

# The mathspec package<sup>\*</sup>

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## 1 PREAMBLE

This document describes the mathspec package, a package that provides an interface to typeset mathematics in X<sub>Y</sub>L<sup>A</sup>T<sub>E</sub>X using arbitrary text fonts. This package is in its developmental stage and users are advised that later versions are likely to be incompatible with this version. Thanks to Will Robertson for his useful advice and suggestions!

### 1.1 *Desired features*

This is a list of features that I intend to include in some version. Please contact me to make any suggestions.

- Definitions of Latin and Greek alphabetic symbols and digits to be typeset in the specified font
- Specifications of the shape (regular, italic) for uppercase and lowercase Latin and Greek alphabets and digits
- Definitions of mathematical symbols to be typeset in such text fonts
- Integration with MnSymbol and other mathematics packages.
- Fine control of spacing
- Provision of shape change commands.

## 2 INTRODUCTION

Since Jonathan Kew released X<sub>Y</sub>L<sup>A</sup>T<sub>E</sub>X, an extension to T<sub>E</sub>X that permits the inclusion of system wide Unicode fonts and modern font technologies in T<sub>E</sub>X documents, users have been able to easily typeset documents using readily available fonts such as Høepler Text and Times New Roman (This document is typeset using Microsoft's Constantia, Candara and Consolas.). Will Robertson's X<sub>Y</sub>L<sup>A</sup>T<sub>E</sub>X package fontspec provides an automatic font selection process for such arbitrary fonts. Still, mathematics typesetting has not benefitted from this development to the same extent

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<sup>\*</sup>This document corresponds to mathspec v0.10, dated 2008/08/17.

as text typesetting, which is not surprising given the font requirements that are demanded.

Will Robertson has in development a package `Unicode-math` that is used to typeset mathematics using some font that has an OpenType mathematics table. Currently, the only two that are in widespread use, to my knowledge, are Cambria Math, a new design, by Microsoft and Asana Math, based on Hermann Zapf's Palatino, by Apostolos Syropoulos. It is expected that the STIX fonts, based on Times, may also be used.

Thus, it is evident that a book designer is confronted with such narrow variety in mathematics typefaces, even considering already established L<sup>A</sup>T<sub>E</sub>X packages such as `euler` (and `Computer Modern`, of course!) that are dedicated to providing mathematics typefaces; and the book designer is challenged to find a suitable pair of typefaces for mathematics and body text.

This package provides mathematics alphabets in any of the same typefaces that are available to X<sub>Y</sub>L<sup>A</sup>T<sub>E</sub>X, using `fontspec` as a backend. Other mathematics symbols such as arrows and operators, whose designs are largely independent of an alphabetic typeface, can be taken from collections like `MnSymbol` or `Computer Modern` and are not covered by the scope of this package, but provision is made to allow them to be used.

### 3 IMPLEMENTATION

To use the package, put `\usepackage{mathspec}` in the preamble of the document. It is not necessary to put `\usepackage{fontspec}` because `mathspec` will ensure that `fontspec` is loaded anyway. To load `fontspec` with some options, parse them through `mathspec`, for example, `\usepackage[quiet]{mathspec}` is equivalent to `\usepackage[quiet]{fontspec}\usepackage{mathspec}`.

#### 3.1 Summary of commands

`\setmaths font[Set=<set>, <shapes>, <font features>]{<font name>}` Specifies the mathematics fonts. `<set>` is either Latin, Greek or Symbols; `<shapes>` is an optional comma separated list of keys with their respective values; keys are Uppercase, Lowercase and Digits and values are Regular, Italic and Plain; `<font features>` and `<font name>` are interpreted by `fontspec`.

Starred form `\setmaths font*` additionally sets the digits in the specified font, ignored if `<set>` is Symbols.

Also `\setmath font`.

`\+ [<size>]` Inserts a `<size>` mu ( $\frac{\langle size \rangle}{18}$  em) space in mathematics mode. The default `<size>` is 1.

#### 3.2 Letters, Digits and Symbols

<code>\setmaths font[Set=&lt;set&gt;, &lt;shapes&gt;, &lt;font features&gt;]{&lt;fontname&gt;}</code> <code>\setmaths font*[Set=&lt;set&gt;, &lt;shapes&gt;, &lt;font features&gt;]{&lt;fontname&gt;}</code>
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

This single command is used to entirely describe the desired font for some use. Usually, the command would appear up to three times in a document, to specify

each the Latin and the Greek fonts and the Symbol font. The command can be used only in the preamble, that is before `\begin{document}` because  $\text{\LaTeX}$  will not allow it to be used elsewhere. Then, there can be only one Latin mathematics typeface and one Greek mathematics typeface in the document.

**$\langle set \rangle$**  Compulsory value for key Set (except in unusual circumstances; see section 7.1).

Latin, Greek or Symbols.

**$\langle shapes \rangle$**  Optional comma separated list of keys. Ignored if  $\langle set \rangle$  is Symbols.

A comma separated list of keys and their values, e.g. (Uppercase=Regular, Lowercase=Italic, Digits=Regular). Keys are Uppercase, Lowercase and Digits which can each have value Regular, Italic or Plain; Regular and Italic respectively indicate the regular and italic fonts of the typeface, Plain indicates that no redefinition is performed by `mathspec`, and that the symbols will be typeset in the default font, which is usually Computer Modern. The Digits key is ignored if the digits are not typeset using the font that is specified by the command. If a key is absent, its default value, as listed in table 1, is used.

Note that the default values are very good and you would never normally want to change the Latin and digits shapes. The Greek shapes can be changed to adhere to some particular style, for example all italic, or because the specified Greek font has only one shape regular.

TABLE 1: The default shapes for the symbol sets

	Latin		Greek	
	Uppercase	Lowercase	Uppercase	Lowercase
Digits				
Regular	Italic	Italic	Regular	Italic

**$\langle font\ features \rangle$** ,  **$\langle font\ name \rangle$**   $\langle font\ features \rangle$  optional comma separated list,  $\langle font\ name \rangle$  compulsory argument.

These are the same arguments as those used by `\fontspec` and are interpreted by `fontspec`. See `fontspec`'s documentation for details.

The starred form of the command causes the digits to be typeset using the font that is specified by the command (interpreted only if  $\langle set \rangle$  is either Latin or Greek). In practice, the Latin font, by default, is used to typeset the digits, unless the Greek font command is starred, in which case the Greek font is used to typeset the digits. If both commands are starred, then the Latin font is used to typeset the digits.

## 4 ALPHABETS

$\text{\LaTeX}$  defines `\mathrm{\langle variable \rangle}`, `\mathit{\langle variable \rangle}`, `\mathbf{\langle variable \rangle}` to change mathematics alphabets to roman, italic and bold respectively for Latin characters. `mathspec` also declares the bold italic alphabet which is invoked using

`\mathbi` `\mathbi{⟨variable⟩}`. `\mathspec` also defines comparable commands to change the Greek alphabet: `\greekmathrm` (or `\greekmathrg`), `\greekmathit`, `\greekmathbf` and `\greekmathbi`.  
This is still being worked out, beware the error ‘! LaTeX Error: Too many math alphabets used in version normal.’

## 5 EXAMPLE

The preamble of this document contains:

```
\setmathsf{font[ Set=Latin, Scale=MatchLowercase]{Berling Antiqua}
\setmathsf{font*[ Set=Greek, Lowercase=Regular, Scale=MatchLowercase]{GFS Didot}
\setmathsf{font[ Set=Symbols, Scale=MatchLowercase]{Gentium Basic}
```

The code:

```
\begin{gather*}
0123456789\\
ABCDEFGH \quad \mathrm{HIJKLM} \quad \quad
\mathbf{NOPQRS} \quad \quad \mathbf{TUVWXYZ}\\
abcdefg \quad \quad \mathrm{hijklm} \quad \quad
\mathbf{nopqrs} \quad \quad \mathbf{tuvwxyz}\\
AB\Gamma\Delta EZ \quad \quad \mathrm{H\Theta I\Kappa\Lambda M} \quad \quad
\mathrm{NΞ O\Pi\rho\Sigma} \quad \quad \mathrm{TΥ\Phi X\Psi\Omega}\\
\alpha\beta\gamma\delta\varepsilon\zeta \quad \quad \mathrm{\eta\theta\iota\kappa\lambda\mu} \quad \quad
\mathrm{\nu\xi\omicron\pi\rho\varsigma\sigma} \quad \quad \mathrm{\tau\upsilon\phi\chi\psi\omega}\\
o!o + o, o.o : o; o < o = o > o? o\sim o^\circ o \pm o\mu o \times o \div o\\
o\forall o\partial o\exists o\emptyset o\Delta o\nabla o\in o\notin o\supset o - o\circ o\cdot o^\alpha o^\infty o\Box o\angle o\wedge o\vee o\cap o\cup o.: o\sim o\\
o\cong o \approx o \neq o \equiv o \leq o \geq o\\
o\subset o\supset o\subsetneq o\subseteq o\supseteq o\oplus o\otimes o\perp o\circ o
\end{gather*}
```

produces:

0123456789  
 ABCDEFG HIJKLM NOPQRS TUVWXYZ  
*abcdefg hijklm nopqrs tuvwxyz*  
 ABΓΔEZ HΘIKΛM NΞOΠΡΣ TΥΦΧΨΩ  
*αβγδεζ ηθικλμ νξοπρςσ τυφχψω*  
 $o!o + o, o.o : o; o < o = o > o? o\sim o^\circ o \pm o\mu o \times o \div o$   
 $o\forall o\partial o\exists o\emptyset o\Delta o\nabla o\in o\notin o\supset o - o\circ o\cdot o^\alpha o^\infty o\Box o\angle o\wedge o\vee o\cap o\cup o.: o\sim o$   
 $o\cong o \approx o \neq o \equiv o \leq o \geq o$   
 $o\subset o\supset o\subsetneq o\subseteq o\supseteq o\oplus o\otimes o\perp o\circ o$

There is no difference whether Greek letters are input using familiar control sequences (although not shown here, they are still available) or literal characters, for example,  $y = \alpha x^2 + \beta x + \gamma$  and  $\$y = \backslash\alpha\backslash\times x^2 + \backslash\beta\backslash\times x + \backslash\gamma\backslash\$$  are equivalent. Note that the two colons are defined differently; `:` is a ratio relation, as in  $p : q$  and `\colon` is a punctuation symbol, as in  $f : X \rightarrow Y$ .

Greek letters that are absent from Computer Modern (i.e. those that appear similar to Latin letters, e.g.,  $\text{\AA}$   $\backslash$ Alpha: A,  $\rho$   $\backslash$ Rho: P,  $\omicron$   $\backslash$ omicron: o) are defined. In addition, three more symbols are defined:  $^\circ$   $\backslash$ degree: °,  $\mu$   $\backslash$ micro: μ,  $\Delta$   $\backslash$ increment: Δ.

There is a bug in the package, in that symbols will be remapped, even if they do not exist in the font. As can be seen in this example, Berling Antiqua does not contain U+221F Right angle:  $\angle$ , and  $\square$  is substituted. Until this bug is fixed, it might be best not to specify a symbols font at all.

Additionally, if the symbols font is specified, the symbols are taken from two sources and it is likely that they will not harmonise together. Potential problems are that their designs be too incompatible, which would cause inconsistencies in colour, and that their widths be different, which would destroy vertical alignment. If this is an issue, then do not specify a symbols font.

The big operators  $\prod$   $\backslash$ prod:  $\prod$ ,  $\sum$   $\backslash$ sum:  $\sum$  and  $\int$   $\backslash$ int:  $\int$  are not included here because in many fonts, they are designed far too small for practical use, as shown in equation (1) where the sum operator is typeset in Constantia, the text font of this document (In Gentium Basic, the symbol font of this document, it is even smaller!) and leaving them alone is currently the best option, as shown in equations (4, 5).

$$\sum_{n=0}^{\infty} \frac{1}{2^n} = 2 \quad (1)$$

For now, a list of symbols that the package remaps and their commands is in section 7.4.7.

## 6 ADDITIONAL INFORMATION

This section describes the shortcomings of this package. I wonder whether the benefits of being able to use an arbitrary font for mathematics outweigh the detriments; in a production environment, it might be best to seek an alternative approach and use some L<sup>A</sup>T<sub>E</sub>X package like *euler*, *mathdesign* or *MinionPro* that is dedicated to producing good mathematics with one font.

### 6.1 *Italic correction*

In using this package to provide arbitrary fonts for mathematics, there are issues with italic correction, as is illustrated in the equations:

$$f(x) = \sum_{n=-\infty}^{\infty} c_n e^{jnx} \quad (2)$$

$$c_n = \frac{1}{2\pi} \int_{-\pi}^{\pi} f(x) e^{-jnx} dx \quad (3)$$

where the function  $f$  is too close to the parenthesis ( and the base  $e$ 's exponent  $jnx$  is too close to  $e$ . The reason is that the font has metrics that are suitable for use in text, but not for mathematics. Comparing the alphabets typeset in Computer Modern Italic, in table 2, it is shown that many characters have greater space around them in the mathematics version, which does not exist in the text version. The adjusted alphabet shows the alphabet typeset as text, but also with a constant  $\mu$

TABLE 2: Computer Modern Italic in text and mathematics.

Text	<i>abcdefghijklmnopqrstuvwxyz</i>
Mathematics	<i>abcdefghijklmnopqrstuvwxyz</i>
Adjusted	<i>abcdefghijklmnopqrstuvwxyz</i>

space intercharacter space (poor man’s tracking). Since the adjusted alphabet is approximately as long as the mathematics alphabet, on average, this is a fair method to increase the space between alphabetic characters in mathematics.

Now, the problem lies with implementing this behaviour. The best way would be adjust  $\text{T}_{\text{E}}\text{X}$ ’s mathematics spacing rules to add this  $1\mu$  extra space after each  $\backslash\text{mathalpha}$ , but not after the  $\backslash\text{mathords}$ . I don’t know whether it is possible to separate the two types as such, since they are almost equivalent. Otherwise, would it look worse if  $\backslash\text{mathords}$  also have this extra space?

As it turns out,  $\text{T}_{\text{E}}\text{X}$ ’s mathematics spacing rules are hardwired into  $\text{T}_{\text{E}}\text{X}$  and can not be adjusted by the user. The table that is used to determine the spacing between pairs of adjacent atoms, from *The  $\text{T}_{\text{E}}\text{X}$ book*, is reproduced below:

Left atom	Right atom							
	Ord.	Op.	Bin.	Rel.	Open	Close	Punct.	Inner
Ordinary, et al. (Ord.)	0	1	2	3	0	0	0	1
Large operator (Op.)	1	1		3	0	0	0	1
Binary operation (Bin.)	2	2			2			2
Relation (Rel.)	3	3		0	3	0	0	3
Opening (Open)	0	0		0	0	0	0	0
Closing (Close)	0	1	2	3	0	0	0	1
Punctuation (Punct.)	1	1		1	1	1	1	1
Delimited subformula (Inner)	1	1	2	3	1	0	1	1

where 0, 1, 2 and 3 represent zero, thin, medium and thick skips respectively and coloured entries indicate that space is to be inserted only in display and text styles and not in script and scriptscript styles. Both Plain  $\text{T}_{\text{E}}\text{X}$  and  $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$  define the three skips as:

$\backslash\text{thinmskip}$	$3\mu$
$\backslash\text{medmskip}$	$4\mu$ plus $2\mu$ minus $4\mu$
$\backslash\text{thickmskip}$	$5\mu$ plus $5\mu$

and unless the option `normalskips` is used, `mathspec` increases each skip by  $1\mu$ :

$\backslash\text{thinmskip}$	$4\mu$
$\backslash\text{medmskip}$	$5\mu$ plus $2\mu$ minus $4\mu$
$\backslash\text{thickmskip}$	$6\mu$ plus $5\mu$

As far as I can tell, nothing can be done about the zero skip.

If  $\text{X}_{\text{Y}}\text{T}_{\text{E}}\text{X}$  is able to get information about the ‘ink box’ of a character, this elaborate, awkward and ugly hack, which is not even good anyway, might be replaced with something that is more elegant (or at least yields better results); better yet, if  $\text{X}_{\text{Y}}\text{T}_{\text{E}}\text{X}$  allows customisation of the mathematics spacing rules. It is impossible at the moment, for now, this described method is the best that is possible.

`\+` The command `\+` is used to produce fine control over the spacing in mathematics. Without its optional argument, it inserts a `\mu` ( $\frac{1}{18}$  em) skip. `\+[ <size>]` inserts a `<size>` `\mu` skip. The spacing of equations (2, 3) are improved by the replacements that are described in table 3:

$$f(x) = \sum_{n=-\infty}^{\infty} c_n e^{jnx} \quad (4)$$

$$c_n = \frac{1}{2\pi} \int_{-\pi}^{\pi} f(x) e^{-jnx} dx \quad (5)$$

This procedure is indeed awkward for the user, but still necessary to produce decent results. Note that `(x)` is replaced with `\left(x\right)`, which should always be done anyway.

TABLE 3: Example replacements that improve spacing

Original	Replacement
<code>f(x)</code>	<code>f\left(x\right)</code>
<code>e^{jnx}</code>	<code>e^{\+[ 4] jnx}</code>
<code>e^{-jnx}</code>	<code>e^{\+ - jnx}</code>
<code>\mathrm{d}x</code>	<code>\mathrm{d}\+x</code>

## 7 MATHSPEC.STY

```

1 \newif\if@eu@normalskips
2 \DeclareOption{normalskips}{\@eu@normalskipsfalse}
3 \DeclareOption*{\PassOptionsToPackage{\CurrentOption}{fontspec}}
4 \ProcessOptions\relax
5 \RequirePackage{fontspec}
6 \RequirePackage{xkeyval}
7 \RequirePackage{xifthen}
8 \newif\if@eu@Latinmathsfontspecified
9 \newif\if@eu@Greekmathsfontspecified
10 \newif\if@eu@Symbolmathsfontspecified
11 \newif\if@eu@LatinDigits
12 \newif\if@eu@GreekDigits
13 \newif\if@eu@declareDigits\@eu@declareDigitstrue
\eu@isloaded amsmath must be loaded before mathspec.
14 \newcommand\eu@isloaded[2][ ]{%
15   \expandafter\newif\csname if@eu@#2loaded\endcsname
16   \@ifpackageloaded{#2}%
17     {\csname @eu@#2loadedtrue\endcsname #1}%
18     {\csname @eu@#2loadedfalse\endcsname}}
19 \eu@isloaded{amsmath}

```

### 7.1 End user commands

`\setmathsfont` The general font specification command.  
`\setmathfont`

```

20 \newcommand\setmaths font{%
21   \@i fstar%
22   \eu@setmaths font@star%
23   \eu@setmaths font@nostar}
24 \let\setmathfont\setmaths font

```

`\eu@ScopeSet@Special` If `Set=Special` (or if `Set` is not listed), then do `\eu@ScopeSet@Special`, which can be externally set in the document (or a package) before `mathspec` is loaded.

```

25 \providecommand\eu@ScopeSet@Special[2]{\relax}
26 \newcommand\eu@setmaths font@star[2][ ]{%
27   \eu@retrieveset{#1}{#2}
28   \ifthenelse{equal{\eu@ScopeSet@value}{Special}}{%
29     \eu@ScopeSet@Special{\eu@keysminusScope}{#2}
30   }{%
31     \expandafter\csname @eu@\eu@ScopeSet@value Digitstrue\endcsname
32     \eu@setmaths font{\eu@keysminusScope}{#2}}
33 \newcommand\eu@setmaths font@nostar[2][ ]{%
34   \eu@retrieveset{#1}{#2}
35   \ifthenelse{equal{\eu@ScopeSet@value}{Special}}{%
36     \eu@ScopeSet@Special{\eu@keysminusScope}{#2}
37   }{%
38     \expandafter\csname @eu@\eu@ScopeSet@value Digitsfalse\endcsname
39     \eu@setmaths font{\eu@keysminusScope}{#2}}
40 \newcommand\eu@retrieveset[2]{%
41   \presetkeys[ eu]{Scope}{Set}{ }
42   \setkeys*[ eu]{Scope}{#1}
43   \let\eu@keysminusScope\XKV@rm}
44 \newcommand\eu@setmaths font[2]{%
45   \ifnum\eu@@ScopeSet@value=0\else
46     \expandafter\csname @eu@\eu@ScopeSet@value mathsfontspecifiedtrue\endcsname
47     \presetkeys[ eu]{\eu@ScopeSet@value}{Uppercase,Lowercase,Digits}{ }
48     \setkeys*[ eu]{\eu@ScopeSet@value}{#1}
49     \zf@fontspec{\XKV@rm}{#2}
50     \expandafter\let\csname eu@\eu@ScopeSet@value mathsfont\endcsname\zf@family
51     \ifthenelse{equal{\eu@ScopeSet@value}{Latin}}%
52       {\let\zf@mmaths\eu@Latinmaths font}{\relax}
53   \fi}

```

`\+` A new command that inserts a space in mathematics. It must be robust and any white space between the `\+` and `[` must not be ignored so that legitimate (square) brackets in mathematics is not interpreted as some optional argument. To do this, `breqn's` `\@i fnext` replaces `\@i fnextchar` in the definition of `LATEX's` `\DeclareRobustCommand`.

```

54 \def\@i fnext#1#2#3{%
55   \let\@tempd= #1\def\@tempa{#2}\def\@tempb{#3}%
56   \futurelet\@tempc\@i fnexta
57 }
58 \def\@i fnexta{\ifx\@tempc\@tempd \let\@tempb\@tempa \fi \@tempb}
59 \def\eu@DeclareRobustCommand{\@star@or@long\eu@declare@robustcommand}
60 \def\eu@declare@robustcommand#1{%
61   \ifx#1\@undefined\else\ifx#1\relax\else
62     \@latex@info{Redefining \string#1}%
63   \fi\fi
64   \edef\reserved@a{\string#1}%

```



```

65 \def\reserved@b{#1}%
66 \edef\reserved@b{\expandafter\strip@prefix\meaning\reserved@b}%
67 \edef#1{%
68   \ifx\reserved@a\reserved@b
69     \noexpand\x@protect
70     \noexpand#1%
71   \fi
72   \noexpand\protect
73   \expandafter\noexpand\csname
74     \expandafter\@gobble\string#1 \endcsname
75 }%
76 \let\@ifdefinable\@rc@ifdefinable
77 \expandafter\eu@new@command\csname
78   \expandafter\@gobble\string#1 \endcsname
79 }
80 \def\eu@new@command#1{%
81   \eu@@testopt{\eu@newcommand#1}{}
82 \def\eu@newcommand#1[#2]{%
83   \@ifnext [{\@xargdef#1[#2]}%
84     {\@argdef#1[#2]}}
85 \long\def\eu@@testopt#1#2{%
86   \@ifnext[ {#1}{#1[#2]}}
87 \eu@DeclareRobustCommand\+{1}[1]{\ensuremath{\mskip#1mu}}

```

## 7.2 Redefinitions

```

88 \if@eu@normalskips\else
89   \thinmuskip=4mu
90   \medmuskip=5mu plus 2mu minus 4mu
91   \thickmuskip=6mu plus 5mu
92 \fi

```

## 7.3 Internal commands

xkeyval key definitions.

```

93 \define@choicekey[eu]{Scope}{Set}%
94   [\eu@ScopeSet@value\eu@@ScopeSet@value]%
95   {Special, Latin, Greek, Symbols}[Special]{\relax}
96 \define@choicekey[eu]{Latin}{Uppercase}%
97   [\eu@LatinUppercase@value\eu@@LatinUppercase@value]%
98   {Regular, Italic, Plain}[Italic]{\relax}
99 \define@choicekey[eu]{Latin}{Lowercase}%
100  [\eu@LatinLowercase@value\eu@@LatinLowercase@value]%
101  {Regular, Italic, Plain}[Italic]{\relax}
102 \define@choicekey[eu]{Latin}{Digits}%
103  [\eu@LatinDigits@value\eu@@LatinDigits@value]%
104  {Regular, Italic, Plain}[Regular]{\relax}
105 \define@choicekey[eu]{Greek}{Uppercase}%
106  [\eu@GreekUppercase@value\eu@@GreekUppercase@value]%
107  {Regular, Italic, Plain}[Regular]{\relax}
108 \define@choicekey[eu]{Greek}{Lowercase}%
109  [\eu@GreekLowercase@value\eu@@GreekLowercase@value]%
110  {Regular, Italic, Plain}[Italic]{\relax}
111 \define@choicekey[eu]{Greek}{Digits}%

```

```

112 [\eu@GreekDigits@value\eu@@GreekDigits@value]%
113 {Regular,Italic,Plain}[Regular]{\relax}

```

`\eu@XeTeXDeclareMathSymbol` A crude extension of L<sup>A</sup>T<sub>E</sub>X's `\DeclareMathSymbol{⟨symbol⟩}{⟨type⟩}{⟨sym-font⟩}{⟨slot⟩}` to allow the greater set of Unicode characters; It could do with some work, for example to permit a control sequence as the first argument. The command allows us to type, say, literal Greek characters in mathematics, for example,  $y = \alpha x^2 + \beta x + \gamma$  and  $y = \alpha x^2 + \beta x + \gamma$  are equivalent, and potentially the other mathematical symbols that are represented in Unicode, as in something like  $\int_{-\infty}^{\infty} e^{-\frac{x^2}{2}} dx = \sqrt{2\pi}$ , but perhaps not exactly.

```

114 \newcommand\eu@XeTeXDeclareMathSymbol[4]{
115   \expandafter\XeTeXmathcode`#1=\mathchar@type#2 \csname sym#3\endcsname #4}

```

`\eu@DeclareMathSymbol` The command `\eu@DeclareMathSymbol` used in this package lets a control sequence be equivalent to a literal character but will only do something if the character exists in the font.

```

116 \newcommand\eu@DeclareMathSymbol[4]{%
117   \iffontchar\font#4%
118     \eu@XeTeXDeclareMathSymbol#1#2#3#4%
119     \let\eu@Character#1%
120   \else
121     \let\eu@Character\relax
122   \fi
123   \futurelet\eu@nexttoken\eu@DeclareMathSymbol@option}
124 \newcommand\eu@DeclareMathSymbol@option{%
125   \ifx\eu@nexttoken%
126     \let\eu@next\eu@option
127   \else
128     \let\eu@next\relax
129   \fi
130   \eu@next}
131 \def\eu@option[#1]{%
132   \ifx\eu@Character\relax\else
133     \let#1\eu@Character
134   \fi}

```

## 7.4 The heavy work

### 7.4.1 Declaring the fonts

`\eu@DeclareFonts`

```

135 \newcommand\eu@DeclareFonts{
136   \if@eu@Latinmathsfontspecified
137     \DeclareSymbolFont{Lmn}{EU1}{\eu@Latinmathsfont}{m}{n}
138     \DeclareSymbolFont{Lmit}{EU1}{\eu@Latinmathsfont}{m}{it}
139     \DeclareMathAlphabet{\mathbi}{EU1}{\eu@Latinmathsfont}{bx}{it}
140   \fi
141   \if@eu@Greekmathsfontspecified
142     \DeclareSymbolFont{Gmn}{EU1}{\eu@Greekmathsfont}{m}{n}
143     \DeclareSymbolFont{Gmit}{EU1}{\eu@Greekmathsfont}{m}{it}
144     \DeclareMathAlphabet{\greekmathrm}{EU1}{\eu@Greekmathsfont}{m}{n}
145     \def\greekmathrg{\greekmathrm}

```

```

146 \DeclareMathAlphabet{\greekmathit}{EU1}{\eu@Greekmaths font}{m}{it}
147 \DeclareMathAlphabet{\greekmathbf}{EU1}{\eu@Greekmaths font}{bx}{n}
148 \DeclareMathAlphabet{\greekmathbi}{EU1}{\eu@Greekmaths font}{bx}{it}
149 \fi
150 \if@eu@Symbolmaths fonts specified
151 \DeclareSymbolFont{Smn}{EU1}{\eu@Symbolmaths font}{m}{n}
152 \fi}

```

#### 7.4.2 Declaring the digits

`\eu@DeclareDigits`

```

153 \newcommand\eu@DeclareDigits{
154   \if@eu@Latinmaths fonts specified
155     \if@eu@LatinDigits
156       \eu@LatinDigits@Plain
157     \else
158       \if@eu@Greekmaths fonts specified
159         \if@eu@GreekDigits
160           \eu@GreekDigits@Plain
161         \else
162           \eu@LatinDigits@Plain
163         \fi
164       \else
165         \eu@LatinDigits@Plain
166       \fi
167     \fi
168   \else
169     \if@eu@Greekmaths fonts specified
170       \eu@GreekDigits@Plain
171     \else
172       \@eu@declareDigits false
173     \fi
174   \fi
175   \if@eu@declareDigits
176     \DeclareMathSymbol{0}{\mathord}{\eu@Digits@symfont}{`0}
177     \DeclareMathSymbol{1}{\mathord}{\eu@Digits@symfont}{`1}
178     \DeclareMathSymbol{2}{\mathord}{\eu@Digits@symfont}{`2}
179     \DeclareMathSymbol{3}{\mathord}{\eu@Digits@symfont}{`3}
180     \DeclareMathSymbol{4}{\mathord}{\eu@Digits@symfont}{`4}
181     \DeclareMathSymbol{5}{\mathord}{\eu@Digits@symfont}{`5}
182     \DeclareMathSymbol{6}{\mathord}{\eu@Digits@symfont}{`6}
183     \DeclareMathSymbol{7}{\mathord}{\eu@Digits@symfont}{`7}
184     \DeclareMathSymbol{8}{\mathord}{\eu@Digits@symfont}{`8}
185     \DeclareMathSymbol{9}{\mathord}{\eu@Digits@symfont}{`9}
186   \fi}
187 \newcommand\eu@LatinDigits@Plain{%
188   \ifcase\eu@@LatinDigits@value
189     \newcommand\eu@Digits@symfont{Lmn}
190   \or
191     \newcommand\eu@Digits@symfont{Lmit}
192   \or
193     \@eu@declareDigits false
194   \fi}
195 \newcommand\eu@GreekDigits@Plain{%

```

```

196 \ifcase\eu@@GreekDigits@value
197 \newcommand\eu@Digits@symfont{Gmn}
198 \or
199 \newcommand\eu@Digits@symfont{Gmit}
200 \or
201 \@eu@declareDigits false
202 \fi}

```

#### 7.4.3 Declaring the uppercase Latin characters

\eu@DeclareLatinUppercase

```

203 \newcommand\eu@DeclareLatinUppercase{
204 \ifcase\eu@@LatinUppercase@value
205 \newcommand\eu@LatinUppercase@symfont{Lmn}
206 \else
207 \newcommand\eu@LatinUppercase@symfont{Lmit}
208 \fi
209 \DeclareMathSymbol{A}{\mathalpha}{\eu@LatinUppercase@symfont}{`A}
210 \DeclareMathSymbol{B}{\mathalpha}{\eu@LatinUppercase@symfont}{`B}
211 \DeclareMathSymbol{C}{\mathalpha}{\eu@LatinUppercase@symfont}{`C}
212 \DeclareMathSymbol{D}{\mathalpha}{\eu@LatinUppercase@symfont}{`D}
213 \DeclareMathSymbol{E}{\mathalpha}{\eu@LatinUppercase@symfont}{`E}
214 \DeclareMathSymbol{F}{\mathalpha}{\eu@LatinUppercase@symfont}{`F}
215 \DeclareMathSymbol{G}{\mathalpha}{\eu@LatinUppercase@symfont}{`G}
216 \DeclareMathSymbol{H}{\mathalpha}{\eu@LatinUppercase@symfont}{`H}
217 \DeclareMathSymbol{I}{\mathalpha}{\eu@LatinUppercase@symfont}{`I}
218 \DeclareMathSymbol{J}{\mathalpha}{\eu@LatinUppercase@symfont}{`J}
219 \DeclareMathSymbol{K}{\mathalpha}{\eu@LatinUppercase@symfont}{`K}
220 \DeclareMathSymbol{L}{\mathalpha}{\eu@LatinUppercase@symfont}{`L}
221 \DeclareMathSymbol{M}{\mathalpha}{\eu@LatinUppercase@symfont}{`M}
222 \DeclareMathSymbol{N}{\mathalpha}{\eu@LatinUppercase@symfont}{`N}
223 \DeclareMathSymbol{O}{\mathalpha}{\eu@LatinUppercase@symfont}{`O}
224 \DeclareMathSymbol{P}{\mathalpha}{\eu@LatinUppercase@symfont}{`P}
225 \DeclareMathSymbol{Q}{\mathalpha}{\eu@LatinUppercase@symfont}{`Q}
226 \DeclareMathSymbol{R}{\mathalpha}{\eu@LatinUppercase@symfont}{`R}
227 \DeclareMathSymbol{S}{\mathalpha}{\eu@LatinUppercase@symfont}{`S}
228 \DeclareMathSymbol{T}{\mathalpha}{\eu@LatinUppercase@symfont}{`T}
229 \DeclareMathSymbol{U}{\mathalpha}{\eu@LatinUppercase@symfont}{`U}
230 \DeclareMathSymbol{V}{\mathalpha}{\eu@LatinUppercase@symfont}{`V}
231 \DeclareMathSymbol{W}{\mathalpha}{\eu@LatinUppercase@symfont}{`W}
232 \DeclareMathSymbol{X}{\mathalpha}{\eu@LatinUppercase@symfont}{`X}
233 \DeclareMathSymbol{Y}{\mathalpha}{\eu@LatinUppercase@symfont}{`Y}
234 \DeclareMathSymbol{Z}{\mathalpha}{\eu@LatinUppercase@symfont}{`Z}}

```

#### 7.4.4 Declaring the lowercase Latin characters

\eu@DeclareLatinLowercase

```

235 \newcommand\eu@DeclareLatinLowercase{
236 \ifcase\eu@@LatinLowercase@value
237 \newcommand\eu@LatinLowercase@symfont{Lmn}
238 \else
239 \newcommand\eu@LatinLowercase@symfont{Lmit}
240 \fi

```

```

241 \DeclareMathSymbol{a}{\mathalpha}{\eu@LatinLowercase@symfont}{`a}
242 \DeclareMathSymbol{b}{\mathalpha}{\eu@LatinLowercase@symfont}{`b}
243 \DeclareMathSymbol{c}{\mathalpha}{\eu@LatinLowercase@symfont}{`c}
244 \DeclareMathSymbol{d}{\mathalpha}{\eu@LatinLowercase@symfont}{`d}
245 \DeclareMathSymbol{e}{\mathalpha}{\eu@LatinLowercase@symfont}{`e}
246 \DeclareMathSymbol{f}{\mathalpha}{\eu@LatinLowercase@symfont}{`f}
247 \DeclareMathSymbol{g}{\mathalpha}{\eu@LatinLowercase@symfont}{`g}
248 \DeclareMathSymbol{h}{\mathalpha}{\eu@LatinLowercase@symfont}{`h}
249 \DeclareMathSymbol{i}{\mathalpha}{\eu@LatinLowercase@symfont}{`i}
250 \DeclareMathSymbol{j}{\mathalpha}{\eu@LatinLowercase@symfont}{`j}
251 \DeclareMathSymbol{k}{\mathalpha}{\eu@LatinLowercase@symfont}{`k}
252 \DeclareMathSymbol{l}{\mathalpha}{\eu@LatinLowercase@symfont}{`l}
253 \DeclareMathSymbol{m}{\mathalpha}{\eu@LatinLowercase@symfont}{`m}
254 \DeclareMathSymbol{n}{\mathalpha}{\eu@LatinLowercase@symfont}{`n}
255 \DeclareMathSymbol{o}{\mathalpha}{\eu@LatinLowercase@symfont}{`o}
256 \DeclareMathSymbol{p}{\mathalpha}{\eu@LatinLowercase@symfont}{`p}
257 \DeclareMathSymbol{q}{\mathalpha}{\eu@LatinLowercase@symfont}{`q}
258 \DeclareMathSymbol{r}{\mathalpha}{\eu@LatinLowercase@symfont}{`r}
259 \DeclareMathSymbol{s}{\mathalpha}{\eu@LatinLowercase@symfont}{`s}
260 \DeclareMathSymbol{t}{\mathalpha}{\eu@LatinLowercase@symfont}{`t}
261 \DeclareMathSymbol{u}{\mathalpha}{\eu@LatinLowercase@symfont}{`u}
262 \DeclareMathSymbol{v}{\mathalpha}{\eu@LatinLowercase@symfont}{`v}
263 \DeclareMathSymbol{w}{\mathalpha}{\eu@LatinLowercase@symfont}{`w}
264 \DeclareMathSymbol{x}{\mathalpha}{\eu@LatinLowercase@symfont}{`x}
265 \DeclareMathSymbol{y}{\mathalpha}{\eu@LatinLowercase@symfont}{`y}
266 \DeclareMathSymbol{z}{\mathalpha}{\eu@LatinLowercase@symfont}{`z}}

```

#### 7.4.5 Declaring the uppercase Greek characters

`\eu@DeclareGreekUppercase`

```

267 \newcommand\eu@DeclareGreekUppercase{
268   \ifcase\eu@Greekgreek@value
269     \newcommand\eu@Greekgreek@symfont{Gmn}
270   \else
271     \newcommand\eu@Greekgreek@symfont{Gmit}
272   \fi
273 \eu@DeclareMathSymbol{A}{\mathalpha}{\eu@Greekgreek@symfont}{`A}[ \Alpha]
274 \eu@DeclareMathSymbol{B}{\mathalpha}{\eu@Greekgreek@symfont}{`B}[ \Beta]
275 \eu@DeclareMathSymbol{\Gamma}{\mathalpha}{\eu@Greekgreek@symfont}{`\Gamma}[ \Gamma]
276 \eu@DeclareMathSymbol{\Delta}{\mathalpha}{\eu@Greekgreek@symfont}{`\Delta}[ \Delta]
277 \eu@DeclareMathSymbol{E}{\mathalpha}{\eu@Greekgreek@symfont}{`E}[ \Epsilon]
278 \eu@DeclareMathSymbol{Z}{\mathalpha}{\eu@Greekgreek@symfont}{`Z}[ \Zeta]
279 \eu@DeclareMathSymbol{H}{\mathalpha}{\eu@Greekgreek@symfont}{`H}[ \Eta]
280 \eu@DeclareMathSymbol{\Theta}{\mathalpha}{\eu@Greekgreek@symfont}{`\Theta}[ \Theta]
281 \eu@DeclareMathSymbol{I}{\mathalpha}{\eu@Greekgreek@symfont}{`I}[ \Iota]
282 \eu@DeclareMathSymbol{K}{\mathalpha}{\eu@Greekgreek@symfont}{`K}[ \Kappa]
283 \eu@DeclareMathSymbol{\Lambda}{\mathalpha}{\eu@Greekgreek@symfont}{`\Lambda}[ \Lambda]
284 \eu@DeclareMathSymbol{M}{\mathalpha}{\eu@Greekgreek@symfont}{`M}[ \Mu]
285 \eu@DeclareMathSymbol{N}{\mathalpha}{\eu@Greekgreek@symfont}{`N}[ \Nu]
286 \eu@DeclareMathSymbol{\Xi}{\mathalpha}{\eu@Greekgreek@symfont}{`\Xi}[ \Xi]
287 \eu@DeclareMathSymbol{\Omicron}{\mathalpha}{\eu@Greekgreek@symfont}{`\Omicron}[ \Omicron]
288 \eu@DeclareMathSymbol{\Pi}{\mathalpha}{\eu@Greekgreek@symfont}{`\Pi}[ \Pi]
289 \eu@DeclareMathSymbol{P}{\mathalpha}{\eu@Greekgreek@symfont}{`P}[ \Rho]
290 \eu@DeclareMathSymbol{\Sigma}{\mathalpha}{\eu@Greekgreek@symfont}{`\Sigma}[ \Sigma]

```

```

291 \eu@DeclareMathSymbol{T}{\mathalpha}{\eu@GreekUppercase@symfont}{`T}[ \Tau]
292 \eu@DeclareMathSymbol{Y}{\mathalpha}{\eu@GreekUppercase@symfont}{`Y}[ \Upsilon]
293 \eu@DeclareMathSymbol{Phi}{\mathalpha}{\eu@GreekUppercase@symfont}{`Phi}[ \Phi]
294 \eu@DeclareMathSymbol{Chi}{\mathalpha}{\eu@GreekUppercase@symfont}{`Chi}[ \Chi]
295 \eu@DeclareMathSymbol{Psi}{\mathalpha}{\eu@GreekUppercase@symfont}{`Psi}[ \Psi]
296 \eu@DeclareMathSymbol{Omega}{\mathalpha}{\eu@GreekUppercase@symfont}{`Omega}[ \Omega]

```

#### 7.4.6 Declaring the lowercase Greek characters

`\eu@DeclareGreekLowercase`

```

297 \newcommand\eu@DeclareGreekLowercase{
298   \ifcase\eu@@GreekLowercase@value
299     \newcommand\eu@GreekLowercase@symfont{Gmn}
300   \else
301     \newcommand\eu@GreekLowercase@symfont{Gmit}
302   \fi
303 \eu@DeclareMathSymbol{alpha}{\mathalpha}{\eu@GreekLowercase@symfont}{`alpha}[ \alpha]
304 \eu@DeclareMathSymbol{beta}{\mathalpha}{\eu@GreekLowercase@symfont}{`beta}[ \beta]
305 \eu@DeclareMathSymbol{gamma}{\mathalpha}{\eu@GreekLowercase@symfont}{`gamma}[ \gamma]
306 \eu@DeclareMathSymbol{delta}{\mathalpha}{\eu@GreekLowercase@symfont}{`delta}[ \delta]
307 \eu@DeclareMathSymbol{epsilon}{\mathalpha}{\eu@GreekLowercase@symfont}{`epsilon}[ \epsilon]
308 \eu@DeclareMathSymbol{zeta}{\mathalpha}{\eu@GreekLowercase@symfont}{`zeta}[ \zeta]
309 \eu@DeclareMathSymbol{eta}{\mathalpha}{\eu@GreekLowercase@symfont}{`eta}[ \eta]
310 \eu@DeclareMathSymbol{theta}{\mathalpha}{\eu@GreekLowercase@symfont}{`theta}[ \theta]
311 \eu@DeclareMathSymbol{iota}{\mathalpha}{\eu@GreekLowercase@symfont}{`iota}[ \iota]
312 \eu@DeclareMathSymbol{kappa}{\mathalpha}{\eu@GreekLowercase@symfont}{`kappa}[ \kappa]
313 \eu@DeclareMathSymbol{lambda}{\mathalpha}{\eu@GreekLowercase@symfont}{`lambda}[ \lambda]
314 \eu@DeclareMathSymbol{mu}{\mathalpha}{\eu@GreekLowercase@symfont}{`mu}[ \mu]
315 \eu@DeclareMathSymbol{nu}{\mathalpha}{\eu@GreekLowercase@symfont}{`nu}[ \nu]
316 \eu@DeclareMathSymbol{xi}{\mathalpha}{\eu@GreekLowercase@symfont}{`xi}[ \xi]
317 \eu@DeclareMathSymbol{omicron}{\mathalpha}{\eu@GreekLowercase@symfont}{`omicron}[ \omicron]
318 \eu@DeclareMathSymbol{pi}{\mathalpha}{\eu@GreekLowercase@symfont}{`pi}[ \pi]
319 \eu@DeclareMathSymbol{rho}{\mathalpha}{\eu@GreekLowercase@symfont}{`rho}[ \rho]
320 \eu@DeclareMathSymbol{sigma}{\mathalpha}{\eu@GreekLowercase@symfont}{`sigma}[ \sigma]
321 \eu@DeclareMathSymbol{tau}{\mathalpha}{\eu@GreekLowercase@symfont}{`tau}[ \tau]
322 \eu@DeclareMathSymbol{upsilon}{\mathalpha}{\eu@GreekLowercase@symfont}{`upsilon}[ \upsilon]
323 \eu@DeclareMathSymbol{phi}{\mathalpha}{\eu@GreekLowercase@symfont}{`phi}[ \phi]
324 \eu@DeclareMathSymbol{chi}{\mathalpha}{\eu@GreekLowercase@symfont}{`chi}[ \chi]
325 \eu@DeclareMathSymbol{psi}{\mathalpha}{\eu@GreekLowercase@symfont}{`psi}[ \psi]
326 \eu@DeclareMathSymbol{omega}{\mathalpha}{\eu@GreekLowercase@symfont}{`omega}[ \omega]
327 \eu@DeclareMathSymbol{varsigma}{\mathalpha}{\eu@GreekLowercase@symfont}{`varsigma}[ \varsigma]

```

#### 7.4.7 Declaring common symbols

`\eu@DeclareSymbols` The future might hold `\include{Unicode-math.tex}` here to quickly expand the list of supported Unicode math symbols, but that list has several omissions and unwanted inclusions.

```

328 \newcommand\eu@DeclareSymbols{
329   \newcommand\eu@Symbols@symfont{Smn}
330   \fontfamily\eu@Symbolsmathsfnt\selectfont
331   \eu@DeclareMathSymbol{!}{\mathclose}{\eu@Symbols@symfont}{!}[ \exclam]
332   \eu@DeclareMathSymbol{+}{\mathbin}{\eu@Symbols@symfont}{+}[ \plus]
333   \eu@DeclareMathSymbol{,}{\mathpunct}{\eu@Symbols@symfont}{,}

```

```

334 \eu@DeclareMathSymbol{\mathord}{\eu@Symbols@symfont}{.}
335 \iffontchar\font`.
336 \XeTeXmathchardef\ldotp6\symSmn`.
337 \fi
338 \eu@DeclareMathSymbol{\mathrel}{\eu@Symbols@symfont}{:}
339 \iffontchar\font`.
340 \XeTeXmathchardef\colon6\symSmn`.
341 \fi
342 \eu@DeclareMathSymbol{\mathpunct}{\eu@Symbols@symfont}{;}[\semicolon]
343 \eu@DeclareMathSymbol{\mathrel}{\eu@Symbols@symfont}{<}[\less]
344 \eu@DeclareMathSymbol{\mathrel}{\eu@Symbols@symfont}{=}[equal]
345 \eu@DeclareMathSymbol{\mathrel}{\eu@Symbols@symfont}{>}[\greater]
346 \eu@DeclareMathSymbol{\mathclose}{\eu@Symbols@symfont}{?}
347 \eu@DeclareMathSymbol{\mathord}{\eu@Symbols@symfont}{-}[\neg]
348 \let\not\neg
349 \eu@DeclareMathSymbol{\mathord}{\eu@Symbols@symfont}{^{\circ}}[\degree]
350 \eu@DeclareMathSymbol{\mathbin}{\eu@Symbols@symfont}{\pm}[\pm]
351 \eu@DeclareMathSymbol{\mathord}{\eu@Symbols@symfont}{\mu}[\micro]
352 \eu@DeclareMathSymbol{\mathbin}{\eu@Symbols@symfont}{\times}[\times]
353 \eu@DeclareMathSymbol{\mathbin}{\eu@Symbols@symfont}{\div}[\div]
354 \eu@DeclareMathSymbol{\mathord}{\eu@Symbols@symfont}{\forall}[\forall]
355 \eu@DeclareMathSymbol{\mathord}{\eu@Symbols@symfont}{\partial}[\partial]
356 \eu@DeclareMathSymbol{\mathord}{\eu@Symbols@symfont}{\exists}[\exists]
357 \eu@DeclareMathSymbol{\mathord}{\eu@Symbols@symfont}{\emptyset}[\emptyset]
358 \eu@DeclareMathSymbol{\mathord}{\eu@Symbols@symfont}{\Delta}[\Delta]
359 \eu@DeclareMathSymbol{\mathord}{\eu@Symbols@symfont}{\nabla}[\nabla]
360 \eu@DeclareMathSymbol{\mathrel}{\eu@Symbols@symfont}{\in}[\in]
361 \eu@DeclareMathSymbol{\mathrel}{\eu@Symbols@symfont}{\notin}[\notin]
362 \eu@DeclareMathSymbol{\mathrel}{\eu@Symbols@symfont}{\ni}[\ni]
363 \let\owns\ni
364 \eu@DeclareMathSymbol{\mathbin}{\eu@Symbols@symfont}{-}[\minus]
365 \eu@DeclareMathSymbol{\mathbin}{\eu@Symbols@symfont}{/}[\slash]
366 \eu@DeclareMathSymbol{\mathbin}{\eu@Symbols@symfont}{*}[\ast]
367 \eu@DeclareMathSymbol{\mathbin}{\eu@Symbols@symfont}{\ast}[\ast]
368 \eu@DeclareMathSymbol{\mathbin}{\eu@Symbols@symfont}{\bullet}[\bullet]
369 \let\bullet\vysmbllkcircle
370 \eu@DeclareMathSymbol{\mathrel}{\eu@Symbols@symfont}{\propto}[\propto]
371 \eu@DeclareMathSymbol{\mathord}{\eu@Symbols@symfont}{\infty}[\infty]
372 \eu@DeclareMathSymbol{\mathord}{\eu@Symbols@symfont}{\perp}[\perp]
373 \eu@DeclareMathSymbol{\mathord}{\eu@Symbols@symfont}{\angle}[\angle]
374 \eu@DeclareMathSymbol{\mathbin}{\eu@Symbols@symfont}{\wedge}[\wedge]
375 \let\land\wedge
376 \eu@DeclareMathSymbol{\mathbin}{\eu@Symbols@symfont}{\vee}[\vee]
377 \let\lor\vee
378 \eu@DeclareMathSymbol{\mathbin}{\eu@Symbols@symfont}{\cap}[\cap]
379 \eu@DeclareMathSymbol{\mathbin}{\eu@Symbols@symfont}{\cup}[\cup]
380 \eu@DeclareMathSymbol{\mathord}{\eu@Symbols@symfont}{\therefore}[\therefore]
381 \eu@DeclareMathSymbol{\mathrel}{\eu@Symbols@symfont}{\sim}[\sim]
382 \eu@DeclareMathSymbol{\mathrel}{\eu@Symbols@symfont}{\cong}[\cong]
383 \eu@DeclareMathSymbol{\mathrel}{\eu@Symbols@symfont}{\approx}[\approx]
384 \eu@DeclareMathSymbol{\mathrel}{\eu@Symbols@symfont}{\neq}[\neq]
385 \let\neq\neq
386 \eu@DeclareMathSymbol{\mathrel}{\eu@Symbols@symfont}{\equiv}[\equiv]

```

```

388 \eu@DeclareMathSymbol{\leq}{\mathrel}{\eu@Symbols@symfont}{\leq}[\leq]
389 \let\leq\leq
390 \eu@DeclareMathSymbol{\geq}{\mathrel}{\eu@Symbols@symfont}{\geq}[\geq]
391 \let\geq\geq
392 \eu@DeclareMathSymbol{\subset}{\mathrel}{\eu@Symbols@symfont}{\subset}[\subset]
393 \eu@DeclareMathSymbol{\supset}{\mathrel}{\eu@Symbols@symfont}{\supset}[\supset]
394 \eu@DeclareMathSymbol{\nsubset}{\mathrel}{\eu@Symbols@symfont}{\nsubset}[\nsubset]
395 \let\nsubset\nsubset
396 \eu@DeclareMathSymbol{\subseteq}{\mathrel}{\eu@Symbols@symfont}{\subseteq}[\subseteq]
397 \eu@DeclareMathSymbol{\supseteq}{\mathrel}{\eu@Symbols@symfont}{\supseteq}[\supseteq]
398 \eu@DeclareMathSymbol{\oplus}{\mathbin}{\eu@Symbols@symfont}{\oplus}[\oplus]
399 \eu@DeclareMathSymbol{\otimes}{\mathbin}{\eu@Symbols@symfont}{\otimes}[\otimes]
400 \eu@DeclareMathSymbol{\bot}{\mathord}{\eu@Symbols@symfont}{\bot}[\bot]
401 \let\perp\bot
402 \eu@DeclareMathSymbol{\cdot}{\mathbin}{\eu@Symbols@symfont}{\cdot}[\cdot]
403 \iffontchar\font`·
404 \XeTeXmathchardef\cdotp6\symSmn`·
405 \fi
406 \fontfamily\rmdefault\selectfont}

```

## 7.5 Finishing

The commands that declare each symbol are done `\AtBeginDocument`.

```

407 \AtBeginDocument{
408   \if@eu@amsmathloaded\else
409     \eu@isloaded[ %
410       \PackageError{mathspec}%
411         {Package amsmath must be loaded before mathspec}{}{amsmath}
412   \fi
413   \eu@DeclareFonts
414   \eu@DeclareDigits
415   \if@eu@Latinmathsfontspecified
416     \ifnum\eu@@LatinUppercase@value<2
417       \eu@DeclareLatinUppercase
418     \fi
419     \ifnum\eu@@LatinLowercase@value<2
420       \eu@DeclareLatinLowercase
421     \fi
422   \fi
423   \if@eu@Greekmathsfontspecified
424     \ifnum\eu@@GreekUppercase@value<2
425       \eu@DeclareGreekUppercase
426     \fi
427     \ifnum\eu@@GreekLowercase@value<2
428       \eu@DeclareGreekLowercase
429     \fi
430   \fi
431   \if@eu@Symbolsmathfontspecified
432     \eu@DeclareSymbols
433   \fi
434 }

```