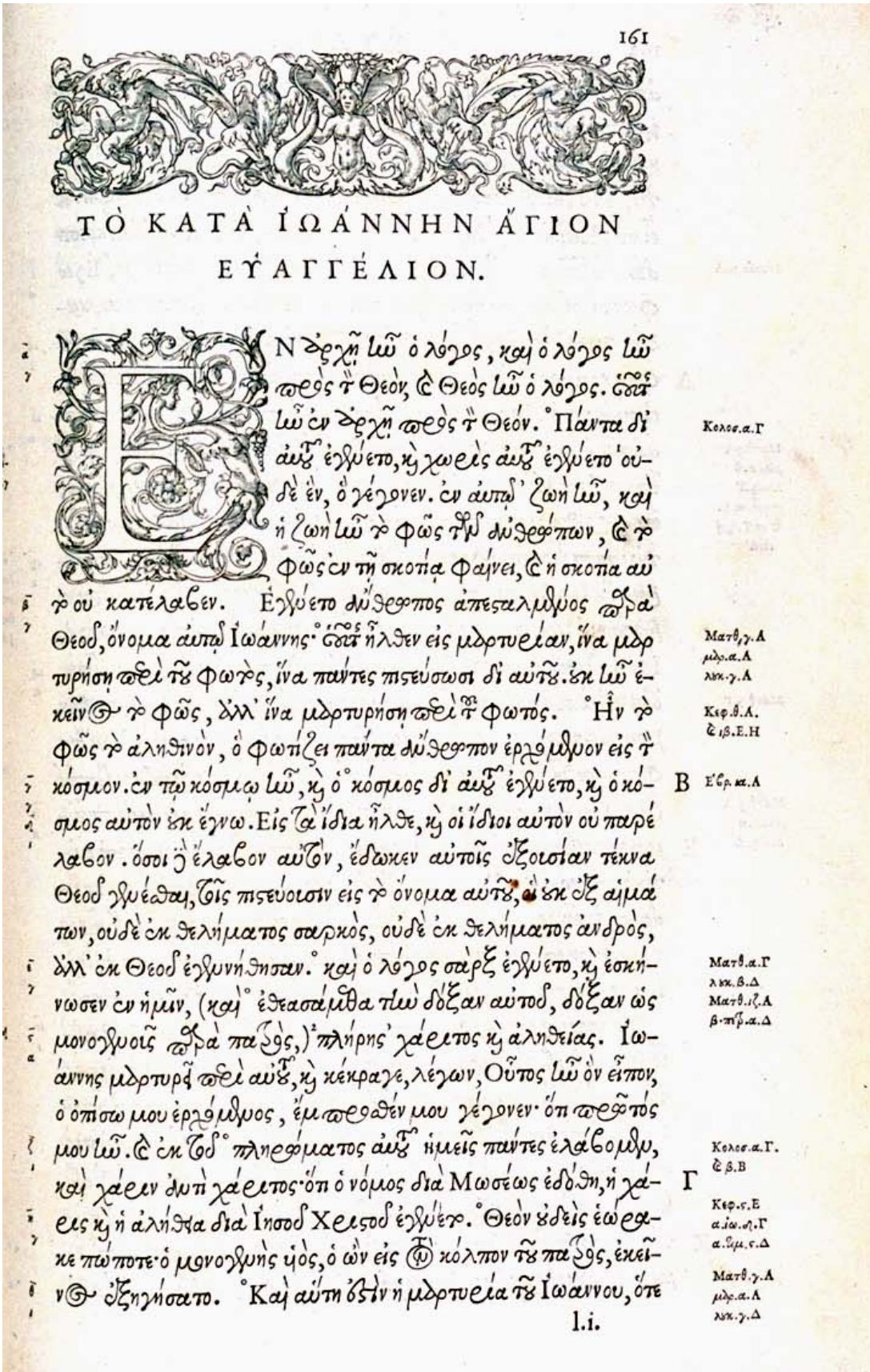


Koine (minuscule) 10th c. AD

Euböa	Ionien	Athen	Korinth	modern
A	AA	AA	AA	A
B	B	B	ꟼ	B
‹‹	Γ	Λ	‹‹	Γ
ᐅᐅ	Δ	Δ	Δ	Δ
ꟻE	ꟻE	ꟻE	ꟻ	E
ꟻ	-	ꟻ	ꟻ	(F)
I	I	I	I	Z
BH	BH	BH	BH	H
⊗⊕⊙	⊗⊕⊙	⊗⊕⊙	⊗⊕⊙	Θ
I	I	I	I	I
K	K	K	K	K
⅃	⅃Λ	⅃	⅃Λ	Λ
ᴛᴛM	ᴛM	ᴛM	ᴛM	M
ᴛN	ᴛN	ᴛN	ᴛN	N
X	Ξ	(X⊱)	Ξ	Ξ
O	O	O	O	O
ΓΓ	Γ	Γ	Γ	Π
M	-	-	M	(M)
Q	Q	Q	Q	(Q)
P	Pᐅ	PR	PR	P
⊱	⊰	⊱	-	Σ
T	T	T	T	T
ᴛYV	YV	ᴛYV	ᴛYV	Y
ΦΦ	Φ	ΦΦ	ΦΦ	Φ
ΨΨ	X	X	X	X
(Φ⊱)	ΨΨ	(Φ⊱)	ΨΨ	Ψ
-	Ω	-	-	Ω

Variations of ancient Greek alphabets (≈900-403 BC)

Koine 1020 AD



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ΤΟ ΚΑΤΑ ΙΩΑΝΝΗΝ ΑΓΙΟΝ
ΕΥΑΓΓΕΛΙΟΝ.

ΕΝ ἀρχῇ ἦν ὁ λόγος, καὶ ὁ λόγος ἦν
πρὸς τὸν Θεὸν, καὶ Θεὸς ἦν ὁ λόγος. οὗτος
ἦν ἐν ἀρχῇ πρὸς τὸν Θεόν. Πάντα δι'
αὐτοῦ ἐγένετο, καὶ χωρὶς αὐτοῦ ἐγένετο οὐ-
δὲ ἕν, ὃ γέγονεν. ἐν αὐτῷ ζωὴ ἦν, καὶ
ἡ ζωὴ ἦν τὸ φῶς τῶν ἀνθρώπων, καὶ τὸ
φῶς ἐν τῇ σκοτίᾳ φαίνει, καὶ ἡ σκοτία αὐ
τὸ οὐ κατέλαβεν. Ἐγένετο ἄνθρωπος ἀπεσταλμένος παρὰ
Θεοῦ, ὄνομα αὐτῷ Ἰωάννης· οὗτος ἦλθεν εἰς μαρτυρίαν, ἵνα μαρ
τυρήσῃ περὶ τοῦ φωτὸς, ἵνα πάντες πιστεύσωσι δι' αὐτοῦ. οὐκ ἦν ἐ-
κεῖνος τὸ φῶς, ἀλλ' ἵνα μαρτυρήσῃ περὶ τοῦ φωτός. Ἦν τὸ
φῶς τὸ ἀληθινὸν, ὃ φωτίζει πάντα ἄνθρωπον ἐρχόμενον εἰς τὸν
κόσμον. ἐν τῷ κόσμῳ ἦν, καὶ ὁ κόσμος δι' αὐτοῦ ἐγένετο, καὶ ὁ κό- B
σμος αὐτὸν οὐκ ἔγνω. Εἰς τὰ ἴδια ἦλθε, καὶ οἱ ἴδιοι αὐτὸν οὐ παρέ
λαβον. ὅσοι δὲ ἔλαβον αὐτὸν, ἔδωκεν αὐτοῖς ἐξουσίαν τέκνα
Θεοῦ γενέσθαι, τοῖς πιστεύουσιν εἰς τὸ ὄνομα αὐτοῦ, οἳ οὐκ ἐξ αἱμά
των, οὐδὲ ἐκ θελήματος σαρκὸς, οὐδὲ ἐκ θελήματος ἀνδρὸς,
ἀλλ' ἐκ Θεοῦ ἐγεννήθησαν. καὶ ὁ λόγος σὰρξ ἐγένετο, καὶ ἐσκή-
νωσεν ἐν ἡμῖν, (καὶ ἐθεασάμεθα τὴν δόξαν αὐτοῦ, δόξαν ὡς
μονογενοῦς παρὰ πατρὸς,) πλήρης χάριτος καὶ ἀληθείας. Ἰω-
άννης μαρτυρεῖ περὶ αὐτοῦ, καὶ κέκραγε, λέγων, Οὗτος ἦν ὃν εἶπον,
ὁ ὀπίσω μου ἐρχόμενος, ἔμπροσθέν μου γέγονεν· ὅτι πρῶτός
μου ἦν. καὶ ἐκ τοῦ πληρώματος αὐτοῦ ἡμεῖς πάντες ἐλάβομεν,
καὶ χάριν ἀντὶ χάριτος· ὅτι ὁ νόμος διὰ Μωσέως ἐδόθη, ἡ χά- Γ
ρις καὶ ἡ ἀλήθεια διὰ Ἰησοῦ Χριστοῦ ἐγένετο. Θεὸν οὐδεὶς ἑώρα-
κε πώποτε· ὁ μονογενὴς υἱὸς, ὁ ὢν εἰς τὸν κόλπον τοῦ πατρὸς, ἐκεῖ-
νος ἐξηγήσατο. Καὶ αὕτη ἐστὶν ἡ μαρτυρία τοῦ Ἰωάννου, ὅτε

Κολοσ.α.Γ
Ματθ.γ.Α
μαρ.α.Α
λουκ.γ.Α
Κεφ.θ.Α.
καὶ ιβ.Ε.Η
Ἑβρ.ια.Α
Ματθ.α.Γ
λουκ.β.Δ
Ματθ.ιζ.Α
β.πετρ.α.Δ
Κολοσ.α.Γ.
καὶ β.Β
Κεφ.ς.Ε
α.ἰω.δ.Γ
α.τιμ.ς.Δ
Ματθ.γ.Α
μαρ.α.Α
λουκ.γ.Δ

l.i.

A 16th-century edition of the New Testament. Koine 1550 AD.

Evolution of alphabet

1) The first writting system was only numbers.
2) At 3200 BC at Ancient Sumer, one of the firsts known system of writing was invented. It was pictures without any phonetic element.
3) In the 26th century BC, the large set of logographic signs had been simplified into a logosyllabic script comprising several hundred signs.
4) A century later, hundreds of thousands of texts and text fragments have been excavated to date, covering a vast textual tradition of mythological narrative, legal texts, scientific work, etc.
5) The known alphabet was descended from Mesopotamia's writing system around 1600 BC. In the meantime, in Greece was used the Linear B', another logosyllabic language that invented there.
6) Around the 1100-800 BC, the Greeks adopted a version of eastern alphabet - the Phoenician one - and added the vowels.
7) The way that we write, from left to right, it was really just happen since at the beginning was used bi-directional text.
8) The Latin alphabet, a form of Greek Archaic alphabet, was used in the west by Etruscan. The "Εύβοια" dialect is probably the origin since there was the most colonies from there.
9) The standardization was around 403 BC (Classic era, end of Pelloponisian War, the reform of Eukleides) by Athenians.
10) By about 200 BC (Hellenistic era) a system of diacritical marks was invented. This system is no more used.
11) Greek lower case letters was not used until 600-700 AD.
12) The Koine (Hellenistic era, 330 BC) is the "international" language which the most Greek text are written and it is very close to modern Greek. From copies of work of Archimedes, Aeschylus, Democretus ... to the Bible and Apostles letters, all are in Koine.

Further reading:

α΄ Wikipedia: History of Writing
β΄ Wikipedia: The Sumerian Language
γ΄ Wikipedia: The Akkadian Language
δ΄ Wikipedia: History of the Alphabet
ε΄ Wikipedia: The Greek Language
ϝ΄ Wikipedia: The Cretan Hieroglyphs
ζ΄ Wikipedia: Linear A'
η΄ Wikipedia: Linear B'

Appendix A′

Get fonts

A′ The Linux Libertine; This is the default font of our package. [WWW:linuxlibertine.org], [CTAN:libertine], [CTAN:libgreek].

B′ The UM Typewriter; This is the default font of our package. [CTAN:umtyperwriter].

Γ′ The GNU Free fonts; This could be also the default font of our package. It has almost everything and it is GNU: [GNU:freefont], [CTAN:gnu-freefont].

Δ′ The Computer Modern; Nice old TEX font package. It has some issues yet: [SF:cm-unicode], [CTAN:cm-unicode].

E′ The DejaVu fonts, Another good and complete font family: [WWW:dejavu-fonts.org], [CTAN:dejavu].

F′ The Croscore fonts: [WP:Croscore_fonts].

Z′ Fonts for schollars: [scholarsnfonts.net]

H′ The Kerkis font family: [Home:Kerkis], [CTAN:kerkis].

Θ′ The Old Standard: [CTAN:oldstandard]. This could be the default font of our package, if there was a whole family.

I′ The Liberation fonts, [WP:Liberation_fonts]. This is RedHat's child, missing polytonic and several symbols.

IA′ Aka Acid (OFL)[1], very nice, [Aka Acid]. Those fonts are not good for typography since there are a lot of problems with metrics but it is a very nice adding that can controlled by the fontspec's parameters.

IB′ Greek Font Society, [GFS].

IΓ′ Wazu Japan, [WAZU JAPAN's Gallery of Unicode Fonts].

IΔ′ Luc Devroye, [Luc Devroye's home page].

IE′ More Fonts at Google, [Google Web Fonts].

[1] AKA-Acid opposes to the oligopoly policies of the Greek companies who sell at exorbitant prices Greek fonts. Our goal is the liberation of Greek fonts, free font creation and development from the Greek market in general...

Appendix B΄

Δοκιμές

B΄.1 Enumeration

This example must works

A΄ GreekNumCap, first element

Nested list, it must have greek enumeration

(α΄) counter = 1

(β΄) counter = 2

(γ΄) counter = 3

(ι΄) counter = 10

(ια΄) counter = 11

(ιβ΄) counter = 12

(j) counter = 10 latin

(k) counter = 11 latin

(l) counter = 12 latin

(cxxix) counter = 129 roman

(mdccclxiii) counter = 1863 roman

(1864) counter = 1864 arabic

(,αωξε΄) counter = 1865 greek

B΄ second element

B′.2 Character Table

Table B′.1: Table of Greek (**ROMAN**) symbols in unicode

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
370	▯	▯	▯	▯	ʹ	͵	▯	▯	▯	▯	ͺ	ϳ	ϵ	϶	;	▯
380	▯	▯	▯	▯	΄	΅	Ά	·	Έ	Ή	Ί	▯	Ό	▯	Ύ	Ώ
390	ΐ	A	B	Γ	Δ	E	Z	H	Θ	I	K	Λ	M	N	Ξ	O
3A0	Π	P	Σ	Σ	T	Y	Φ	X	Ψ	Ω	Ϊ	Ϋ	ά	έ	ή	ί
3B0	ΰ	α	β	γ	δ	ε	ζ	η	θ	ι	κ	λ	μ	ν	ξ	ο
3C0	π	ρ	ς	σ	τ	υ	φ	χ	ψ	ω	ϊ	ϋ	ό	ύ	ώ	▯
3D0	ϐ	ϑ	ϒ	ϓ	ϔ	ϕ	ϖ	ϗ	Ϙ	ϙ	Ϛ	ϛ	Ϝ	ϝ	Ϟ	ϟ
3E0	Ϡ	ϡ	▯	▯	▯	▯	▯	▯	▯	▯	▯	▯	▯	▯	▯	▯
3F0	ϰ	ϱ	ϲ	ϳ	ϴ	ϵ	϶	▯	ϸ	Ϲ	▯	ϻ	▯	Ͻ	Ͼ	Ͽ

Table B′.2: Table of Greek (**SANSSERIF**) symbols in unicode

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
370	▯	▯	▯	▯	ʹ	͵	▯	▯	▯	▯	ͺ	ϳ	ϵ	϶	;	▯
380	▯	▯	▯	▯	΄	΅	Ά	·	Έ	Ή	Ί	▯	Ό	▯	Ύ	Ώ
390	ΐ	A	B	Γ	Δ	E	Z	H	Θ	I	K	Λ	M	N	Ξ	O
3A0	Π	P	Σ	Σ	T	Y	Φ	X	Ψ	Ω	Ϊ	Ϋ	ά	έ	ή	ί
3B0	ΰ	α	β	γ	δ	ε	ζ	η	θ	ι	κ	λ	μ	ν	ξ	ο
3C0	π	ρ	ς	σ	τ	υ	φ	χ	ψ	ω	ϊ	ϋ	ό	ύ	ώ	▯
3D0	ϐ	ϑ	ϒ	ϓ	ϔ	ϕ	ϖ	ϗ	Ϙ	ϙ	Ϛ	ϛ	Ϝ	ϝ	Ϟ	ϟ
3E0	Ϡ	ϡ	▯	▯	▯	▯	▯	▯	▯	▯	▯	▯	▯	▯	▯	▯
3F0	ϰ	ϱ	ϲ	ϳ	ϴ	ϵ	϶	▯	ϸ	Ϲ	▯	ϻ	▯	Ͻ	Ͼ	Ͽ

Table B′.3: Table of Greek (**TELETYPE**) symbols

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
370					ʹ	͵					ͺ				;	
380					΄	΅	Ά	·	Έ	Ή	Ί		Ό		Ύ	Ώ
390	ΐ	A	B	Γ	Δ	E	Z	H	Θ	I	K	Λ	M	N	Ξ	O
3A0	Π	P	Σ	Σ	T	Y	Φ	X	Ψ	Ω	Ϊ	Ϋ	ά	έ	ή	ί
3B0	ΰ	α	β	γ	δ	ε	ζ	η	θ	ι	κ	λ	μ	ν	ξ	ο
3C0	π	ρ	ς	σ	τ	υ	φ	χ	ψ	ω	ϊ	ϋ	ό	ύ	ώ	
3D0									Ϙ	ϙ	ϛ		Ϝ	ϝ		Ϟ
3E0	ϟ	Ϡ														
3F0																

B′.3 Test font families and styles

Typical Size

Large This is Roman

Large This is Sans Serif

Large `This is TeleType`

normalsize This is Roman

normalsize This is Sans Serif

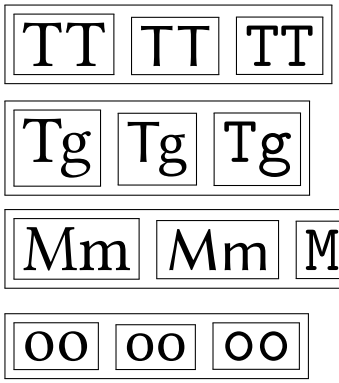
normalsize `This is TeleType`

footnotesize This is Roman

footnotesize This is Sans Serif

footnotesize `This is TeleType`

Compare Family



‘Tg’ test: Vertical Roman - SansSerif = 0.65886pt, Ratio 1.080

‘Tg’ test: Vertical Roman - TeleType = 0.55095pt, Ratio 1.066

‘Mm’ test: Horizontal Roman - SansSerif = 0.50287pt, Ratio 1.032

‘Mm’ test: Horizontal Roman - TeleType = 5.8598pt, Ratio 1.559

‘oo’ test: Vertical Roman - SansSerif = 0.3037pt, Ratio 1.072

‘oo’ test: Vertical Roman - TeleType = 0.05086pt, Ratio 1.011

‘oo’ test: Vertical SansSerif - TeleType = -0.25284pt, Ratio 0.9433

Regular Styles

Regular style (italic, bold, italic+bold, small-caps)

Style	Roman	Sans Serif	Teletype
normal	Roman	Sans Serif	`Teletype`
bold	**Roman**	**Sans Serif**	**`Teletype`**
italic	*Roman*	*Sans Serif*	*`Teletype`*
bold+italic	***Roman***	*Sans Serif*	***`Teletype`***
small-caps	Roman	Sans Serif	`Teletype`
small-caps	Ρόμαν	Σανς Σέριφ	Τηλέτυπος
\FakeSC	Roman	Sans Serif	`Teletype`
\FakeSC	Ρoman	Σανς Σέριφ	Τηλέττποσ

Β΄.4 Test hyphenation

> «ἄνδρα μοι ἔννεπε, μοῦσα, πολύτροπον, ὃς μάλα πολλὰ πλάγχθη, ἐπεὶ Τροίης ἱερὸν πτολίεθρον ἔπερσεν.»
>
> "TELL ME, O MUSE, of that ingenious hero who travelled far and wide after he had sacked the famous town of Troy."
>
> — Homer, The Odyssey

Ο Αρχιμήδης ο Συρακούσιος (περ. 287 π.Χ- περ. 212 π.Χ.) ήταν Έλληνας μαθηματικός, φυσικός, μηχανικός, εφευρέτης και αστρονόμος. Αν και είναι γνωστές λίγες λεπτομέρειες από τη ζωή του, αυτός θεωρείται ως ένας από τους καθοδηγητές επιστήμονες στην κλασσική αρχαιότητα. Μεταξύ των προκαταβολών του στη φυσική είναι οι βάσεις της υδροστατικής στατικής, και μια εξήγηση της αρχής του μοχλού. Αυτός πιστώνεται με τον σχεδιασμό καινοτόμων μηχανών, συμπεριλαμβανομένων των πολιορκητικών μηχανών και των αντλιών με κοχλία που φέρουν το όνομά του. Σύγχρονα πειράματα έχουν δοκιμάσει αξιώσεις ότι ο Αρχιμήδης σχεδίασε μηχανές ικανές να επιτίθενται σε πλοία, να τα σηκώνουν έξω από το νερό και να τα πυρπολούν χρησιμοποιώντας μια σειρά από καθρέφτες. Ο Αρχιμήδης θεωρείται κατά γενική ομολογία ότι είναι ο σπουδαιότερος από τους μαθηματικούς της αρχαιότητας και ένας από τους σπουδαιότερους όλων των εποχών. Αυτός χρησιμοποίησε τη μέθοδο της εξάντλησης για τον υπολογισμό της περιοχής κάτω από το τόξο παραβολής, με την άθροιση άπειρης σειράς, και έδωσε μια εξαιρετικά ακριβή προσέγγιση για τον αριθμό Πι. Όρισε επίσης την επίπεδη έλικα (σπείρα) που έφερε το όνομά του, φόρμουλες για τον όγκο των επιφανειών εκ περιστροφής και ένα ευφυές σύστημα για την έκφραση πολύ μεγάλων αριθμών.

Perseus was the son of Zeus and Danaë, the daughter of Acrisius, King of Argos. Disappointed by his lack of luck in having a son, Acrisius consulted the oracle at Delphi, who warned him that he would one day be killed by his daughter's son with Zeus. In order to keep Danaë childless, Acrisius imprisoned her in a bronze chamber, open to the sky, in the courtyard of his palace: This mytheme is also connected to Ares, Oenopion, Eurystheus, etc. Zeus came to her in the form of a shower of gold, and impregnated her. Soon after, their child was born; Perseus — "Perseus Eurymedon, for his mother gave him this name as well" (Apollonius of Rhodes, Argonautica IV). Fearful for his future, but unwilling to provoke the wrath of the gods by killing the offspring of Zeus and his daughter, Acrisius cast the two into the sea in a wooden chest. Danaë's fearful prayer, made while afloat in the darkness, has been expressed by the poet Simonides of Ceos. Mother and child washed ashore on the island of Serifos, where they were taken in by the fisherman Dictys ("fishing net"), who raised the boy to manhood. The brother of Dictys was Polydectes ("he who receives/welcomes many"), the king of the island.

```
\begin{multicols}{2}
\UseGreek
Ο Αρχιμήδης ο Συρακούσιος (περ. 287 π.Χ- περ. 212 π.Χ.) ήταν
...
\columnbreak

\UseBritish
Perseus was the son of Zeus and Danaë, the daughter of Acrisius,
...
\end{multicols}
```

Appendix Γ΄

Unordered

Γ΄.1 Hyphenations in your TeX

The ‘`language.def`’ file has the languages hyphenations that you have already installed in your TEX distribution. This file is created by your distribution automatically in the ‘rebuild’ or ‘update’ process.

The ‘`language.def`’ must be at:
`${tex-install-dir}/texmf-var/tex/generic/config/language.def`

Γ΄.2 Check fonts for Greek support

Find all Greek fonts:

```
# fc-list :lang=el
```

The main problem with “Greek” fonts is that a lot are claim that had Greek ‘grek’ script but in reality it has only a few characters for mathematics.

So you have to search for specific ‘glyphs’. If the font has the “ΐ” (iotadieresistonos) (lower-case) is almost sure that has full modern Greek support. Ignore the ‘Iotadieresistonos’ (upper-case), it is belongs to Latin’s character sets.

Check font for Greek support:

```
# otfinfo /usr/share/fonts/OTF/Iwona-Regular.otf -g | grep '[iI]ota'
Iota
iota
Iotadieresis
iotadieresis
iotadieresistonos # This means true support.
Iotatonos
iotatonos
Iotadieresistonos # WOW!
```

The font is passed.

This font has full support, at least the modern Greek.

```
# otfinfo /usr/share/fonts/OTF/GFSNeohellenic.otf -g | grep '[iI]ota'
Iotatonos         # this means it has capital Greeks with tonos
iotadieresistonos # this means it has true support
Iota
Iotadieresis
```

```
iota
iotatonos
iotadieresis
```

The font is passed.

Γ′.3 Use 96 DPI at X Windows

Well, I would like my original DPI which are 85 for my monitor. The problem is that almost all fonts are designed for 96 DPI. After all Microsoft Windows, always reports 96 DPI; this explain a lot.

```
# echo 'Xft.dpi: 96.0' >> ~/.Xresources
# xrdb -merge ~/.Xresources
```

/etc/X11/xorg.conf

```
Section "Monitor"
    Identifier     "Monitor0"
    ...
    Option "UseEdidDpi" "false"
    Option "DPI" "96x96"
    ...
EndSection
```

Also, the KDE had additional option in its settings but if you set-up the X, there will no need to set it too.

For best results sets the viewer (okular, xpdf, acrobat reader, whatever...) to 110 DPI...

Γ′.4 Modern Greek and Unicode issues

The ano teleia

The ano teleia - means upper dot - is middle dot in Unicode Standard.

The capital 'E' lunate

During Byzantine period used often the 'lunate' form of 'E' we can see it in Coptic alphabet as Epsilon (Ⲉ) and Cyrillic as Ukrainian Epsilon/IE (Є). In Unicode standard exists only the small 'ϵ'.

The 'ου' monograph

During Byzantine period (still used today) it is not rare to see the 'ου' written as the 'υ' over 'ο', as one letter. This was used as lower-case 'OY'. The upper-case 'OY' using the 'V' over the 'O'. Those character are almost same in Extended Latin B and in Cyrillic alphabet:

Ȣ	Latin Capital Letter OU
ȣ	Latin Small Letter OU
Oy	Cyrillic Capital Letter UK
oy	Cyrillic Small Letter UK
Ꙋ	Cyrillic Capital Letter Monograph UK
ꙋ	Cyrillic Small Letter Monograph UK

You can see it in original text p21, 4th line (title not included), 3rd character (it is with 'T' over it), or better in 10th line, 3rd word (it has only a 'tilde' over it).

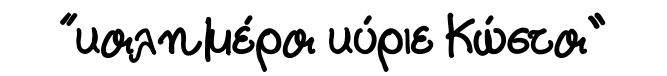
The ‘ϖ’ letter

The ‘ϖ’ was archaic symbol, today it is used often as default handwritten ‘π’ but it is a bit different. Instead of an ‘ω’ with a dash, it is continued line from the right edge of ‘ω’ makes a small arc over ‘ω’ and crosses the left edge and ends a bit inside.

You can see it in original text p21, 2nd line (title not included), 1st character.

The ‘κ’ letter

The English ‘u’ (the Greek lower ypsilon is ‘υ’) used often today as ‘κ’ “calligraphic”. Here is an image from 10th century AD p20. Notice the word ‘καί’ several times.



(kalimera kyrie Costa)

The small xi letter

The small xi also used in few other forms close to Coptic Xi (ⲝ) and Cyrillic Xi (ҙ), after all it is the same letter.

The ‘϶’ letter

The small beta usually written as the ‘ℓ’ by closing the lower arc. I personally, use it more like the english version of ℓ. In images we see more versions.

Γ΄.5 Symbols not in font

Well, this problem is well known.

A lot of fonts supports modern Greek, several of them poly-tonic too, but only a few have the most symbols. I am still thinking how to solve. I suppose that a second set of the already defined font with a specific prefix could be used for macros that can use a specific font to show a symbol. The symbola font (George Douros, TEI Larissas) is excellent for the most missing symbols (see below).

I would like a discussion at forum about this.

Γ΄.6 Unicode Fonts for Ancient Scripts

Actually the best source for almost all Archaic variation symbols are the Cardo font. Unfortunately all interesting symbols are in PUA (private area) and not in Unicode (the symbols are not “yet” defined in Unicode standard). Cardo font.

This is another excellent font, it would replace all missing symbols. Probably better than Cardo at this time.

- ▹ ΤΕΙ Λάρισας

Γ΄.7 Typing Polytonic

How to Type in Greek; Accents, Combined Accents, and Punctuation in Polytonic Greek

Πολυτονική γραφή της Ελληνικής γλώσσας

All OSes have support for poly-tonic (Greek extended) keyboard, also a few utilities for find symbols in Unicode set. The combinations of keys may vary from OS to OS but all characters are available. Still I found more easy to input poly-tonic with old LaTeX way.

I use Linux with KDE, I have the excellent '`kcharselect`' but I prefer a plasma applet similar to kcharselect that is always in my task bar. In Windows there is a similar utility the '`charmap.exe`', no so powerful of course.

You can also use the ‹***alphabeta***›[12], if you preferred to write poly-tonic with macros.

Γ΄.8 Software

TeX Studio (all)

TeXstudio is an integrated writing environment for creating LaTeX documents. Its goal is to make writing LaTeX as easy and comfortable as possible. Therefore TeXstudio has numerous features like syntax-highlighting, integrated viewer, reference checking and various assistants.

TeX Studio Home Page

BabelMap (Windows only)

BabelMap is a free character map application for Windows that allows you to browse through the entire Unicode character repertoire of over 113K characters, or search for a particular character by name or by code point. Characters can then be copied to the clipboard for use in any Unicode-aware application. It also provides many useful features and special utilities. BabelMap supports the most recent version of the Unicode Standard, currently Unicode 7.0 (released June 2014).

BabelMap Home Page

Appendix Δ′

F.A.Q.

I can't see the X symbol...

The symbols are defined in Unicode Standard[10], this does not means that your font have it. Try to use the Gnu's Free Fonts family (FreeSerif, FreeSans, FreeMono), or the 'Cardo'[1] font or use it only to print the symbol.

The following example is used in this document since the FreeSans has no the Greek Zero Symbol.

```
\newfontfamily\cardo[Scale=MatchLowercase]{Cardo} % somewhere at header...
...
normal font text {\cardo\ouden} normal font text...
```

▷ All letters and symbols in this document are produced with FreeSerif and in some cases with Cardo too.

I see the X symbol in the page but not on Reader's contents sidebar...

The symbols are defined in Unicode Standard[10], this does not means your viewer can show it (uses a font that have it).

I can't use my mathematics package...

Use option '*no-math*'. This also pass the '*no-math*' to ‹***fontspec***›. If you still have problems try to load math package before xstdgreek.

```
\documentclass[a4paper,10pt]{report}
\usepackage{libgreek}
\usepackage[english,no-math,fontset=gnu]{xstdgreek}
...
```

Can you add the X character ?

Of course. Just give me the details, the number, a name, and if it is possible a brief story.

Can you support the X language ?

Of course. Just help me to do it by translating a few words (LaTeX constants) and give me what symbols do you need (quotation marks, etc).

The textsubscript and textsuperscript produces weird results

Do not load the ‹***xltxtra***›.

Error at <any-font> in Windows

Use the 'windows' fontset until you figure out what happens. Install fonts by control-panel. You will find a lot of Greek fonts to download in p23.

ERROR: This font using the "seac" command for accented characters...

First, update font map database from distribution environment. If didn't fixed, use another font! Actually this happens with CMU fonts; please send them a bug report.

Cannot load calc.sty

Instead of old good ‹***calc***›, we use the ε-TEX based ‹***adjcalc***›. Still you can load the old ‹***calc***› by passing the '*old-calc*'.

Undefined… \isempty{xxx}

Instead of \isempty{} you can use the ε-TEX macro \ifempty{a}{b}{true}{false}.

Why not .dtx

Well I am programmer, hardcore one; the code must be clean and well written. Messing up the code with the text is not something that I like. Keep in mind that a normal programmer reads the code as you read an article.

Why do you insist to fix the PDF

Because I don't write books to be printed. I write technical articles and manuals to be used online or on screen. That means I need very good compatibility with PDF especially the contents sidebar.

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