

Using the *MathTimeProfessional II* fonts with L^AT_EX^{*}

Walter Schmidt

2006/05/03

Abstract

This document describes the macro package `mtpro2`, which serves for using the *MathTimeProfessional II* fonts with L^AT_EX. The package code was partially adopted from the `mathtime` package written by Frank Mittelbach and David Carlisle.

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^{*}This document refers to version v1.1 of the `mtpro2` package.

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1 The *MathTimeProfessional* fonts

MathTimeProfessional II is a set of math fonts particularly designed for use with \TeX or \LaTeX .

Separate fonts for text size, superscripts, and second order superscripts are provided, allowing quality mathematical typesetting that has hitherto been available only with metal type or with the Computer Modern and the Euler fonts. Furthermore, *MathTimeProfessional* includes, for instance,

- ▷ individually designed delimiters and radical signs for sizes up to 4 inches tall and extra-wide mathematical accents,
- ▷ complete Greek alphabets, both slanted and upright,
- ▷ matching script, fraktur and BlackBoard Bold fonts,
- ▷ AMS symbols, and more.

In addition to the ‘Complete’ set of the *MathTimeProfessional II* fonts, there is a ‘Lite’ version, which includes only a basic set, essentially replacing the standard Computer Modern math fonts that are required for plain \TeX .

2 The **mtpro2** package

Basically, loading the macro package `mtpro2`

```
\usepackage[options]{mtpro2}
```

makes \LaTeX use *MathTimeProfessional* in place of the default Computer Modern math fonts. The following sections describe the particular features of the package and the additional options that control its behavior.

The package `mtpro2` constitutes a successor to the previously separate packages `mtp`, `mtpams` and `mtpb` and integrates all of their capabilities.

2.1 *Lite* vs. *Complete* font set

If you are using the ‘lite’ font set, you should disable all those features that would require the complete collection. To do so, load the package with the option `lite`:

```
\usepackage[lite,...]{mtpro2}
```

In particular, the following features are available only with the complete font set:

- ▷ Bold math fonts, except for the bold upright math alphabets `\mathbf` and `\mbf`, and for the bold versions of the CM Calligraphic and the Euler fonts;
- ▷ Times-compatible script, curly, fraktur and ‘blackboard bold’ fonts;
- ▷ AMS symbols.

When `mtpro2` is loaded with the option `lite`, they are disabled so that you cannot use any missing fonts inadvertently. Features requiring the complete font set are marked appropriately in the remainder of the present document.



2.2 Text fonts

Loading the `mtpro2` package does not change L^AT_EX's default text font families (Computer Modern). However, the *MathTimeProfessional* fonts were designed to blend best with Times. The Monotype Times New Roman fonts are an ideal match, but `mtpro2` can equally well be used with Adobe Times, Times Ten and similar typefaces, such as Baskerville or Concorde.

The roman, sans-serif and typewriter font families and the encoding of the text fonts are to be selected *before* loading of `mtpro2` (unless you stay with L^AT_EX's defaults), so that the package 'knows' the fonts and the encoding to be used for operator names such as 'sin' and for the math alphabets `\mathrm`, `\mathsf` and `\mathtt`. For instance,

```
\usepackage[T1]{fontenc}
\usepackage{textcomp}
\renewcommand{\rmdefault}{ptm}
\usepackage[scaled=0.92]{helvet}
\usepackage{mtpro2}
```

selects T1 encoding with additional text companion symbols and loads *MathTimeProfessional* in conjunction with Adobe Times (`ptm`) and Helvetica, while the default typewriter font family (CM Typewriter) is unchanged. This is how the present document has been typeset.

2.3 Greek letters

With T_EX or L^AT_EX, uppercase Greek letters in math mode are usually typeset as upright, even though they are usually meant to designate variables. Since this violates the International Standards ISO31-0:1992 to ISO31-13:1992, the `mtpro2` package provides an option `slantedGreek`, which causes uppercase Greek (`\Gamma`, `\Delta` etc.), to be typeset as slanted.

Upright lowercase and uppercase Greek letters are available with command names such as `\upalpha`, `\upbeta`, `\upGamma`, `\upDelta`, etc. They are always upright, regardless of the `slantedGreek` option.

The response of the Greek letters to math alphabet commands differs from that of standard L^AT_EX when `mtpro2` is used: Lowercase Greek letters will respond to math alphabet commands; otherwise, `\mathbf` and `\mathbb` would not work as described below.

This behavior, may, however, cause problems with legacy documents, because applying a different math alphabet than `\mathbf` or one of the italic doublestroke alphabets on lowercase Greek letters will result in garbage output (or no output at all). To avoid this, specify the package option `compatiblegreek`, which causes the lowercase Greek letters to be declared as 'ordinary' symbols—however, with the drawback that they will no longer honor `\mathbf` or `\mathbb`.




2.4 Numbers and punctuation in math mode

L^AT_EX's default behavior is to typeset numbers and punctuation in math mode using the `\mathrm` alphabet, which normally equals the default text font.

With the `mpro2` package, in contrast, numerals and punctuation characters are—in math mode—taken from the *MathTimeProfessional* fonts. Thus, entering `1.23` will yield a different result than `1.23`, and you will have to decide in each case whether an input fragment is a math or a non-math entity.

2.5 Bold math fonts

 Bold and ‘heavy’ math fonts are available only with the complete font set, except for the alphabets `\mathbf` and `\mbf`, and for the bold versions of the CM Calligraphic and Euler fonts.

2.5.1 Emboldening complete formulas

The declaration `\boldmath` will embolden all formulas within its scope, just as with the standard CM math fonts. Use it, for instance, to emphasize complete formulas or to make sure that mathematical expressions within bold section titles also appear in bold type. Bold formulas should, however, not contain the extra-large parentheses, roots and operators described in section 2.12 below. The `\wide...` accents (2.13) cannot be emboldened, either.

2.5.2 Bold letters and symbols

The declaration `\boldmath` cannot be issued when you are already in math mode. Thus it is not a suitable means to embolden single letters, e.g., if you want to designate vectors with bold type. This use of bold letters in formulas is supported through a number of bold *math alphabets*:

- ▷ `\mathbf` prints its argument using the **bold upright** text font.
- ▷ `\mbf` is similar, but uses a specially modified version of the bold upright Times font, with the spacing and the letter shapes adapted to math typesetting. Thus `\mbf` is appropriate to typeset single variables, while `\mathbf` can be used, e.g., to emphasize an operator name.
- ▷ An additional **bold italic** math alphabet named `\mathbfbold` is provided—something that isn’t easily available with standard L^AT_EX. In contrast to `\mathbf` and `\mbf`, this alphabet also includes Greek letters.¹
- ▷ Beside the usual `\mathcal`, there is also a bold variant `\mathbfcal`; see, however, section 2.6 for a possible exception.
- ▷ When a `\mathscr` alphabet is set up (see below), a corresponding bold `\mathbfscr` is defined, too.

¹The shape of the uppercase Greek letters follows the `slantedGreek` option.

An *alternative* to the use of several different bold math alphabets is available through the macro package `bm`. It defines the command `\bm`, which can embolden not only letters but also symbols or arbitrary expressions—provided that the required fonts exist. The command `\bm` should, however, not be used on constructs like `\PARENS` or `\SQRT` or the `\wide...` accents. The package `bm` belongs to the `tools` collection, which is part of every \LaTeX system. *It is highly recommended to read the documentation of the package before using it!* To recognize the existence of the bold math fonts, the package `bm` is to be loaded *after* `mtpro2`.

2.5.3 ‘Heavy’ symbols

Most—but not all—of the mathematical symbols of the *MathTimeProfessional* fonts exist also in a ‘heavy’ (i.e., extra-bold) variant, which can be used through the command `\hm` of the above-mentioned package `bm`. (Use of the corresponding `\heavymath` declaration is, however, pointless, because the heavy math fonts are incomplete.)

The ‘heavy’ symbols are darker and more prominent than the ‘bold’ ones, so they are suitable, for instance, if you need an extra-bold plus sign with a different mathematical meaning than the regular $+$. Applying `\hm` to characters that are not available as ‘heavy’ yields either normal type or a ‘slug’ (a black box), depending on the math alphabet. In particular, this restriction affects Latin and Greek letters, as well as the ‘extra-large’ delimiters, root, operators and accents described below.

2.6 Calligraphic math alphabet

`\mathcal` defaults to the calligraphic font of the Computer Modern family. Other script fonts can be used through the following package options:

eucal assigns the Euler Calligraphic font to the math alphabet `\mathcal`,

mtpcal assigns the Times-compatible Math Script font to `\mathcal`,

mtppcal assigns the Times-compatible upright ‘Curly’ font to `\mathcal`,

mtpscr assigns Math Script to a new math alphabet `\mathscr`.



While the calligraphic CM and Euler fonts are standard components of any \LaTeX system, the Math Script and Curly fonts are available only with the complete version of the *MathTimeProfessional* font set:

$\mathcal{A}\mathcal{B}\mathcal{C}[\mathcal{C}]\mathcal{D}\mathcal{E}\mathcal{F}\mathcal{G}[\mathcal{G}]\mathcal{H}\mathcal{I}\mathcal{J}\mathcal{K}\mathcal{L}[\mathcal{L}]\mathcal{M}\mathcal{N}\mathcal{O}\mathcal{P}\mathcal{Q}[\mathcal{Q}]\mathcal{R}\mathcal{S}[\mathcal{S}]\mathcal{T}\mathcal{U}\mathcal{V}\mathcal{W}\mathcal{X}\mathcal{Y}[\mathcal{Y}]\mathcal{Z}[\mathcal{Z}]$
 $a b c d e f g h i j k l m n o p q r[r] s t u v w x y z[z]$
 $\mathfrak{A}\mathfrak{B}\mathfrak{C}\mathfrak{D}\mathfrak{E}\mathfrak{F}\mathfrak{G}[\mathfrak{G}]\mathfrak{H}\mathfrak{I}\mathfrak{J}\mathfrak{K}\mathfrak{L}\mathfrak{M}[\mathfrak{M}]\mathfrak{N}[\mathfrak{N}]\mathfrak{O}\mathfrak{P}\mathfrak{Q}[\mathfrak{Q}]\mathfrak{R}\mathfrak{S}\mathfrak{T}\mathfrak{U}\mathfrak{V}\mathfrak{W}\mathfrak{X}\mathfrak{Y}[\mathfrak{Y}]\mathfrak{Z}$
 $a b c d e f g h i j k l m n o p q r s t u v w x y z$



There is no bold variant of the Curly font, so `\mathbcal` is *not* defined when `\mathcal` is assigned to this font.

Section 4 lists further options to set up `\mathcal` or an additional math alphabet `\mathscr`. They are somewhat confusing and are provided only for the sake of compatibility with the old `mathtime` package.



Do not try to use the declaration `\cal` in place of the text-generating command `\mathcal`. This syntax is obsolete and may not work with the package `mtpro2`.

2.7 Fraktur math alphabet

A Fraktur alphabet `\mathfrak` can be made available through a package option:

eufrak assigns the Euler Fraktur font to `\mathfrak`;

mtpfrak assigns the Times-compatible Math Fraktur font to `\mathfrak`.



While the Euler fraktur font is a standard component of any \LaTeX system, the Math Fraktur font is available only with the complete version of the *MathTimeProfessional* font set:

$\mathfrak{A}\mathfrak{B}\mathfrak{C}\mathfrak{D}\mathfrak{E}\mathfrak{F}\mathfrak{G}\mathfrak{H}\mathfrak{I}\mathfrak{J}\mathfrak{K}\mathfrak{L}\mathfrak{M}\mathfrak{N}\mathfrak{O}\mathfrak{P}\mathfrak{Q}\mathfrak{R}\mathfrak{S}\mathfrak{T}\mathfrak{U}\mathfrak{V}\mathfrak{W}\mathfrak{X}\mathfrak{Y}\mathfrak{Z}$
 $\mathfrak{a}\mathfrak{b}\mathfrak{c}\mathfrak{d}\mathfrak{e}\mathfrak{f}\mathfrak{g}\mathfrak{h}\mathfrak{i}\mathfrak{j}\mathfrak{k}\mathfrak{l}\mathfrak{m}\mathfrak{n}\mathfrak{o}\mathfrak{p}\mathfrak{q}\mathfrak{r}\mathfrak{s}\mathfrak{t}\mathfrak{u}\mathfrak{v}\mathfrak{w}\mathfrak{x}\mathfrak{y}\mathfrak{z}$



The symbols `\Re` and `\Im` from the basic *MathTimeProfessional* fonts are not exactly the same as the corresponding letters from these `\mathfrak` alphabets. If you would prefer to have `\Re` and `\Im` use the `\mathfrak` alphabet, just redefine these macros appropriately:

```
\renewcommand{\Re}{\mathfrak{R}}
\renewcommand{\Im}{\mathfrak{I}}
```

2.8 Variant letters in the Fraktur and Script alphabets



This section is relevant with the complete font set only!

Several letters on the Times-compatible Math Script, Curly and Fraktur fonts are available with alternative shapes:

Script:				Curly:				Fraktur:			
C	\mathcal{C}	<code>\altC</code>	\mathcal{C}	G	\mathcal{G}	<code>\altG</code>	\mathcal{G}	Y	\mathcal{Y}	<code>\altY</code>	\mathcal{Y}
G	\mathcal{G}	<code>\altG</code>	\mathcal{G}	M	\mathcal{M}	<code>\altM</code>	\mathcal{M}	x	\mathcal{x}	<code>\altx</code>	\mathcal{x}
L	\mathcal{L}	<code>\altL</code>	\mathcal{L}	N	\mathcal{N}	<code>\altN</code>	\mathcal{N}	y	\mathcal{y}	<code>\alty</code>	\mathcal{y}
Q	\mathcal{Q}	<code>\altQ</code>	\mathcal{Q}	Q	\mathcal{Q}	<code>\altQ</code>	\mathcal{Q}				
S	\mathcal{S}	<code>\altS</code>	\mathcal{S}	Y	\mathcal{Y}	<code>\altY</code>	\mathcal{Y}				
Y	\mathcal{Y}	<code>\altY</code>	\mathcal{Y}								
Z	\mathcal{Z}	<code>\altZ</code>	\mathcal{Z}								
r	\mathcal{r}	<code>\altr</code>	\mathcal{r}								
z	\mathcal{z}	<code>\altz</code>	\mathcal{z}								

The `\alt...` commands work only in conjunction with the *MathTimeProfessional* Script, Curly and Fraktur fonts, i.e., within the argument of a related math alphabet command. For instance, `\mathfrak{\altx}` yields \mathfrak{x} , provided that Math Fraktur is in fact assigned to `\mathfrak`. When the commands are used with other fonts, the corresponding ‘normal’ letter is printed.

2.9 ‘Blackboard Bold’ math alphabet

A ‘blackboard bold’ font can be made available as math alphabet `\mathbb`. Various fonts can be selected using the following package options:

amsbb AMS ‘B’

mtphrb Times-compatible Holey Roman Bold

mtpbb Times-compatible Blackboard Bold

mtpbhi Times-compatible Holey Roman Bold Italic

mtpbbi Times-compatible Blackboard Bold Italic

mtphrd Times-compatible Holey Roman Dark

mtpbbd Times-compatible Blackboard Bold Dark



While the AMS ‘B’ font is a standard component of any L^AT_EX system, the Times-compatible fonts are available only with the complete version of the *MathTimeProfessional* font set:

The first version, **holey roman bold**, is a ‘bold open’ font, formed by hollowing out bold letters:

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz0123456789

By contrast, the **blackboard bold** font is the sort of alphabet that one might actually write on a blackboard:

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz0123456789

Beside these, corresponding italic fonts are available, too. They comprise also Greek letters, which are accessible through the usual commands `\alpha... \Omega`.

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz0123456789
α...ω...Γ...Ω

and

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz0123456789
α...ω...Γ...Ω

Or you might prefer one of the dark versions, **holey roman dark**:

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz0123456789

or **blackboard bold dark**:

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz0123456789

`\boldmath` and `\bm` also act on the Times Blackboard Bold and Holey Roman Bold fonts and yield the related ‘dark’ font. However, if you have already chosen one of the ‘dark’ fonts for the `\mathbb` alphabet (option `mtpbdd` or `mtphrd`), it will not be emboldened further, and the italic doublestroke fonts also have no bold counterparts.

2.10 Positioning of subscripts

The appearance of subscripts can be improved by loading the package with the option `subscriptcorrection`. When certain letters, like f or j , occur as a subscript, the positioning will be automatically adjusted. In the following example, the left sum was typeset with subscript correction, the right one without:

$$C_f + C_j + X_A \quad C_f + C_j + X_A$$

The `\enablesubscriptcorrection` and `\disablesubscriptcorrection` commands can also be used to turn subscript correction on and off within the document.

No guarantee is made as to the proper functioning of the automatic subscript correction in conjunction with any additional macro package, because the underscore character `_` is made active.

2.11 Styles of operator symbols

The operators \sum , \prod and \coprod have slanted versions, too: \sum , \prod and \coprod . These are selected as the default ones by specifying the package option `sloperators`. Whichever convention you use, you can always use `\slsum` etc. to get the slanted versions and `\upsum` etc. to get the upright versions.

2.12 The big differences

2.12.1 Extra-large delimiters and roots

The *MathTimeProfessional* font set includes individually designed parentheses and other delimiters, all of which go up to 4 inches high.

The large parentheses are produced by the command `\PARENS{...}`; just compare the left matrix with the output obtained from the ordinary `\left(` and `\right(` macros:

$$\left(\begin{array}{ccc} x_{11} & x_{12} & \dots \\ x_{21} & x_{22} & \dots \\ x_{31} & x_{32} & \dots \\ \vdots & \vdots & \ddots \end{array} \right) \quad \left(\begin{array}{ccc} x_{11} & x_{12} & \dots \\ x_{21} & x_{22} & \dots \\ x_{31} & x_{32} & \dots \\ \vdots & \vdots & \ddots \end{array} \right)$$

Basically, `\PARENS{...}` is just an abbreviation for `\LEFTRIGHT(){...}`. In general, you can use `\LEFTRIGHT` directly with any two delimiters, including the period for an empty delimiter. In addition to parentheses, you can get `/`, `\backslash`, `<` (or `\langle`), and `>` (or `\rangle`), all up to 4 inches high.

There are also two special delimiters `\lcbbrace` and `\rcbbrace` that can't be used with `\left` and `\right`, but can be used after `\LEFTRIGHT`. These give individually designed vertical curly braces up to 4 inches high, which you might prefer to the usual extensible braces. Again compare the output obtained by `\LEFTRIGHT\lcbbrace\rcbbrace{...}` with the result of the usual `\left\{...\right\}`:

$$\left(\begin{array}{ccc} x_{11} & x_{12} & \dots \\ x_{21} & x_{22} & \dots \\ x_{31} & x_{32} & \dots \\ \vdots & \vdots & \ddots \end{array} \right) \quad \left(\begin{array}{ccc} x_{11} & x_{12} & \dots \\ x_{21} & x_{22} & \dots \\ x_{31} & x_{32} & \dots \\ \vdots & \vdots & \ddots \end{array} \right)$$

To go along with this, a `\ccases` construction is provided, which yields a decorated array with two columns, both left aligned:

$$S(x) := \begin{cases} -1 & x < 0 \\ 0 & x = 0 \\ 1 & x > 0 \end{cases}$$

The syntax is similar to the `\cases` macro², but the lines are separated in a L^AT_EX-like manner by `\\`:

```
S(x) \coloneq \ccases{
-1 & x < 0 \\
0 & x = 0 \\
1 & x > 0}
```

A combination like `\LEFTRIGHT[]{\formula}` is also possible; the `]` just gets extended in the usual way. At large sizes, however, the `(` might end up slightly larger than the `]`, since the `]` grows at the same (6 pt) rate, no matter how large the argument, while the parentheses grow faster for larger formulas. So in such cases you may need to replace `{\formula}` with

`\vcorrection{\langle dimen \rangle}{\formula}`

to artificially increase its vertical size to `\langle dimen \rangle`, thereby forcing the square bracket to be larger.

In addition to the `\sqrt` command, which uses an ‘extensible’ symbol, `mtpro2` provides `\SQRT`, with the same syntax. It produces individually designed

²There is, however, no beautified counterpart to the `cases` environment of the `amsmath` package!

root signs up to 4 inches high: In the example below, the left root was typeset using `\SQRT`, the right one results from the ordinary `\sqrt` command.

$$\sqrt[3]{\sum_{i=1}^n (y^i - x^i)^3} \quad \sqrt[3]{\sum_{i=1}^n (y^i - x^i)^3}$$

The positioning of the root index can be adjusted through the commands `\LEFTRoot` and `\UPROOT`. They are to be issued in math mode, they are valid inside the current formula only, and they act only on roots produced from `\SQRT`. Positive arguments to these commands will move the root index to the left and up respectively, while a negative argument will move it to the right and down. The units of increment are quite small, which is useful for such adjustments. In the example below, the index β of the left root is moved 2 units to the right and 6 units up by saying `\LEFTRoot{-2} \UPROOT{6} \SQRT . . .`; the right root shows the default appearance:

$$\sqrt[{}^{\beta}]{k} \quad \sqrt[{}^{\beta}]{k}$$

Notice that the syntax of the `\LEFTRoot` and `\UPROOT` commands differs both from the `amsmath` package and from `mtp.tex`!

You can nest `\PARENS` (or `\LEFTRIGHT`), though of course that shouldn't be needed very often. Doing so slows \TeX down exponentially and may also exhaust its capacity. It should also be mentioned that `\PARENS` ends up typesetting its argument more than once, in order to find out the right size of the delimiters, so you need to be careful when using boxes: For example, if you have stored a formula in `\box\eqnbox`, then you should be sure to type `\PARENS{\copy\eqnbox}`, rather than `\PARENS{\box\eqnbox}`. The same precaution applies to `\SQRT` and to the new `\wide . . .` accents explained in section 2.13.

2.12.2 Extra-large under- and overbraces

Individually designed curly underbraces and overbraces up to 4 inches wide are available by using the macros `\undercbrace` or `\overcbrace` instead of the usual `\underbrace` and `\overbrace`. Compare these (left) with standard \LaTeX (right);

$$\underbrace{A_1 + \cdots + A_i + \cdots + A_n} \quad \overbrace{A_1 + \cdots + A_i + \cdots + A_n}$$

2.12.3 Extra-large operator symbols

In a displayed formula like

$$\sum_{i \notin I} \frac{\int_{-\infty}^{+\infty} f(\alpha_i x) dx + 1}{\oint_C f(\beta_i z) dz - 1}$$

you might feel the need for a larger sum sign. Normally printers don't provide one, but with the *MathTimeProfessional* fonts you can get an extra-large `\sum` with the `\x1` command. For instance, `\x1\sum_{i \notin I}...` yields:

$$\sum_{i \notin I} \frac{\int_{-\infty}^{+\infty} f(\alpha_i x) dx + 1}{\oint_C f(\beta_i z) dz - 1}$$

`\x1` can be applied to all ‘large’ operators, including those in section 2.14.1. In most cases `\x1` produces a symbol about 18 pt tall. There are also `\XL` and `\XXL` versions that are 36 pt and 72 pt (a full inch) high! And, heaven forbid, you can even get `\XXXL` versions that are two inches high, thereby assuring yourself (as well as the designer of the MathTime fonts) the lasting enmity of journal editors everywhere.

As usual, you can also add `\nolimits` after the `\sum` if you want the subscript and superscript to be placed to the side. And, in combinations like `\x1\int` where they are normally placed to the side, you can add `\limits` if you do want them to be set above and below the integral sign.



When the package `amsmath` is used, its options `nosumlimits` and `inlimits` are, however, not honored, i.e., the *default* placement of subscripts and superscripts on extra-large operators will always follow the normal L^AT_EX convention.

2.13 Accents in math

In addition to `\widehat` and `\widetilde`, there is now `\widecheck`. The `\widehat`, `\widecheck`, and `\widetilde` accents are extended in a similar fashion as the large delimiters and roots (see above); in each case you can get accents up to 4 inches wide:

$$\widehat{a+b} + \widehat{a+b+c} + \widehat{a+b+c+d} + \widehat{a+b+c+d+e}$$

If, for some reason, you need double `\wide...` accents, you may be disappointed to find that `\widehat{\widehat{...}}` gives

$$\widehat{\widehat{A+B+C+D+E+F+G}}$$

with the top accent seemingly too high (its base is at the level of the top of the lower `\widehat`). So there is also `\widehatdown{<dimen>}{...}` to move a `\widehat` down (and similarly for the `\widetilde` and the `\widecheck` accents). For example,

$$\widehatdown{2pt}{\widehat{A+B+C+D+E+F+G}}$$

produces

$$\widehatdown{2pt}{A+B+C+D+E+F+G}.$$

In a combination like \hat{A} , the `\hat` accent might look a little small, while `\widehat` produces an accent \widehat{A} that looks too large (and also isn't positioned well, because `\widehat` is meant for entire formulas, and doesn't properly position the accent for single letters). So there is `\what` to produce a slightly wider hat accent, \widehat{A} . Similarly, there are `\wtilde`, `\wcheck`, and `\wbar`.

In addition, there are slightly larger `\wwhat`, `\wwcheck`, `\wwtilde`, and `\wwbar`. The `\wwhat`, `\wwcheck`, and `\wwtilde` accents are identical to the smallest versions of the accents produced by `\widehat` etc., but in some cases it might be preferable to force this smallest size instead of relying on the `\wide...` accents themselves. For example, `\widehat M` yields \widehat{M} , because the M (counting the white space on its sides) happens to be just a bit too wide for the smallest `\widehat` accent, whereas `\wwhat M` will result in \widehat{M} .

The `\wwbar` accent is what used to be called `\widebar` in the *MathTime* fonts, but that really wasn't a very good name, since `\overline` is what actually corresponds to the `\wide...` accents.

The standard commands `\dot` and `\ddot` are complemented with ready-made triple and quadruple dot accents `\dddots` and `\ddddots`; they work with or without the `amsmath` package.

In situations like $\dot{\Gamma}$, the dot accents might look better if they were moved up a bit. So there are `\dotup`, `\ddotup`, `\dddotup` and `\ddddotup`, to produce $\dot{\Gamma}$, $\ddot{\Gamma}$, etc.

2.14 Additional symbols not available with standard L^AT_EX

2.14.1 Integrals

The *MathTimeProfessional* fonts include multiple, surface and line integrals. They are available in text size (as shown in the below table) as well as display size:

\iint	<code>\iint</code>	\iiint	<code>\iiint</code>	\oiint	<code>\oiint</code>	\oiiint	<code>\oiiint</code>
\oint	<code>\cwoint</code>	\oint	<code>\awoint</code>	\oint	<code>\cwint</code>		
\int	<code>\barint</code>	\int	<code>\slashint</code>				

The macros are compatible with the `amsmath` package, which may be loaded additionally.

2.14.2 Negated relation symbols

MathTimeProfessional includes a number of ready-made negated relation symbols, see table 1, which are normally built from pieces. For instance, with *MathTimeProfessional* you should write `\notleq` instead of `\not\leq`. Almost all of of these symbols are accessible also through an alternative name, which follows the naming scheme of the `amssymb` package.

2.14.3 Miscellaneous symbols

The *MathTimeProfessional* fonts provide various symbols and letters that are not defined with standard L^AT_EX, see table 2

\nless	<code>\notless, \nless</code>	\nsubset	<code>\notsupset, \nsubset</code>
\nleq	<code>\notleq, \nleq</code>	\nsubseteq	<code>\notsupseteq, \nsubseteq</code>
\nprec	<code>\notprec, \nprec</code>	\nsubsetneq	<code>\notsqsupseteq, \nsubsetneq</code>
\npreceq	<code>\notpreceq, \npreceq</code>	\neq	<code>\neq</code>
\nsubset	<code>\notsubset, \nsubset</code>	\nequiv	<code>\notequiv, \nequiv</code>
\nsubseteq	<code>\notsubseteq, \nsubseteq</code>	\notsim	<code>\notsim</code>
\nsubsetneq	<code>\notsqsubseteq, \nsubsetneq</code>	\nsubseteq	<code>\notsubseteq, \nsubseteq</code>
\ngtr	<code>\notgr, \ngtr</code>	\napprox	<code>\notapprox, \napprox</code>
\ngeq	<code>\notgeq, \ngeq</code>	\ncong	<code>\notcong, \ncong</code>
\nsucc	<code>\notsucc, \nsucc</code>	\nasympt	<code>\notasympt, \nasympt</code>
\nsucceq	<code>\notsucceq, \nsucceq</code>		

Table 1: Non-standard negated relation symbols.

Table 2 shows `\bigcap`, `\bigcup`, `\bigast` and `\bigvar` as they would appear within inline formulas. Being ‘large operators’, they are enlarged when used within displayed formulas, for instance:

$$\bigcap_{i=1}^n \alpha_i \quad \bigcup_{i=1}^n \alpha_i \quad \bigast_{i=1}^n \alpha_i \quad \bigvar_{i=1}^n \alpha_i$$

`\varbeta` and `\vardelta` are old forms of β and δ that you might find useful if you are trying to imitate certain old books. Notice that `\vardelta` is hardly distinguishable from the `\partial` symbol (the circular portion of `\vardelta` is taller, to match the height of letters like x and o in math formulas). The only reason for providing `\vardelta` is that all the various Greek alphabets specified for mathematics in the Unicode standard include this variant (perversely called ‘partial’).

The bold or heavy versions of ♠ and ♣ are somewhat grotesque. If you need to have different varieties of these, you might like to use the `\open...` or `\shaded...` macros. Notice, however, that these variants themselves have no bold or heavy counterparts!

2.14.4 Alternative shapes of z in math mode

Some people like to have an italic z with a ‘swash’ tail: z . Loading the package with the option `zswash` cause `z` to yield z instead of z in your equations.

2.15 AMS symbols

The ‘lite’ *MathTimeProfessional* font set already provides several symbols that are normally available only with the package `amssymb`—see the sections 2.14.2 and 2.14.3 above.



With the complete font set, in contrast, *all* of the so-called ‘AMS symbols’ are available in a Times-compatible style. You need *not* load the packages `amfonts` or `amssymb` additionally; in fact, you *must not* do so, because the packages are not compatible with `mtpro2`.

Relations:

\gtrsim	<code>\simarrow</code>	$\hat{=}$	<code>\hateq</code>
\coloneqq	<code>\coloneq</code>	\equiv	<code>\eqcolon</code>
$\circ\!\!\!\dashrightarrow$	<code>\circdashbullet</code>	$\bullet\!\!\!\dashrightarrow$	<code>\bullettdashcirc</code>

Binary operators:

\cap	<code>\capprod</code>	\cup	<code>\cupprod</code>
\circ	<code>\comp</code>	\setminus	<code>\setdif</code>
\lrcorner	<code>\contraction</code>	$\&$	<code>\varland</code>

Large operators:

\bigcap	<code>\bigcapprod</code>	\bigcup	<code>\bigcupprod</code>
\bigstar	<code>\bigast</code>	$\big\&$	<code>\bigvarland</code>

Letters:

β	<code>\varbeta</code>	β	<code>\upvarbeta</code>
∂	<code>\vardelta</code>	∂	<code>\upvardelta</code>
κ	<code>\varkappa</code>	κ	<code>\upvarkappa</code>
\hslash	<code>\hslash</code>	F	<code>\digamma</code>
\bar{d}	<code>\dbar</code>	\bar{d}	<code>\updbar</code>

Alternative card suit symbols:

\spadesuit	<code>\openspadesuit</code>	\spadesuit	<code>\shadedspadesuit</code>
\clubsuit	<code>\openclubsuit</code>	\clubsuit	<code>\shadedclubsuit</code>

Table 2: Miscellaneous non-standard symbols

The definitions of the AMS symbols consume a huge amount of \TeX resources, so you can disable them through the package option `noamssymbols`. This does, however, not affect any of the symbols shown in the tables 1 and 2; they always remain accessible.

2.15.1 Ordinary symbols

Most of the AMS symbols are binary operators or relations, but first we have a group of various ordinary symbols, shown in table 3. `\yen`, `\maltese`, `\circledR` and `\checkmark` are sort of special, since they can be used both in text mode and in math mode. \Diamond (`\Diamond`) was adopted from the so-called \LaTeX symbols, and you may prefer its shape over \diamond .

The AMS symbols F (`\digamma`), and \hslash (`\hslash`), have been placed on the *MathTimeProfessional* ‘lite’ fonts, along with the \hbar (`\bar{h}`).

2.15.2 Delimiters

Table 4 shows four special delimiters (which occur in only one size).

\backslash	<code>\backprime</code>	\emptyset	<code>\varnothing</code>
\triangle	<code>\vartriangle</code>	\blacktriangle	<code>\blacktriangle</code>
∇	<code>\triangledown</code>	\blacktriangledown	<code>\blacktriangledown</code>
\square	<code>\square</code>	\blacksquare	<code>\blacksquare</code>
\lozenge	<code>\lozenge</code>	\blacklozenge	<code>\blacklozenge</code>
\diamond	<code>\Diamond</code>	\bigstar	<code>\bigstar</code>
\sphericalangle	<code>\measuredangle</code>	\sphericalangle	<code>\sphericalangle</code>
\nexists	<code>\nexists</code>	\complement	<code>\complement</code>
\mho	<code>\mho</code>	\eth	<code>\eth</code>
\Finv	<code>\Finv</code>	\Game	<code>\Game</code>
\diagup	<code>\diagup</code>	\diagdown	<code>\diagdown</code>
\beth	<code>\beth</code>	\gimel	<code>\gimel</code>
\daleth	<code>\daleth</code>	\yen	<code>\yen</code>
\maltese	<code>\maltese</code>	\circledR	<code>\circledR</code>
\checkmark	<code>\checkmark</code>	\circledS	<code>\circledS</code>

Table 3: AMS symbols of type ‘ordinary’

\ulcorner	<code>\ulcorner</code>	\urcorner	<code>\urcorner</code>
\llcorner	<code>\llcorner</code>	\lrcorner	<code>\lrcorner</code>

Table 4: AMS symbols: Delimiters

2.15.3 Binary operators

Table 5 shows the additional binary operator symbols in the complete font set. The macro `\smallsetminus` is actually just a synonym for `\setdif` on the *MathTimeProfessional* basic fonts.

$\dot{+}$	<code>\dotplus</code>	\smallsetminus	<code>\smallsetminus</code>
\ltimes	<code>\ltimes</code>	\rtimes	<code>\rtimes</code>
\Cap	<code>\Cap, \doublecap</code>	\Cup	<code>\Cup, \doublecup</code>
\leftthreetimes	<code>\leftthreetimes</code>	\rightthreetimes	<code>\rightthreetimes</code>
$\bar{\wedge}$	<code>\barwedge</code>	\veebar	<code>\veebar</code>
$\overline{\wedge}$	<code>\doublebarwedge</code>		
\curlywedge	<code>\curlywedge</code>	\curlyvee	<code>\curlyvee</code>
\boxplus	<code>\boxplus</code>	\boxminus	<code>\boxminus</code>
\boxtimes	<code>\boxtimes</code>	\boxdot	<code>\boxdot</code>
\circleddash	<code>\circleddash</code>	\circledast	<code>\circledast</code>
\circledcirc	<code>\circledcirc</code>	\divideontimes	<code>\divideontimes</code>
\centerdot	<code>\centerdot</code>	\intercal	<code>\intercal</code>

Table 5: AMS symbols: Binary operators

2.15.4 Binary relations

In table 6, note that \sqsubset (`\sqsubset`) and \sqsupset (`\sqsupset`) are ‘AMS’ symbols, while the more complicated \sqsubseteq (`\sqsubseteq`) and \sqsupseteq (`\sqsupseteq`) already exist in the basic fonts!

Note also that \smile (`\smallsmile`) and \frown (`\smallfrown`) are different from the symbols \cup (`\cup`) and \cap (`\cap`), and that the old \models (`\models`) is different from \Vdash (`\Vdash`).

\leqslant	<code>\leqq</code>	\geqslant	<code>\geqq</code>
\leqslant	<code>\leqslant</code>	\geqslant	<code>\geqslant</code>
\leqslant	<code>\eqslantless</code>	\geqslant	<code>\eqslantgtr</code>
\lesssim	<code>\lesssim</code>	\gtrsim	<code>\gtrsim</code>
\lessapprox	<code>\lessapprox</code>	\gtrapprox	<code>\gtrapprox</code>
\approxeq	<code>\approxeq</code>		
\lessdot	<code>\lessdot</code>	\gtrdot	<code>\gtrdot</code>
\lll	<code>\lll, \llless</code>	\ggg	<code>\ggg, \gggtr</code>
\lessgtr	<code>\lessgtr</code>	\gtrless	<code>\gtrless</code>
\lesseqgtr	<code>\lesseqgtr</code>	\gtreqless	<code>\gtreqless</code>
\lesseqqgtr	<code>\lesseqqgtr</code>	\gtreqqless	<code>\gtreqqless</code>
\doteqdot	<code>\doteqdot, \Doteq</code>	\eqcirc	<code>\eqcirc</code>
\fallingdotseq	<code>\fallingdotseq</code>	\risingdotseq	<code>\risingdotseq</code>
\circeq	<code>\circeq</code>	\triangleq	<code>\triangleq</code>
\backsim	<code>\backsim</code>	\thicksim	<code>\thicksim</code>
\backsimeq	<code>\backsimeq</code>	\thickapprox	<code>\thickapprox</code>
\subseteq	<code>\subseteq</code>	\supseteq	<code>\supseteq</code>
\Subset	<code>\Subset</code>	\Supset	<code>\Supset</code>
\sqsubset	<code>\sqsubset</code>	\sqsupset	<code>\sqsupset</code>
\preccurlyeq	<code>\preccurlyeq</code>	\succcurlyeq	<code>\succcurlyeq</code>
\curlyeqprec	<code>\curlyeqprec</code>	\curlyeqsucc	<code>\curlyeqsucc</code>
\precsim	<code>\precsim</code>	\succsim	<code>\succsim</code>
\precapprox	<code>\precapprox</code>	\succapprox	<code>\succapprox</code>
\vartriangleleft	<code>\vartriangleleft</code>	\vartriangleright	<code>\vartriangleright</code>
\trianglelefteq	<code>\trianglelefteq</code>	\trianglerighteq	<code>\trianglerighteq</code>
\blacktriangleleft	<code>\blacktriangleleft</code>	\blacktriangleright	<code>\blacktriangleright</code>
\Vdash	<code>\Vdash</code>	\Vdash	<code>\Vdash</code>
\Vvdash	<code>\Vvdash</code>		
\smallsmile	<code>\smallsmile</code>	\smallfrown	<code>\smallfrown</code>
\shortmid	<code>\shortmid</code>	\shortparallel	<code>\shortparallel</code>
\bumpeq	<code>\bumpeq</code>	\Bumpeq	<code>\Bumpeq</code>
\therefore	<code>\therefore</code>	\because	<code>\because</code>
\between	<code>\between</code>	\pitchfork	<code>\pitchfork</code>
\varpropto	<code>\varpropto</code>	\backepsilon	<code>\backepsilon</code>

Table 6: AMS symbols: Binary relations

`\mathrel{\midshaft\midshaft\midshaft\rarrowhead}`

can be used to produce the arrow in the formula

$$A \dashrightarrow B.$$

\dashrightarrow	<code>\dashrightarrow, \dasharrow</code>	\dashleftarrow	<code>\dashleftarrow</code>
* \larrowhead	<code>\larrowhead</code>	* \rarrowhead	<code>\rarrowhead</code>
* \mid	<code>\midshaft</code>		
\Lleftarrow	<code>\leftleftarrows</code>	\Rrightarrow	<code>\rightrightarrows</code>
\Leftrightarrow	<code>\leftrightharpoons</code>	\Rleftrightharpoons	<code>\rightleftharpoons</code>
\Lleftarrow	<code>\Lleftarrow</code>	\Rrightarrow	<code>\Rrightarrow</code>
\twoheadleftarrow	<code>\twoheadleftarrow</code>	\twoheadrightarrow	<code>\twoheadrightarrow</code>
\leftarrowtail	<code>\leftarrowtail</code>	\rightarrowtail	<code>\rightarrowtail</code>
\looparrowleft	<code>\looparrowleft</code>	\looparrowright	<code>\looparrowright</code>
\leftrightharpoons	<code>\leftrightharpoons</code>	\rightleftharpoons	<code>\rightleftharpoons</code>
\curvearrowleft	<code>\curvearrowleft</code>	\curvearrowright	<code>\curvearrowright</code>
* \undercurvearrowleft	<code>\undercurvearrowleft</code>	* \undercurvearrowright	<code>\undercurvearrowright</code>
\circlearrowleft	<code>\circlearrowleft</code>	\circlearrowright	<code>\circlearrowright</code>
\Lsh	<code>\Lsh</code>	\Rsh	<code>\Rsh</code>
\Uparrow	<code>\upuparrows</code>	\Downarrow	<code>\downdownarrows</code>
\Uparrow	<code>\upharpoonright, \restriction</code>	\Uparrow	<code>\upharpoonleft</code>
\Downarrow	<code>\downharpoonright</code>	\Downarrow	<code>\downharpoonleft</code>
\Updownarrow	<code>\updownarrows</code>	\Updownarrow	<code>\downuparrows</code>
\Updownarrow	<code>\updownharpoons</code>	\Updownarrow	<code>\downupharpoons</code>
\Updownarrow	<code>\upupharpoons</code>	\Updownarrow	<code>\downdownharpoons</code>
\rightsquigarrow	<code>\rightsquigarrow</code>	\leadsto	<code>\leadsto</code>
\leftrightsquigarrow	<code>\leftrightsquigarrow</code>	\multimap	<code>\multimap</code>

Table 8: AMS arrows. Symbols marked by an asterisk do not exist on the Computer Modern AMS fonts or are not given names of their own with the AMS macros.

\nleftarrow	<code>\nleftarrow</code>	\nrightarrow	<code>\nrightarrow</code>
\nLleftarrow	<code>\nLleftarrow</code>	\nRrightarrow	<code>\nRrightarrow</code>
\nleftrightarrow	<code>\nleftrightarrow</code>	\nLeftrightarrow	<code>\nLeftrightarrow</code>

Table 9: AMS arrows (negated)

2.15.7 Alternative symbol names

Several symbols are made available both under the names introduced by the AMS and under the names known from L^AT_EX 2.09 or from the `latexsym` package—see table 10.

\square	<code>\square</code>	<code>\Box</code>
\triangleleft	<code>\vartriangleleft</code>	<code>\lhd</code>
\trianglelefteq	<code>\trianglelefteq</code>	<code>\unlhd</code>
\triangleright	<code>\vartriangleright</code>	<code>\rhd</code>
\trianglerighteq	<code>\trianglerighteq</code>	<code>\unrhd</code>
\bowtie	<code>\bowtie</code>	<code>\Join</code>

Table 10: Alternative symbol names

3 Transition from mtp_{ro} to mtp_{ro}2

As explained above, mtp_{ro}2 constitutes the successor to the three packages mtp_{ro}, mtp_{pams} and mtp_b. Transition from the predecessor packages should be easy:

1. Load mtp_{ro}2 in place of mtp_{ro}; adopt its options (with the exception of `boldalphabet`, see below).
2. If you were using the package mtp_{pams}, pass its options (if any) to mtp_{ro}2 now.
3. If you were using the package mtp_b, pass its options to mtp_{ro}2 now.



Only few incompatibilities are to be mentioned:

- ▷ The syntax of `\x1` & friends has changed: The limits can be specified ‘as usual’ now.
- ▷ The option `boldalphabet` does not exist any more, and all Greek letters are of type ‘mathalpha’ by default.
- ▷ No blackboard bold math alphabet `\mathbb` is set up by default. To declare a blackboard bold alphabet, one of the options explained in section 2.9 needs to be used.

4 Option summary

This section lists all options of the mtp_{ro}2 package. Options that correspond to the default behavior of the package are marked by an asterisk and need normally not to be specified.

complete* Uses all of the *MathTimeProfessional* fonts.

lite Uses the fonts of the ‘lite’ release only.

uprightGreek* Makes the uppercase Greek letters upright.

slantedGreek Makes the uppercase Greek letters slanted.

compatiblegreek Declares the lowercase Greek letters as ‘ordinary’ symbols, which are not affected by math alphabet commands.

uprightoperators* Makes \sum , \prod and \coprod upright.

slantedoperators Makes \sum , \prod and \coprod slanted.

cmcal* Assigns the Computer Modern calligraphic fonts to the math alphabets \mathcal and $\mathbf{\mathcal}$.

eucal Assigns Euler Script to \mathcal and $\mathbf{\mathcal}$.

mtpluscal Assigns the MTMS and MTMSB script fonts, which were part of Y&Y's *MathTime* Plus collection, to \mathcal and $\mathbf{\mathcal}$.

lucidacal Assigns Lucida Script to \mathcal and $\mathbf{\mathcal}$.

lucidascr Like **lucidacal**, but assigns the fonts to \mathscr and $\mathbf{\mathscr}$.

mtplusscr Like **mtpluscal**, but assigns the fonts to \mathscr and $\mathbf{\mathscr}$.

eufrak Declares a new math alphabet \mathfrak and assigns the Euler Calligraphic fonts to it.

amsbb Declares a math alphabet $\mathbf{\mathbb}$ and assigns the AMS 'B' font.

subscriptcorrection Redefines the underscore character so that it automatically corrects the spacing of subscripts.

nosubscriptcorrection* Disables the subscript correction.

zswash Makes \mathbb{Z} print \mathbb{Z} .

nozswash* Makes \mathbb{Z} print \mathbb{Z} .

The following options require the complete font set. They select math fonts that are not part of the 'lite' font set, so they are *not* to be used in conjunction with **lite**:

mtpcal Assigns *MathTimeProfessional* Script to \mathcal and $\mathbf{\mathcal}$.

mtppcal Assigns *MathTimeProfessional* Curly to \mathcal .

mtpscr Like **mtpcal**, but puts the fonts into new \mathscr and $\mathbf{\mathscr}$ alphabets.

mtpfra Assigns the *MathTimeProfessional* Fraktur font to \mathfrak .

mtphrb Assigns the *MathTimeProfessional* Holey Roman Bold font to $\mathbf{\mathbb}$.

mtpb Assigns the *MathTimeProfessional* Blackboard Bold font to $\mathbf{\mathbb}$.

mtphbi Assigns the *MathTimeProfessional* Holey Roman Bold Italic font to $\mathbf{\mathbb}$.

mtpb Assigns the *MathTimeProfessional* Blackboard Bold Italic font to $\mathbf{\mathbb}$.

mtphrd Assigns the *MathTimeProfessional* Holey Roman Bold Dark font to `\mathbb`.

mtpbdd Assigns the *MathTimeProfessional* Blackboard Bold Dark font to `\mathbb`.

amssymbols* Makes the AMS symbols available. This option is disabled automatically when `lite` is specified.

noamssymbols AMS symbols are not defined, thus saving \TeX resources.

This package makes a lot of font re-assignments. Normally these generate warning messages on the terminal, however getting so many messages would be distracting, so a further three options control the font tracing. Even more control may be obtained by loading the `tracefmt` package.

errorsnow* Only show font *errors* on the terminal. Warnings are just sent to the log file.


warningsnow Show font warnings on the terminal. This corresponds to the usual \LaTeX behavior.

nofontinfo Suppress all font warnings, even from the log file.

NB: Not all options can be used together: E.g., one can select at most one of the options setting up `\mathcal`; if more than one such option is given, `mtpcal` will win over `mtpluscal`, `eucal`, `lucidalcal` and `cmcal`.

NB: The options to set up a `\mathscr`, `\mathfrak` or `\mathbb` alphabet should not be used when an additional package is loaded that also declares one of these math alphabets.

5 Using the Curly, Script, Fraktur and doublestroke fonts without the `mtpro2` package

 Particular font definition files are provided for the Times-compatible script, fraktur and doublestroke fonts described in the sections 2.6, 2.7 and 2.9. Thus, they can be used also without the `mtpro2` package. Table 11 provides the information required to set up math alphabets using these fonts.

6 The implementation of `mtpro2`

6.1 Options

The first options to be evaluated are those that distinguish between the complete and the ‘lite’ font set.

```
1 \langle *mtpro \rangle
2 \newif\ifmtp@full
3 \DeclareOption{complete}{\mtp@fulltrue}
4 \DeclareOption{lite}{\mtp@fullfalse\mtp@amsfalse}
```

Encoding	family	series	shape	
Curly				
U	mt2ms	m	n	$\alpha, \beta \dots \mathcal{Z}$
Script				
U	mt2ms	m	it	$\alpha, \beta \dots \mathcal{Z}$
U	mt2ms	b	it	$\alpha, \beta \dots \mathbf{\mathcal{Z}}$
Fraktur				
U	mt2mf	m	n	$\alpha, \beta \dots \mathfrak{Z}$
U	mt2mf	m	it	$\alpha, \beta \dots \mathbf{\mathfrak{Z}}$
Blackboard Bold				
U	mt2bb	m	n	$\alpha, \mathbb{B} \dots \mathbb{Z}$
U	mt2bb	m	it	$\alpha, \mathbb{B} \dots \mathbb{Z}$
U	mt2bb	b	n	$\alpha, \mathbb{B} \dots \mathbb{Z}$
Holey Roman Bold				
U	mt2hrb	m	n	$\alpha, \mathbb{B} \dots \mathbb{Z}$
U	mt2hrb	m	it	$\alpha, \mathbb{B} \dots \mathbb{Z}$
U	mt2hrb	b	n	$\alpha, \mathbb{B} \dots \mathbb{Z}$

Table 11: NFSS classification of the additional Times-compatible math alphabets

A procedure to signal that an option is incompatible with lite:

```

5 \def\mtp@opterr{%
6   \PackageError{mtpro2}%
7   {Option \CurrentOption\space cannot be used\MessageBreak
8   together with the option ‘lite’}%
9   {Remove the option ‘lite’ or make sure that the complete MT-Pro font set is provided.
10 }

```

Do we want to turn off the AMS symbols?

```

11 \newif\ifmtp@ams
12 \DeclareOption{noamssymbols}{\mtp@amsfalse}
13 \DeclareOption{amssymbols}{\ifmtp@full\mtp@amstrue\else\mtp@opterr\fi}

```

For the (un)slanted Greek we take `\Gamma` as a marker, since it will be redefined anyway.

```

14 \DeclareOption{uprightGreek}{\let\Gamma=u}
15 \DeclareOption{slantedGreek}{\let\Gamma=s}

```

Slanted or upright operators? Using `\sum` as a marker would break `amsmath`, so we can’t avoid to define one more `\if` . . . :

```

16 \newif\ifmtp@slops
17 \DeclareOption{uprightoperators}{\mtp@slopsfalse}
18 \DeclareOption{slantedoperators}{\mtp@slopstrue}

```

Subscript correction:

```

19 \newcommand\enablesubscriptcorrection {\catcode‘\_ =12\relax}
20 \newcommand\disablesubscriptcorrection{\catcode‘\_ =8\relax}

```



```

21 \DeclareOption{nosubscriptcorrection}{\disablesubscriptcorrection}
22 \DeclareOption{subscriptcorrection}{\enablesubscriptcorrection}

```

Alternative z in math mode:

```

23 \DeclareOption{zswash}{\mathcode 'z="8000}

```

For the sake of symmetry:

```

24 \DeclareOption{nozswash}{\mathcode 'z="717A}

```

`\mathcal` and `\mathscr` are (mis)used as the markers for the calligraphic and script alphabets. In a similar fashion we handle `\mathscr`.

```

25 \DeclareOption{cmcal}{\let\mathcal=c}
26 \DeclareOption{lucidacal}{\let\mathcal=l}
27 \DeclareOption{eucal}{\let\mathcal=e}
28 \DeclareOption{mtpuscal}{\let\mathcal=s}
29 \DeclareOption{mtpcal}{\ifmtp@full\let\mathcal=a\else\mtp@opterr\fi}
30 \DeclareOption{mtpccal}{\ifmtp@full\let\mathcal=u\else\mtp@opterr\fi}
31 \DeclareOption{lucidascr}{\let\mathscr=l}
32 \DeclareOption{mtpusscr}{\let\mathscr=s}
33 \DeclareOption{mtpscr}{\ifmtp@full\let\mathscr=a\else\mtp@opterr\fi}

```

`\mathfrak` is the marker for the Fraktur alphabet. In contrast to `mtp` there is now an option to load Euler Fraktur:

```

34 \DeclareOption{eufrak}{\let\mathfrak=e}
35 \DeclareOption{mtpfrak}{\ifmtp@full\let\mathfrak=a\else\mtp@opterr\fi}

```

By default, the lc Greek letters are declared as type ‘`mathalpha`’, so that the math alphabets `\mathbf` and `\mathbb` act upon them. To protect against compatibility problems with legacy documents, this can be turned off through the option `compatiblegreek`:

```

36 \newif\ifmtp@greekalpha\mtp@greekalphatrue
37 \DeclareOption{compatiblegreek}{\mtp@greekalphafalse}

```

Finally, there are the options for setting up a `\mathbb` alphabet:

```

38 \DeclareOption{amsbb}{\let\mathbb=y}
39 \DeclareOption{mtpbb}{\let\mathbb=b}
40 \DeclareOption{mtpbbd}{\let\mathbb=d}
41 \DeclareOption{mtphrb}{\let\mathbb=h}
42 \DeclareOption{mtphrd}{\let\mathbb=k}
43 \DeclareOption{mtpbbi}{\let\mathbb=i}
44 \DeclareOption{mtpbhi}{\let\mathbb=j}

```

This package makes a lot of redefinitions. The warnings can be rather annoying so some package options control whether the information is printed to the terminal or log file. More control can be obtained by loading the `tracefnt` package.

Just show font errors; Warning and info to the log file. The default for this package.

```

45 \DeclareOption{errorshow}{%
46   \def\@font@info#1{%
47     \GenericInfo{(Font)}\@spaces\@spaces\@spaces\space\space}%
48     {LaTeX Font Info: \space\space\space#1}}%
49   \def\@font@warning#1{%
50     \GenericInfo{(Font)}\@spaces\@spaces\@spaces\space\space}%
51     {LaTeX Font Warning: #1}}

```

The normal L^AT_EX default, Font Info to the log file and Font Warning to the terminal.

```
52 \DeclareOption{warningshow}{%
53   \def\@font@info#1{%
54     \GenericInfo{(Font)\@spaces\@spaces\@spaces\space\space}%
55     {LaTeX Font Info: \space\space\space#1}}%
56   \def\@font@warning#1{%
57     \GenericWarning{(Font)\@spaces\@spaces\@spaces\space\space}%
58     {LaTeX Font Warning: #1}}}
```

On some machines writing all the log info may slow things down so extra option not to log font changes at all.

```
59 \DeclareOption{nofontinfo}{%
60   \let\@font@info\@gobble
61   \let\@font@warning\@gobble}
```

The defaults:

```
62 \ExecuteOptions{%
63   complete,amssymbols,uprightGreek,uprightoperators,nosubscriptcorrection,cmcal,errors
64 \ProcessOptions
```

6.2 Fonts

Switch to `\normalfont`. This makes any—possibly—changed values of em and ex come into effect. (Is this really necessary? In any case, it won't hurt...)

```
65 \normalfont
```

By default there is no ‘heavy’ mathversion, so let's declare it, if we have the full font set:

```
66 \ifmtp@full
67 \DeclareMathVersion{heavy}
68 \newcommand\heavymath{\@nomath\heavymath\mathversion{heavy}}
69 \fi
```

Next, set up the math core fonts in terms of NFSS. Notice that there are no external FD files for these, because the encoding is defined only locally. The LMP1 encoding is similar to OML:

```
70 \DeclareFontEncoding{LMP1}{-}{-}
71 \DeclareFontSubstitution{LMP1}{mtt}{m}{it}
72 \DeclareFontFamily{LMP1}{mtt}{\skewchar\font45}
73 \DeclareFontShape{LMP1}{mtt}{m}{it}{<-7> mt2mif <7-9> mt2mis <9-> mt2mit}{-}
74 \DeclareFontShape{LMP1}{mtt}{b}{it}{<-7> mt2bmif <7-9> mt2bmis <9-> mt2bmit}{-}
```

The LMP2 encoding corresponds to OMS:

```
75 \DeclareFontEncoding{LMP2}{-}{-}
76 \DeclareFontSubstitution{LMP2}{mtt}{m}{n}
77 \DeclareFontFamily{LMP2}{mtt}{\skewchar\font48}
78 \DeclareFontShape{LMP2}{mtt}{m}{n}{<-7> mt2syf <7-9> mt2sys <9-> mt2syt}{-}
79 \DeclareFontShape{LMP2}{mtt}{b}{n}{<-7> mt2bsyf <7-9> mt2bsys <9-> mt2bsyt}{-}
80 \DeclareFontShape{LMP2}{mtt}{eb}{n}{<-7> mt2hsyf <7-9> mt2hsys <9-> mt2hsyt}{-}
```

The ‘extension symbol’ font is similar to the Computer Modern cmex font; however, it contains additional symbols. One more encoding just for this reason:

```
81 \DeclareFontEncoding{LMP3}{-}{-}
82 \DeclareFontSubstitution{LMP3}{mtt}{m}{n}
83 \DeclareFontFamily{LMP3}{mtt}{-}
84 \DeclareFontShape{LMP3}{mtt}{m}{n}{<->mt2exa}{-}
85 \DeclareFontShape{LMP3}{mtt}{b}{n}{<->mt2bexa}{-}
86 \DeclareFontShape{LMP3}{mtt}{eb}{n}{<->mt2hexa}{-}
```

There is also a bold upright font, which is used for the \mbf alphabet. It contains letters and digits only, so we assign ‘U’ as the encoding.

```
87 \DeclareFontFamily{U}{mtt}{\skewchar\font45}
88 \DeclareFontShape{U}{mtt}{b}{n}{<-7> mt2mbf <7-9> mt2mbs <9-> mt2mbt}{-}% (MJ)
```

The main four symbol fonts:

```
89 \DeclareSymbolFont{operators} {\encodingdefault}{\rmdefault}{m}{n}
90 \DeclareSymbolFont{letters} {LMP1}{mtt}{m}{it}
91 \DeclareSymbolFont{symbols} {LMP2}{mtt}{m}{n}
92 \DeclareSymbolFont{largesymbols}{LMP3}{mtt}{m}{n}
```

The particular ‘bold’ variants (with full font set only):

```
93 \ifmtpt@full
94 \SetSymbolFont{operators} {bold}{\encodingdefault}{\rmdefault}{b}{n}
95 \SetSymbolFont{letters} {bold}{LMP1}{mtt}{b}{it}
96 \SetSymbolFont{symbols} {bold}{LMP2}{mtt}{b}{n}
97 \SetSymbolFont{largesymbols}{bold}{LMP3}{mtt}{b}{n}
```

The ‘heavy’ variants (ditto). Note that there are no ‘heavy’ variants of the ‘letters’ and ‘operators’ fonts:

```
98 \SetSymbolFont{symbols} {heavy}{LMP2}{mtt}{eb}{n}
99 \SetSymbolFont{largesymbols}{heavy}{LMP3}{mtt}{eb}{n}
```

The AMS symbols, also with full set only:

```
100 \DeclareFontFamily{U}{mt2sya}{-}%
101 \DeclareFontShape{U}{mt2sya}{m}{n}{<-7>mt2syaf<7-9>mt2syas<9->mt2syat}{-}%
102 \DeclareFontShape{U}{mt2sya}{b}{n}{<-7>mt2bsyaf<7-9>mt2bsyas<9->mt2bsyat}{-}%
103 \DeclareFontShape{U}{mt2sya}{eb}{n}{<-7>mt2hsyaf<7-9>mt2hsyas<9->mt2hsyat}{-}%
104 \fi
```

The fonts named \MTEXA@, \MTEXE@, \MTEXF@ and \MTEG@, are used for the extra-large roots, delimiters and accents. The fonts \MTXL@ and \MTXXXL@ provide the extra-large operators. They are to be loaded at 1×, 2×, 3× and 4× \normalsize. Notice that we are bypassing the NFSS! In addition to that, the ‘normal’ font size is stored in the macro \tMTPsize:.

```
105 \normalsize
106 \dimen@ \f@size pt
107 \edef\tMTPsize{\f@size pt}
108 \font\MTEXA@=mt2exa at \the\dimen@
109 \font\MTXL@=mt2xl at \the\dimen@
110 \multiply\dimen@\tw@
111 \font\MTEXE@=mt2exe at \the\dimen@
112 \font\MTXXXL@=mt2xxxl at \the\dimen@
113 \multiply\dimen@\tw@
```

```

114 \font\MTEXF@=mt2exf at \the\dimen@
115 \multiply\dimen@\tw@
116 \font\MTEXG@=mt2exg at \the\dimen@

```

An auxiliary macro, borrowed from Ams- \TeX :

```

117 \alloc@0\count\countdef\insc@unt\pointcount@
Can't say \newcount, since that's outer.
118 \def\getpoints@#1.#2\getpoints@{\pointcount@#1\relax}

```

6.3 Math alphabet declarations

6.3.1 The standard alphabets

We don't have to declare `\mathrm` as \LaTeX declares it as a math symbol alphabet pointing to 'operators' symbol font. Notice that we let `\mathbf` point to series 'b' rather than 'bf', since Times and similar fonts are usually available with that series.

```

119 % \DeclareSymbolFontAlphabet{\mathrm}{operators}
120 \DeclareMathAlphabet{\mathbf}{\encodingdefault}{\rmdefault}{b}{n}
121 \DeclareMathAlphabet{\mathit}{\encodingdefault}{\rmdefault}{m}{it}
122 \DeclareMathAlphabet{\mathsf}{\encodingdefault}{\sfdefault}{m}{n}
123 \DeclareMathAlphabet{\mathtt}{\encodingdefault}{\ttdefault}{m}{n}
124 \SetMathAlphabet{\mathit}{bold}{\encodingdefault}{\rmdefault}{b}{it}
125 \SetMathAlphabet{\mathsf}{bold}{\encodingdefault}{\sfdefault}{b}{n}
126 \SetMathAlphabet{\mathtt}{bold}{\encodingdefault}{\ttdefault}{b}{n}

```

6.3.2 Bold math alphabets

We provide a non-standard **bold upright** math alphabet, which points to the MTMBF, MTMBS and MTMBT fonts:

```

127 \DeclareMathAlphabet{\mbf}{U}{mtt}{b}{n}

```

The *bold italic* math alphabet is non-standard, too:

```

128 \DeclareMathAlphabet{\mathbold}{LMP1}{mtt}{b}{it}

```

NB: Packages such `mathpazo`, `eulervm` or `fixmath`, too, provide a `\mathbold` alphabet.

6.3.3 Script alphabets

MathTime Plus Script:

```

129 \ifx\mathscr s
130   \let\mathscr\relax
131   \DeclareMathAlphabet{\mathscr}{U}{mtms}{m}{n}
132   \SetMathAlphabet{\mathscr}{bold}{U}{mtms}{b}{n}
133   \DeclareMathAlphabet{\mathbscr}{U}{mtms}{b}{n}
134 \fi

```

Lucida Calligraphic:

```

135 \ifx\mathscr l
136   \let\mathscr\relax

```

```

137 \DeclareMathAlphabet{\mathscr} {OMS}{lrm}{m}{n}
138 \SetMathAlphabet{\mathscr}{bold}{OMS}{lrm}{b}{n}
139 \DeclareMathAlphabet{\mathbscr} {OMS}{lrm}{b}{n}
140 \fi

```

Math Script:

```

141 \ifx\mathscr a
142 \let\mathscr\relax
143 \DeclareRobustCommand*\mathscr[1]{\MTPsetupScript\MTPScript{#1}}
144 \DeclareRobustCommand*\mathbscr[1]{\MTPsetupScript\MTPbScript{#1}}
145 \fi

```

6.3.4 Calligraphic alphabets

Lucida:

```

146 \ifx\mathcal l
147 \let\mathcal\relax
148 \DeclareMathAlphabet{\mathcal} {OMS}{lrm}{m}{n}
149 \SetMathAlphabet{\mathcal}{bold}{OMS}{lrm}{b}{n}
150 \DeclareMathAlphabet{\mathbcal} {OMS}{lrm}{b}{n}
151 \fi

```

MathTime Plus Script:

```

152 \ifx\mathcal s
153 \let\mathcal\relax
154 \DeclareMathAlphabet{\mathcal} {U}{mtms}{m}{n}
155 \SetMathAlphabet{\mathcal}{bold}{U}{mtms}{b}{n}
156 \DeclareMathAlphabet{\mathbcal} {U}{mtms}{b}{n}
157 \fi

```

Euler Script

```

158 \ifx\mathcal e
159 \let\mathcal\relax
160 \DeclareFontFamily{U}{eus}{\skewchar\font'60}
161 \DeclareFontShape{U}{eus}{m}{n}{<-7>eusm5<7-9>eusm7<9->eusm10}{ }
162 \DeclareFontShape{U}{eus}{b}{n}{<-7>eusb5<7-9>eusb7<9->eusb10}{ }
163 \DeclareMathAlphabet{\mathcal} {U}{eus}{m}{n}
164 \SetMathAlphabet{\mathcal}{bold}{U}{eus}{b}{n}
165 \DeclareMathAlphabet{\mathbcal} {U}{eus}{b}{n}
166 \fi

```

Use CM for `\mathcal`; this is the default behavior, since the CM Calligraphic fonts are always available:

```

167 \ifx\mathcal c
168 \let\mathcal\relax
169 \DeclareMathAlphabet{\mathcal} {OMS}{cmsy}{m}{n}
170 \SetMathAlphabet{\mathcal}{bold}{OMS}{cmsy}{b}{n}
171 \DeclareMathAlphabet{\mathbcal} {OMS}{cmsy}{b}{n}
172 \fi

```

Math Script:

```

173 \ifx\mathcal a
174 \let\mathcal\relax

```

```

175 \DeclareRobustCommand*\mathcal}[1]{\MTPsetupScript\MTPScript{#1}}
176 \DeclareRobustCommand*\mathbcal}[1]{\MTPsetupScript\MTPbScript{#1}}
177 \fi

```

Curly:

```

178 \ifx\mathcal u
179 \let\mathcal\relax
180 \DeclareRobustCommand*\mathcal}[1]{\MTPsetupCurly\MTPCurly{#1}}
181 \def\mathbcal{\PackageError{mtpro2}
182   {There is no bold variant of the Curly font}
183   {Type <return> to proceed; \protect\mathbcal\space will be ignored.}
184 }
185 \fi

```

6.3.5 Fraktur alphabets

Euler:

```

186 \ifx\mathfrak e
187 \let\mathfrak\relax
188 \DeclareFontFamily{U}{euf}{}%
189 \DeclareFontShape{U}{euf}{m}{n}{<-7>eufm5<7-9>eufm7<9->eufm10}{}%
190 \DeclareFontShape{U}{euf}{b}{n}{<-7>eufb5<7-9>eufb7<9->eufb10}{}%
191 \DeclareMathAlphabet{\mathfrak}{U}{euf}{m}{n}
192 \SetMathAlphabet{\mathfrak}{bold}{U}{euf}{b}{n}
193 \fi

```

Math Fraktur:

```

194 \ifx\mathfrak a
195 \DeclareRobustCommand*\mathfrak}[1]{\MTPsetupFrak\MTPFrak{#1}}
196 \fi

```

6.3.6 Preliminaries for the Math Script and Fraktur fonts

The code in this section is required only with the full font set:

```

197 \ifmtp@full

```

We change the definitions of `\imath` and `\jmath` so that math alphabet commands will act on them:

```

198 \DeclareMathSymbol{\imath}{\mathalpha}{letters}{"7B}
199 \DeclareMathSymbol{\jmath}{\mathalpha}{letters}{"7C}

```

We provide default definitions of the commands for the alternative letters. They expand to a warning message, followed by the ‘normal’ letter:

```

200 \newcommand{\altC}{%
201   \PackageWarning{mtpro2}{Invalid use of \protect\altC}C}
202 \newcommand{\altG}{%
203   \PackageWarning{mtpro2}{Invalid use of \protect\altG}G}
204 \newcommand{\altL}{%
205   \PackageWarning{mtpro2}{Invalid use of \protect\altL}L}
206 \newcommand{\altM}{%
207   \PackageWarning{mtpro2}{Invalid use of \protect\altM}M}
208 \newcommand{\altN}{%

```

```

209 \PackageWarning{mtpro2}{Invalid use of \protect\altN}N}
210 \newcommand{\altQ}{\%
211 \PackageWarning{mtpro2}{Invalid use of \protect\altQ}Q}
212 \newcommand{\altS}{\%
213 \PackageWarning{mtpro2}{Invalid use of \protect\altS}S}
214 \newcommand{\altY}{\%
215 \PackageWarning{mtpro2}{Invalid use of \protect\altY}Y}
216 \newcommand{\altZ}{\%
217 \PackageWarning{mtpro2}{Invalid use of \protect\altZ}Z}
218 \newcommand{\altr}{\%
219 \PackageWarning{mtpro2}{Invalid use of \protect\altr}r}
220 \newcommand{\altx}{\%
221 \PackageWarning{mtpro2}{Invalid use of \protect\altx}x}
222 \newcommand{\alty}{\%
223 \PackageWarning{mtpro2}{Invalid use of \protect\alty}y}
224 \newcommand{\altz}{\%
225 \PackageWarning{mtpro2}{Invalid use of \protect\altz}z}

```

With the Math Script font the following macro will serve to redefine the above commands appropriately:

```

226 \newcommand{\MTPsetupScript}{\%
227 \let\altC=\MTP@C
228 \let\altG=\MTP@G
229 \let\altL=\MTP@L
230 \let\altQ=\MTP@Q
231 \let\altS=\MTP@S
232 \let\altY=\MTP@Y
233 \let\altZ=\MTP@Z
234 \let\altr=\MTP@r
235 \let\altz=\MTP@z}

```

Ditto for Fraktur...

```

236 \newcommand{\MTPsetupFrak}{\%
237 \let\altY=\MTP@Y
238 \let\altx=\MTP@x
239 \let\alty=\MTP@y}

```

... and Curly:

```

240 \newcommand{\MTPsetupCurly}{\%
241 \let\altG=\MTP@G
242 \let\altM=\MTP@M
243 \let\altN=\MTP@N
244 \let\altQ=\MTP@Q
245 \let\altY=\MTP@Y}

```

These are the macros to actually access the alternative letters:

```

246 \DeclareMathSymbol{\MTP@C}{\mathalpha}{letters}{'003}
247 \DeclareMathSymbol{\MTP@G}{\mathalpha}{letters}{'007}
248 \DeclareMathSymbol{\MTP@L}{\mathalpha}{letters}{'014}
249 \DeclareMathSymbol{\MTP@M}{\mathalpha}{letters}{'015}
250 \DeclareMathSymbol{\MTP@N}{\mathalpha}{letters}{'016}
251 \DeclareMathSymbol{\MTP@Q}{\mathalpha}{letters}{'021}
252 \DeclareMathSymbol{\MTP@S}{\mathalpha}{letters}{'023}

```

```

253 \DeclareMathSymbol{\MTP@Y}{\mathalpha}{letters}{'031}
254 \DeclareMathSymbol{\MTP@Z}{\mathalpha}{letters}{'032}
255 \DeclareMathSymbol{\MTP@r}{\mathalpha}{letters}{'062}
256 \DeclareMathSymbol{\MTP@x}{\mathalpha}{letters}{'070}
257 \DeclareMathSymbol{\MTP@y}{\mathalpha}{letters}{'071}
258 \DeclareMathSymbol{\MTP@z}{\mathalpha}{letters}{'072}

```

NB: The choice of `letters` as the default font is arbitrary and meaningless, since none of the predefined ‘symbol fonts’ comprises the symbols in question. All that counts here is the type `\mathalpha`.

Math Script, Math Curly and Math Fraktur are assigned math alphabets, which are, however, not to be used directly:

```

259 \DeclareMathAlphabet{\MTPScript}{U}{mt2ms}{m}{it}
260 \SetMathAlphabet{\MTPScript}{bold}{U}{mt2ms}{b}{it}
261 \DeclareMathAlphabet{\MTPbScript}{U}{mt2ms}{b}{it}

262 \DeclareMathAlphabet{\MTPCurly}{U}{mt2ms}{m}{n}

263 \DeclareMathAlphabet{\MTPFrak}{U}{mt2mf}{m}{n}
264 \SetMathAlphabet{\MTPFrak}{bold}{U}{mt2mf}{b}{n}

```

NB: Just *declaring* math alphabets does not yet consume any math font families!

```
265 \fi
```

6.3.7 Blackboard Bold alphabet

Optionally, we set up a ‘blackboard bold’ alphabet, too.

```

266 \ifx\mathbb i
267   \let\mathbb\relax
268   \DeclareMathAlphabet{\mathbb}{U}{mt2bb}{m}{it}
269 \fi

270 \ifx\mathbb j
271   \let\mathbb\relax
272   \DeclareMathAlphabet{\mathbb}{U}{mt2hrb}{m}{it}
273 \fi

274 \ifx\mathbb b
275   \let\mathbb\relax
276   \DeclareMathAlphabet{\mathbb}{U}{mt2bb}{m}{n}
277   \SetMathAlphabet{\mathbb}{bold}{U}{mt2bb}{b}{n}
278 \fi

279 \ifx\mathbb d
280   \let\mathbb\relax
281   \DeclareMathAlphabet{\mathbb}{U}{mt2bb}{b}{n}
282 \fi

283 \ifx\mathbb h
284   \let\mathbb\relax
285   \DeclareMathAlphabet{\mathbb}{U}{mt2hrb}{m}{n}
286   \SetMathAlphabet{\mathbb}{bold}{U}{mt2hrb}{b}{n}
287 \fi

288 \ifx\mathbb k
289   \let\mathbb\relax
290   \DeclareMathAlphabet{\mathbb}{U}{mt2hrb}{b}{n}

```



```

291 \fi
292 \ifx\mathbb y
293   \let\mathbb\relax
294   \DeclareFontFamily{U}{msb}{}%
295   \DeclareFontShape{U}{msb}{m}{n}{<-7>msbm5<7-9>msbm7<9->msbm10}{}%
296   \DeclareMathAlphabet{\mathbb}{U}{msb}{m}{n}
297 \fi

```

6.4 Math symbol declarations

Definitions which are unchanged from standard L^AT_EX are commented out.

6.4.1 Existing symbols

All digits and punctuation characters are taken from the ‘letters’ and ‘symbols’ fonts now:

```

298 \DeclareMathSymbol{0}{\mathalpha}{letters}{"30}
299 \DeclareMathSymbol{1}{\mathalpha}{letters}{"31}
300 \DeclareMathSymbol{2}{\mathalpha}{letters}{"32}
301 \DeclareMathSymbol{3}{\mathalpha}{letters}{"33}
302 \DeclareMathSymbol{4}{\mathalpha}{letters}{"34}
303 \DeclareMathSymbol{5}{\mathalpha}{letters}{"35}
304 \DeclareMathSymbol{6}{\mathalpha}{letters}{"36}
305 \DeclareMathSymbol{7}{\mathalpha}{letters}{"37}
306 \DeclareMathSymbol{8}{\mathalpha}{letters}{"38}
307 \DeclareMathSymbol{9}{\mathalpha}{letters}{"39}
308 \DeclareMathSymbol{!}{\mathclose}{letters}{"8A}
309 % \DeclareMathSymbol{*}{\mathbin}{symbols}{"03} % \ast
310 \DeclareMathSymbol{+}{\mathbin}{symbols}{67}
311 % \DeclareMathSymbol{,}{\mathpunct}{letters}{"3B}
312 % \DeclareMathSymbol{-}{\mathbin}{symbols}{"00}
313 % \DeclareMathSymbol{.}{\mathord}{letters}{"3A}
314 \DeclareMathSymbol{:}{\mathrel}{symbols}{"57}
315 \DeclareMathSymbol{;}{\mathpunct}{symbols}{"49}
316 \DeclareMathSymbol{?}{\mathclose}{letters}{"8B}
317 \DeclareMathSymbol{=}{\mathrel}{symbols}{"44}

```

Delimiters that are normally taken from the ‘operators’ font are mapped to ‘symbols’ or ‘letters’ now:

```

318 \DeclareMathDelimiter{({\mathopen}{letters}{46}{largesymbols}{0}
319 \DeclareMathDelimiter{)}{\mathclose}{letters}{47}{largesymbols}{1}
320 \DeclareMathDelimiter{[}{\mathopen}{letters}{140}{largesymbols}{02}
321 \DeclareMathDelimiter{]}\mathclose}{letters}{141}{largesymbols}{03}
322 % \DeclareMathDelimiter{<}{\mathopen}{symbols}{68}{largesymbols}{0A}
323 % \DeclareMathDelimiter{>}{\mathclose}{symbols}{69}{largesymbols}{0B}
324 % \DeclareMathSymbol{<}{\mathrel}{letters}{3C}
325 % \DeclareMathSymbol{>}{\mathrel}{letters}{3E}
326 \DeclareMathDelimiter{/}{\mathord}{letters}{3D}{largesymbols}{0E}
327 % \DeclareMathSymbol{/}{\mathord}{letters}{3D}
328 % \DeclareMathDelimiter{|}{\mathord}{symbols}{6A}{largesymbols}{0C}
329 % \expandafter\DeclareMathDelimiter{\backslashchar

```

330 % $\{\backslash\mathrm{mathord}\}\{\mathrm{symbols}\}\{^6\mathrm{E}\}\{\mathrm{largesymbols}\}\{^0\mathrm{F}\}$
 The lc Greek letters must be made $\backslash\mathrm{mathalpha}$, if we want $\backslash\mathrm{mathbold}$ or
 $\backslash\mathrm{mathbbb}$ to act upon them:

```

331 \ifmtpt@greekalpha
332 \DeclareMathSymbol{\alpha}{\mathalpha}{letters}{^0B}
333 \DeclareMathSymbol{\beta}{\mathalpha}{letters}{^0C}
334 \DeclareMathSymbol{\gamma}{\mathalpha}{letters}{^0D}
335 \DeclareMathSymbol{\delta}{\mathalpha}{letters}{^0E}
336 \DeclareMathSymbol{\epsilon}{\mathalpha}{letters}{^0F}
337 \DeclareMathSymbol{\zeta}{\mathalpha}{letters}{^10}
338 \DeclareMathSymbol{\eta}{\mathalpha}{letters}{^11}
339 \DeclareMathSymbol{\theta}{\mathalpha}{letters}{^12}
340 \DeclareMathSymbol{\iota}{\mathalpha}{letters}{^13}
341 \DeclareMathSymbol{\kappa}{\mathalpha}{letters}{^14}
342 \DeclareMathSymbol{\lambda}{\mathalpha}{letters}{^15}
343 \DeclareMathSymbol{\mu}{\mathalpha}{letters}{^16}
344 \DeclareMathSymbol{\nu}{\mathalpha}{letters}{^17}
345 \DeclareMathSymbol{\xi}{\mathalpha}{letters}{^18}
346 \DeclareMathSymbol{\pi}{\mathalpha}{letters}{^19}
347 \DeclareMathSymbol{\rho}{\mathalpha}{letters}{^1A}
348 \DeclareMathSymbol{\sigma}{\mathalpha}{letters}{^1B}
349 \DeclareMathSymbol{\tau}{\mathalpha}{letters}{^1C}
350 \DeclareMathSymbol{\upsilon}{\mathalpha}{letters}{^1D}
351 \DeclareMathSymbol{\phi}{\mathalpha}{letters}{^1E}
352 \DeclareMathSymbol{\chi}{\mathalpha}{letters}{^1F}
353 \DeclareMathSymbol{\psi}{\mathalpha}{letters}{^20}
354 \DeclareMathSymbol{\omega}{\mathalpha}{letters}{^21}
355 \DeclareMathSymbol{\varepsilon}{\mathalpha}{letters}{^22}
356 \DeclareMathSymbol{\vartheta}{\mathalpha}{letters}{^23}
357 \DeclareMathSymbol{\varpi}{\mathalpha}{letters}{^24}
358 \DeclareMathSymbol{\varrho}{\mathalpha}{letters}{^25}
359 \DeclareMathSymbol{\varsigma}{\mathalpha}{letters}{^26}
360 \DeclareMathSymbol{\varphi}{\mathalpha}{letters}{^27}
361 \DeclareMathSymbol{\varkappa}{\mathalpha}{letters}{126}% new
362 \DeclareMathSymbol{\varbeta}{\mathalpha}{letters}{176}% new
363 \DeclareMathSymbol{\vardelta}{\mathalpha}{letters}{178}% new
364 \else

```

With the options `compatibleeek` the lc Greek letters are declared as ‘`mathord`’:

```

365 % \DeclareMathSymbol{\alpha}{\mathord}{letters}{^0B}
366 % \DeclareMathSymbol{\beta}{\mathord}{letters}{^0C}
367 % \DeclareMathSymbol{\gamma}{\mathord}{letters}{^0D}
368 % \DeclareMathSymbol{\delta}{\mathord}{letters}{^0E}
369 % \DeclareMathSymbol{\epsilon}{\mathord}{letters}{^0F}
370 % \DeclareMathSymbol{\zeta}{\mathord}{letters}{^10}
371 % \DeclareMathSymbol{\eta}{\mathord}{letters}{^11}
372 % \DeclareMathSymbol{\theta}{\mathord}{letters}{^12}
373 % \DeclareMathSymbol{\iota}{\mathord}{letters}{^13}
374 % \DeclareMathSymbol{\kappa}{\mathord}{letters}{^14}
375 % \DeclareMathSymbol{\lambda}{\mathord}{letters}{^15}
376 % \DeclareMathSymbol{\mu}{\mathord}{letters}{^16}
377 % \DeclareMathSymbol{\nu}{\mathord}{letters}{^17}

```

```

378 % \DeclareMathSymbol{\xi}{\mathord}{letters}{18}
379 % \DeclareMathSymbol{\pi}{\mathord}{letters}{19}
380 % \DeclareMathSymbol{\rho}{\mathord}{letters}{1A}
381 % \DeclareMathSymbol{\sigma}{\mathord}{letters}{1B}
382 % \DeclareMathSymbol{\tau}{\mathord}{letters}{1C}
383 % \DeclareMathSymbol{\upsilon}{\mathord}{letters}{1D}
384 % \DeclareMathSymbol{\phi}{\mathord}{letters}{1E}
385 % \DeclareMathSymbol{\chi}{\mathord}{letters}{1F}
386 % \DeclareMathSymbol{\psi}{\mathord}{letters}{20}
387 % \DeclareMathSymbol{\omega}{\mathord}{letters}{21}
388 % \DeclareMathSymbol{\varepsilon}{\mathord}{letters}{22}
389 % \DeclareMathSymbol{\vartheta}{\mathord}{letters}{23}
390 % \DeclareMathSymbol{\varpi}{\mathord}{letters}{24}
391 % \DeclareMathSymbol{\varrho}{\mathord}{letters}{25}
392 % \DeclareMathSymbol{\varsigma}{\mathord}{letters}{26}
393 % \DeclareMathSymbol{\varphi}{\mathord}{letters}{27}
394 \DeclareMathSymbol{\varkappa}{\mathord}{letters}{126}% new
395 \DeclareMathSymbol{\varbeta}{\mathord}{letters}{176} % new
396 \DeclareMathSymbol{\vardelta}{\mathord}{letters}{178}% new
397 \fi

```

With ordinary L^AT_EX uppercase Greek is always upright—why? The options `uprightGreek` and `slantedGreek` control, how uppercase Greek letters are to appear. This option is provided also with packages such as `mathpazo`. Additionally, `\ifmtp@greekalpha` controls whether the uc Greek letters are declared as ‘`math-alpha`’ or ‘`mathord`’.

Let’s start with `[slantedGreek]`:

```

398 \ifx\Gamma s
399 \let\Gamma\@undefined
400 \DeclareMathSymbol{\Gamma}{\mathalpha}{letters}{00}
401 \DeclareMathSymbol{\Delta}{\mathalpha}{letters}{01}
402 \DeclareMathSymbol{\Theta}{\mathalpha}{letters}{02}
403 \DeclareMathSymbol{\Lambda}{\mathalpha}{letters}{03}
404 \DeclareMathSymbol{\Xi}{\mathalpha}{letters}{04}
405 \DeclareMathSymbol{\Pi}{\mathalpha}{letters}{05}
406 \DeclareMathSymbol{\Sigma}{\mathalpha}{letters}{06}
407 \DeclareMathSymbol{\Upsilon}{\mathalpha}{letters}{07}
408 \DeclareMathSymbol{\Phi}{\mathalpha}{letters}{08}
409 \DeclareMathSymbol{\Psi}{\mathalpha}{letters}{09}
410 \DeclareMathSymbol{\Omega}{\mathalpha}{letters}{0A}

```

The `[uprightGreek]` variant, which is the default:

```

411 \else
412 \let\Gamma\@undefined
413 \DeclareMathSymbol{\Gamma}{\mathalpha}{letters}{80}
414 \DeclareMathSymbol{\Delta}{\mathalpha}{letters}{81}
415 \DeclareMathSymbol{\Theta}{\mathalpha}{letters}{82}
416 \DeclareMathSymbol{\Lambda}{\mathalpha}{letters}{83}
417 \DeclareMathSymbol{\Xi}{\mathalpha}{letters}{84}
418 \DeclareMathSymbol{\Pi}{\mathalpha}{letters}{85}
419 \DeclareMathSymbol{\Sigma}{\mathalpha}{letters}{86}
420 \DeclareMathSymbol{\Upsilon}{\mathalpha}{letters}{87}

```

```

421 \DeclareMathSymbol{\Phi}{\mathalpha}{letters}{"88}
422 \DeclareMathSymbol{\Psi}{\mathalpha}{letters}{"89}
423 \DeclareMathSymbol{\Omega}{\mathalpha}{letters}{"7F}
424 \fi

```

The following Greek letters are always upright.

```

425 \DeclareMathSymbol{\upGamma}{\mathord}{letters}{"80}
426 \DeclareMathSymbol{\upDelta}{\mathord}{letters}{"81}
427 \DeclareMathSymbol{\upTheta}{\mathord}{letters}{"82}
428 \DeclareMathSymbol{\upLambda}{\mathord}{letters}{"83}
429 \DeclareMathSymbol{\upXi}{\mathord}{letters}{"84}
430 \DeclareMathSymbol{\upPi}{\mathord}{letters}{"85}
431 \DeclareMathSymbol{\upSigma}{\mathord}{letters}{"86}
432 \DeclareMathSymbol{\upUpsilon}{\mathord}{letters}{"87}
433 \DeclareMathSymbol{\upPhi}{\mathord}{letters}{"88}
434 \DeclareMathSymbol{\upPsi}{\mathord}{letters}{"89}
435 \DeclareMathSymbol{\upOmega}{\mathord}{letters}{"7F}
436 \DeclareMathSymbol{\upalph}{\mathord}{letters}{"92}
437 \DeclareMathSymbol{\upbeta}{\mathord}{letters}{"93}
438 \DeclareMathSymbol{\upgamma}{\mathord}{letters}{"94}
439 \DeclareMathSymbol{\updelta}{\mathord}{letters}{"95}
440 \DeclareMathSymbol{\upepsilon}{\mathord}{letters}{"96}
441 \DeclareMathSymbol{\upzeta}{\mathord}{letters}{"97}
442 \DeclareMathSymbol{\upeta}{\mathord}{letters}{"98}
443 \DeclareMathSymbol{\uptheta}{\mathord}{letters}{"99}
444 \DeclareMathSymbol{\upiota}{\mathord}{letters}{"9A}
445 \DeclareMathSymbol{\upkappa}{\mathord}{letters}{"9B}
446 \DeclareMathSymbol{\uplambda}{\mathord}{letters}{"9C}
447 \DeclareMathSymbol{\upmu}{\mathord}{letters}{"9D}
448 \DeclareMathSymbol{\upnu}{\mathord}{letters}{"9E}
449 \DeclareMathSymbol{\upxi}{\mathord}{letters}{"9F}
450 \DeclareMathSymbol{\uppi}{\mathord}{letters}{160}
451 \DeclareMathSymbol{\uprho}{\mathord}{letters}{161}
452 \DeclareMathSymbol{\upsigma}{\mathord}{letters}{162}
453 \DeclareMathSymbol{\uptau}{\mathord}{letters}{163}
454 \DeclareMathSymbol{\upupsilon}{\mathord}{letters}{164}
455 \DeclareMathSymbol{\upphi}{\mathord}{letters}{165}
456 \DeclareMathSymbol{\upchi}{\mathord}{letters}{166}
457 \DeclareMathSymbol{\uppsi}{\mathord}{letters}{167}
458 \DeclareMathSymbol{\upomega}{\mathord}{letters}{168}
459 \DeclareMathSymbol{\upvarepsilon}{\mathord}{letters}{169}
460 \DeclareMathSymbol{\upvartheta}{\mathord}{letters}{170}
461 \DeclareMathSymbol{\upvarpi}{\mathord}{letters}{171}
462 \DeclareMathSymbol{\upvarrho}{\mathord}{letters}{172}
463 \DeclareMathSymbol{\upvarsigma}{\mathord}{letters}{173}
464 \DeclareMathSymbol{\upvarphi}{\mathord}{letters}{174}
465 \DeclareMathSymbol{\upvarkappa}{\mathord}{letters}{175}
466 \DeclareMathSymbol{\upvarbeta}{\mathord}{letters}{177}
467 \DeclareMathSymbol{\upvardelta}{\mathord}{letters}{179}

```

We continue with standard symbols:

```

468 % \DeclareMathSymbol{\aleph}{\mathord}{symbols}{"40}
469 % \DeclareMathSymbol{\imath}{\mathord}{letters}{"7B}

```

```

470 % \DeclareMathSymbol{\jmath}{\mathord}{letters}{"7C}
471 % \DeclareMathSymbol{\ell}{\mathord}{letters}{"60}
472 % \DeclareMathSymbol{\wp}{\mathord}{letters}{"7D}
473 % \DeclareMathSymbol{\Re}{\mathord}{symbols}{"3C}
474 % \DeclareMathSymbol{\Im}{\mathord}{symbols}{"3D}
475 % \DeclareMathSymbol{\partial}{\mathord}{letters}{"40}
476 % \DeclareMathSymbol{\infty}{\mathord}{symbols}{"31}
477 % \DeclareMathSymbol{\prime}{\mathord}{symbols}{"30}
478 % \DeclareMathSymbol{\emptyset}{\mathord}{symbols}{"3B}
479 % \DeclareMathSymbol{\nabla}{\mathord}{symbols}{"72}
480 % \def\surd{\mathchar"1270}
481 % \DeclareMathSymbol{\top}{\mathord}{symbols}{"3E}
482 % \DeclareMathSymbol{\bot}{\mathord}{symbols}{"3F}
483 % \DeclareMathSymbol{\triangle}{\mathord}{symbols}{"34}
484 % \DeclareMathSymbol{\forall}{\mathord}{symbols}{"38}
485 % \DeclareMathSymbol{\exists}{\mathord}{symbols}{"39}
486 % \DeclareMathSymbol{\neg}{\mathord}{symbols}{"3A}
487 % \let\not=\neg
488 % \DeclareMathSymbol{\flat}{\mathord}{letters}{"5B}
489 % \DeclareMathSymbol{\natural}{\mathord}{letters}{"5C}
490 % \DeclareMathSymbol{\sharp}{\mathord}{letters}{"5D}
491 % \DeclareMathSymbol{\clubsuit}{\mathord}{symbols}{"7C}
492 % \DeclareMathSymbol{\diamondsuit}{\mathord}{symbols}{"7D}
493 % \DeclareMathSymbol{\heartsuit}{\mathord}{symbols}{"7E}
494 % \DeclareMathSymbol{\spadesuit}{\mathord}{symbols}{"7F}
495 % \DeclareMathSymbol{\coprod}{\mathop}{largesymbols}{"60}
496 % \DeclareMathSymbol{\bigvee}{\mathop}{largesymbols}{"57}
497 % \DeclareMathSymbol{\bigwedge}{\mathop}{largesymbols}{"56}
498 % \DeclareMathSymbol{\biguplus}{\mathop}{largesymbols}{"55}
499 % \DeclareMathSymbol{\bigcap}{\mathop}{largesymbols}{"54}
500 % \DeclareMathSymbol{\bigcup}{\mathop}{largesymbols}{"53}
501 % \DeclareMathSymbol{\intop}{\mathop}{largesymbols}{"52}
502 % \def\int{\intop\nolimits}
503 % \DeclareMathSymbol{\prod}{\mathop}{largesymbols}{"51}
504 % \DeclareMathSymbol{\sum}{\mathop}{largesymbols}{"50}
505 % \DeclareMathSymbol{\bigotimes}{\mathop}{largesymbols}{"4E}
506 % \DeclareMathSymbol{\bigoplus}{\mathop}{largesymbols}{"4C}
507 % \DeclareMathSymbol{\bigodot}{\mathop}{largesymbols}{"4A}
508 % \DeclareMathSymbol{\ointop}{\mathop}{largesymbols}{"48}
509 % \def\oint{\ointop\nolimits}
510 % \DeclareMathSymbol{\bigsqcup}{\mathop}{largesymbols}{"46}
511 % \DeclareMathSymbol{\smallint}{\mathop}{symbols}{"73}
512 % \DeclareMathSymbol{\triangleleft}{\mathbin}{symbols}{"47}
513 % \DeclareMathSymbol{\triangleright}{\mathbin}{symbols}{"46}
514 % \DeclareMathSymbol{\bigtriangleup}{\mathbin}{symbols}{"34}
515 % \DeclareMathSymbol{\bigtriangledown}{\mathbin}{symbols}{"35}
516 % \DeclareMathSymbol{\wedge}{\mathbin}{symbols}{"5E}
517 % \let\land=\wedge
518 % \DeclareMathSymbol{\vee}{\mathbin}{symbols}{"5F}
519 % \let\lor=\vee
520 % \DeclareMathSymbol{\cap}{\mathbin}{symbols}{"5C}
521 % \DeclareMathSymbol{\cup}{\mathbin}{symbols}{"5B}

```

```

522 \DeclareMathSymbol{\ddagger}{\mathbin}{letters}{8F}
523 \DeclareMathSymbol{\dagger}{\mathbin}{letters}{8E}
524 % \DeclareMathSymbol{\sqcap}{\mathbin}{symbols}{75}
525 % \DeclareMathSymbol{\sqcup}{\mathbin}{symbols}{74}
526 % \DeclareMathSymbol{\uplus}{\mathbin}{symbols}{5D}
527 % \DeclareMathSymbol{\amalg}{\mathbin}{symbols}{71}
528 % \DeclareMathSymbol{\diamond}{\mathbin}{symbols}{05}
529 % \DeclareMathSymbol{\bullet}{\mathbin}{symbols}{0F}
530 % \DeclareMathSymbol{\wr}{\mathbin}{symbols}{6F}
531 % \DeclareMathSymbol{\div}{\mathbin}{symbols}{04}
532 % \DeclareMathSymbol{\odot}{\mathbin}{symbols}{0C}
533 % \DeclareMathSymbol{\oslash}{\mathbin}{symbols}{0B}
534 % \DeclareMathSymbol{\otimes}{\mathbin}{symbols}{0A}
535 % \DeclareMathSymbol{\ominus}{\mathbin}{symbols}{09}
536 % \DeclareMathSymbol{\oplus}{\mathbin}{symbols}{08}
537 % \DeclareMathSymbol{\mp}{\mathbin}{symbols}{07}
538 % \DeclareMathSymbol{\pm}{\mathbin}{symbols}{06}
539 % \DeclareMathSymbol{\circ}{\mathbin}{symbols}{0E}
540 % \DeclareMathSymbol{\bigcirc}{\mathbin}{symbols}{0D}
541 % \DeclareMathSymbol{\setminus}{\mathbin}{symbols}{6E}
542 % \DeclareMathSymbol{\cdot}{\mathbin}{symbols}{01}
543 % \DeclareMathSymbol{\ast}{\mathbin}{symbols}{03}
544 % \DeclareMathSymbol{\times}{\mathbin}{symbols}{02}
545 % \DeclareMathSymbol{\star}{\mathbin}{letters}{3F}
546 % \DeclareMathSymbol{\propto}{\mathrel}{symbols}{2F}
547 % \DeclareMathSymbol{\sqsubseteq}{\mathrel}{symbols}{76}
548 % \DeclareMathSymbol{\sqsupseteq}{\mathrel}{symbols}{77}
549 % \DeclareMathSymbol{\parallel}{\mathrel}{symbols}{6B}
550 % \DeclareMathSymbol{\mid}{\mathrel}{symbols}{6A}
551 % \DeclareMathSymbol{\dashv}{\mathrel}{symbols}{61}
552 % \DeclareMathSymbol{\vdash}{\mathrel}{symbols}{60}
553 % \DeclareMathSymbol{\nearrow}{\mathrel}{symbols}{25}
554 % \DeclareMathSymbol{\searrow}{\mathrel}{symbols}{26}
555 % \DeclareMathSymbol{\nrightarrow}{\mathrel}{symbols}{2D}
556 % \DeclareMathSymbol{\swarrow}{\mathrel}{symbols}{2E}
557 % \DeclareMathSymbol{\Leftrightarrow}{\mathrel}{symbols}{2C}
558 % \DeclareMathSymbol{\Leftarrow}{\mathrel}{symbols}{28}
559 % \DeclareMathSymbol{\Rightarrow}{\mathrel}{symbols}{29}
560 % \def\neq{\not=} \let\ne=\neq
561 % \DeclareMathSymbol{\leq}{\mathrel}{symbols}{14}
562 % \let\le=\leq
563 % \DeclareMathSymbol{\geq}{\mathrel}{symbols}{15}
564 % \let\ge=\geq
565 % \DeclareMathSymbol{\succ}{\mathrel}{symbols}{1F}
566 % \DeclareMathSymbol{\prec}{\mathrel}{symbols}{1E}
567 % \DeclareMathSymbol{\approx}{\mathrel}{symbols}{19}
568 % \DeclareMathSymbol{\succeq}{\mathrel}{symbols}{17}
569 % \DeclareMathSymbol{\preceq}{\mathrel}{symbols}{16}
570 % \DeclareMathSymbol{\supset}{\mathrel}{symbols}{1B}
571 % \DeclareMathSymbol{\subset}{\mathrel}{symbols}{1A}
572 % \DeclareMathSymbol{\supseteq}{\mathrel}{symbols}{13}
573 % \DeclareMathSymbol{\subseteq}{\mathrel}{symbols}{12}

```

```

574 % \DeclareMathSymbol{\in}{\mathrel}{symbols}{"32}
575 % \DeclareMathSymbol{\ni}{\mathrel}{symbols}{"33}
576 % \let\owns=\ni
577 % \DeclareMathSymbol{\gg}{\mathrel}{symbols}{"1D}
578 % \DeclareMathSymbol{\ll}{\mathrel}{symbols}{"1C}
579 % \DeclareMathSymbol{\not}{\mathrel}{symbols}{"36}
580 % \DeclareMathSymbol{\leftrightharpoonup}{\mathrel}{symbols}{"24}
581 % \DeclareMathSymbol{\leftarrow}{\mathrel}{symbols}{"20}
582 % \let\gets=\leftarrow
583 % \DeclareMathSymbol{\rightarrow}{\mathrel}{symbols}{"21}
584 % \let\to=\rightarrow
585 % \DeclareMathSymbol{\mapstochar}{\mathrel}{symbols}{"37}
586 % \DeclareMathSymbol{\sim}{\mathrel}{symbols}{"18}
587 % \DeclareMathSymbol{\simeq}{\mathrel}{symbols}{"27}
588 % \DeclareMathSymbol{\perp}{\mathrel}{symbols}{"3F}
589 % \DeclareMathSymbol{\equiv}{\mathrel}{symbols}{"11}
590 % \DeclareMathSymbol{\asymp}{\mathrel}{symbols}{"10}
591 % \DeclareMathSymbol{\smile}{\mathrel}{letters}{"5E}
592 % \DeclareMathSymbol{\frown}{\mathrel}{letters}{"5F}
593 % \DeclareMathSymbol{\leftharpoonup}{\mathrel}{letters}{"28}
594 % \DeclareMathSymbol{\leftharpoondown}{\mathrel}{letters}{"29}
595 % \DeclareMathSymbol{\rightharpoonup}{\mathrel}{letters}{"2A}
596 % \DeclareMathSymbol{\rightharpoondown}{\mathrel}{letters}{"2B}
597 % \def\doteq{\buildrel\textstyle.\over=}
598 % \def\joinrel{\mathrel{\mkern-3mu}}
599 % \def\relbar{\mathrel{\smash-}}
600 \let\Relbar\@undefined
601 \DeclareMathSymbol{\Relbar}{\mathrel}{symbols}{"48}
602 % \DeclareMathSymbol{\lhook}{\mathrel}{letters}{"2C}
603 % \def\hookrightarrow{\lhook\joinrel\rightarrow}
604 % \DeclareMathSymbol{\rhook}{\mathrel}{letters}{"2D}
605 % \def\hookleftarrow{\leftarrow\joinrel\rhook}
606 % \def\bowtie{\mathrel\triangleright\joinrel\mathrel\triangleleft}
607 % \def\models{\mathrel{||}\joinrel\Relbar}
608 % \def\Longrightarrow{\Relbar\joinrel\rightarrow}
609 % \DeclareRobustCommand\longrightarrow
610 % {\relbar\joinrel\rightarrow}
611 % \DeclareRobustCommand\longleftarrow
612 % {\leftarrow\joinrel\relbar}
613 % \def\Longleftarrow{\Leftarrow\joinrel\Relbar}
614 % \def\longmapsto{\mapstochar\longrightarrow}
615 % \def\longleftrightharpoonup{\leftarrow\joinrel\rightarrow}
616 % \def\Longleftrightharpoonup{\Leftarrow\joinrel\rightarrow}
617 % \def\iff{\;\Longleftrightharpoonup\;}
618 \DeclareMathSymbol{\ldotp}{\mathpunct}{letters}{"3A}
619 % \DeclareMathSymbol{\cdotp}{\mathpunct}{symbols}{"01}
620 \let\colon\@undefined % for amsmath!
621 \DeclareMathSymbol{\colon}{\mathpunct}{symbols}{"57}
622 % \def\cdots{\mathinner{\cdotp\cdotp\cdotp}}

```

Improved definitions of the commands `\vdots` and `\ddots` are adapted from `mathtime`. They take their dots always from the math font, rather than from a

text font. If the package mathdots was loaded before, we skip the redefinitions, since that package provides a much more comprehensive solution.

```

623 \ifpackageloaded{mathdots}{-}{%
624   \newcommand\hb@xmdot{\hbox{$\m@th.$}}
625   \def\vdots{\vbox{\baselineskip4\p@ \lineskiplimit\z@
626     \kern6\p@\hb@xmdot\hb@xmdot\hb@xmdot}}
627   \def\ddots{\mathinner{\mkern1mu\raise7\p@\vbox{\kern7\p@
628     \hb@xmdot}\mkern2mu
629     \raise4\p@\hb@xmdot\mkern2mu\raise\p@\hb@xmdot\mkern1mu}}
630 }

```

We make all accents `\mathord`; as they are placed in strange positions it is really not feasible to support changing them.

```

631 \DeclareMathAccent{\vec}{\mathord}{symbols}{69}
632 \DeclareMathAccent{\grave}{\mathord}{symbols}{74}
633 \DeclareMathAccent{\acute}{\mathord}{symbols}{75}
634 \DeclareMathAccent{\check}{\mathord}{symbols}{76}
635 \DeclareMathAccent{\breve}{\mathord}{symbols}{77}
636 \DeclareMathAccent{\bar}{\mathord}{symbols}{78}
637 \DeclareMathAccent{\hat}{\mathord}{symbols}{79}
638 \DeclareMathAccent{\dot}{\mathord}{symbols}{80}
639 \DeclareMathAccent{\tilde}{\mathord}{symbols}{81}
640 \DeclareMathAccent{\ddot}{\mathord}{symbols}{82}
641 \DeclareMathAccent{\mathring}{\mathord}{symbols}{86}

```

The wide math accents will later be defined as macros:

```

642 % \DeclareMathAccent{\widetilde}{\mathord}{largesymbols}{65}
643 % \DeclareMathAccent{\widehat}{\mathord}{largesymbols}{62}

644 % \DeclareMathRadical{\sqrtsign}{symbols}{70}{largesymbols}{70}
645 % \def\overrightarrow#1{\vbox{\m@th\ialign{##\crrc
646 %   \rightarrowfill\crrc\noalign{\kern-\p@\nointerlineskip}
647 %   $\hfil\displaystyle{#1}\hfil$\crrc}}}
648 % \def\overleftarrow#1{\vbox{\m@th\ialign{##\crrc
649 %   \leftarrowfill\crrc\noalign{\kern-\p@\nointerlineskip}%
650 %   $\hfil\displaystyle{#1}\hfil$\crrc}}}
651 % \def\overbrace#1{\mathop{\vbox{\m@th\ialign{##\crrc\noalign{\kern3\p@}%
652 %   \downbracefill\crrc\noalign{\kern3\p@\nointerlineskip}%
653 %   $\hfil\displaystyle{#1}\hfil$\crrc}}}\limits}
654 % \def\underbrace#1{\mathop{\vtop{\m@th\ialign{##\crrc
655 %   $\hfil\displaystyle{#1}\hfil$\crrc
656 %   \noalign{\kern3\p@\nointerlineskip}%
657 %   \upbracefill\crrc\noalign{\kern3\p@}}}\limits}
658 % \def\skew#1#2#3{\muskip\z@#1mu\divide\muskip\z@ \tw@ \mkern\muskip\z@
659 %   #2{\mkern-\muskip\z@#3}\mkern\muskip\z@}\mkern-\muskip\z@}
660 % \def\rightarrowfill{$\m@th\smash-\mkern-7mu%
661 %   \cleaders\hbox{$\mkern-2mu\smash-\mkern-2mu$}\hfill
662 %   \mkern-7mu\mathord\rightarrow$}
663 % \def\leftarrowfill{$\m@th\mathord\leftarrow\mkern-7mu%
664 %   \cleaders\hbox{$\mkern-2mu\smash-\mkern-2mu$}\hfill
665 %   \mkern-7mu\smash-$}

666 \DeclareMathSymbol{\braced}{\mathord}{largesymbols}{82}

```



```

667 \DeclareMathSymbol{\bracerd}{\mathord}{largesymbols}{83}
668 \DeclareMathSymbol{\bracelu}{\mathord}{largesymbols}{84}
669 \DeclareMathSymbol{\braceru}{\mathord}{largesymbols}{85}
670 % \def\downbracefill{$\m@th \setbox\z@\hbox{$\braceld$}%
671 %   \braceld\leaders\vrule \@height\ht\z@ \@depth\z@\hfill\braceru
672 %   \bracelu\leaders\vrule \@height\ht\z@ \@depth\z@\hfill\bracerd$}
673 % \def\upbracefill{$\m@th \setbox\z@\hbox{$\braceld$}%
674 %   \bracelu\leaders\vrule \@height\ht\z@ \@depth\z@\hfill\bracerd
675 %   \braceld\leaders\vrule \@height\ht\z@ \@depth\z@\hfill\braceru$}
676 % \DeclareMathDelimiter{\lmoustache} % top from (, bottom from )
677 %   {\mathopen}{largesymbols}{7A}{largesymbols}{40}
678 % \DeclareMathDelimiter{\rmoustache} % top from ), bottom from (
679 %   {\mathclose}{largesymbols}{7B}{largesymbols}{41}
680 % \DeclareMathDelimiter{\arrowvert} % arrow without arrowheads
681 %   {\mathord}{symbols}{6A}{largesymbols}{3C}
682 % \DeclareMathDelimiter{\Arrowvert} % double arrow without arrowheads
683 %   {\mathord}{symbols}{6B}{largesymbols}{3D}
684 % \DeclareMathDelimiter{\Vert}
685 %   {\mathord}{symbols}{6B}{largesymbols}{0D}
686 % \let\l=\Vert
687 % \DeclareMathDelimiter{\vert}
688 %   {\mathord}{symbols}{6A}{largesymbols}{0C}
689 % \DeclareMathDelimiter{\uparrow}
690 %   {\mathrel}{symbols}{22}{largesymbols}{78}
691 % \DeclareMathDelimiter{\downarrow}
692 %   {\mathrel}{symbols}{23}{largesymbols}{79}
693 % \DeclareMathDelimiter{\updownarrow}
694 %   {\mathrel}{symbols}{6C}{largesymbols}{3F}
695 % \DeclareMathDelimiter{\Uparrow}
696 %   {\mathrel}{symbols}{2A}{largesymbols}{7E}
697 % \DeclareMathDelimiter{\Downarrow}
698 %   {\mathrel}{symbols}{2B}{largesymbols}{7F}
699 % \DeclareMathDelimiter{\Updownarrow}
700 %   {\mathrel}{symbols}{6D}{largesymbols}{77}
701 % \DeclareMathDelimiter{\backslash} % for double coset G\backslash H
702 %   {\mathord}{symbols}{6E}{largesymbols}{0F}
703 % \DeclareMathDelimiter{\rangle}
704 %   {\mathclose}{symbols}{69}{largesymbols}{0B}
705 % \DeclareMathDelimiter{\langle}
706 %   {\mathopen}{symbols}{68}{largesymbols}{0A}
707 % \DeclareMathDelimiter{\rbrace}
708 %   {\mathclose}{symbols}{67}{largesymbols}{09}
709 % \DeclareMathDelimiter{\lbrace}
710 %   {\mathopen}{symbols}{66}{largesymbols}{08}
711 % \DeclareMathDelimiter{\rceil}
712 %   {\mathclose}{symbols}{65}{largesymbols}{07}
713 % \DeclareMathDelimiter{\lceil}
714 %   {\mathopen}{symbols}{64}{largesymbols}{06}
715 % \DeclareMathDelimiter{\rfloor}
716 %   {\mathclose}{symbols}{63}{largesymbols}{05}
717 % \DeclareMathDelimiter{\lfloor}
718 %   {\mathopen}{symbols}{62}{largesymbols}{04}

```

```

719% \DeclareMathDelimiter{\lgroup} % extensible ( with sharper tips
720%      {\mathopen}{\largesymbols}{"3A}{\largesymbols}{"3A}
721% \DeclareMathDelimiter{\rgroup} % extensible ) with sharper tips
722%      {\mathclose}{\largesymbols}{"3B}{\largesymbols}{"3B}
723% \DeclareMathDelimiter{\bracevert} % the vertical bar that extends braces
724%      {\mathord}{\largesymbols}{"3E}{\largesymbols}{"3E}
725 \DeclareMathSymbol{\mathparagraph}{\mathord}{letters}{"91}
726 \DeclareMathSymbol{\mathsection}{\mathord}{letters}{"90}

```

6.4.2 Big operators

These exist in both upright and slanted form:

```

727 \DeclareMathSymbol{\slsumop}{\mathop}{\largesymbols}{160}
728 \DeclareMathSymbol{\slprodop}{\mathop}{\largesymbols}{162}
729 \DeclareMathSymbol{\slcoprodop}{\mathop}{\largesymbols}{164}
730 \DeclareMathSymbol{\upsumop}{\mathop}{\largesymbols}{"50}
731 \DeclareMathSymbol{\upprodop}{\mathop}{\largesymbols}{"51}
732 \DeclareMathSymbol{\upcoprodop}{\mathop}{\largesymbols}{"60}

```

The actual definitions of `\sum`, `\prod` and `\coprod` are deferred until `\begin{document}`, wrt/ amsmath.

6.4.3 New symbols and accents

Ordinary symbols:

```

733 \DeclareMathSymbol{\openclubsuit}{\mathord}{symbols}{"80}
734 \DeclareMathSymbol{\shadedclubsuit}{\mathord}{symbols}{"81}
735 \DeclareMathSymbol{\openspadesuit}{\mathord}{symbols}{"82}
736 \DeclareMathSymbol{\shadedspadesuit}{\mathord}{symbols}{"83}
737 \DeclareMathSymbol{\hslash}{\mathord}{symbols}{175}
738 \DeclareMathSymbol{\digamma}{\mathord}{symbols}{177}
739 \DeclareMathSymbol{\dbar}{\mathord}{letters}{181}
740 \DeclareMathSymbol{\updbar}{\mathord}{letters}{182}

```

Binary operators and relations:

```

741 \DeclareMathSymbol{\comp}{\mathbin}{symbols}{66}
742 \DeclareMathSymbol{\setdif}{\mathbin}{symbols}{88}
743 \DeclareMathSymbol{\cupprod}{\mathbin}{symbols}{89}
744 \DeclareMathSymbol{\capprod}{\mathbin}{symbols}{90}
745 \DeclareMathSymbol{\simarrow}{\mathrel}{symbols}{176}
746 \DeclareMathSymbol{\varland}{\mathbin}{symbols}{178}
747 \DeclareMathSymbol{\contraction}{\mathbin}{symbols}{179}
748 \DeclareMathSymbol{\coloneq}{\mathrel}{symbols}{180}
749 \DeclareMathSymbol{\eqcolon}{\mathrel}{symbols}{181}
750 \DeclareMathSymbol{\hateq}{\mathrel}{symbols}{182}
751 \DeclareMathSymbol{\circdashbullet}{\mathrel}{symbols}{183}
752 \DeclareMathSymbol{\bulletdashcirc}{\mathrel}{symbols}{184}

```

Large operators:

```

753 \DeclareMathSymbol{\bigcupprod}{\mathop}{\largesymbols}{"8E}
754 \DeclareMathSymbol{\bigcapprod}{\mathop}{\largesymbols}{"90}
755 \DeclareMathSymbol{\bigvarland}{\mathop}{\largesymbols}{166}
756 \DeclareMathSymbol{\bigast}{\mathop}{\largesymbols}{168}

```

MathTimeProfessional has triple and quadruple dot accents and raised dot accents. The definitions of `\dddot` and `\ddddot` are deferred until `\begin{document}`; otherwise they would break `amsmath`, which tries to define them using `\newcommand`.

```

757 % \DeclareMathAccent{\dddot}{\mathord}{symbols}{171}
758 % \DeclareMathAccent{\ddddot}{\mathord}{symbols}{172}
759 \DeclareMathAccent{\dotup}{\mathord}{symbols}{54}
760 \DeclareMathAccent{\ddotup}{\mathord}{symbols}{55}
761 \DeclareMathAccent{\dddotup}{\mathord}{symbols}{173}
762 \DeclareMathAccent{\ddddotup}{\mathord}{symbols}{174}

763 \let\oacc\mathring
764 \DeclareMathAccent{\what}{\mathord}{symbols}{79}
765 \DeclareMathAccent{\wtilde}{\mathord}{symbols}{7A}
766 \DeclareMathAccent{\wcheck}{\mathord}{symbols}{7B}
767 \DeclareMathAccent{\wbar}{\mathord}{symbols}{78}

768 \DeclareMathAccent{\wwhat}{\mathord}{largesymbols}{80}
769 \DeclareMathAccent{\wwtilde}{\mathord}{largesymbols}{81}
770 \DeclareMathAccent{\wwcheck}{\mathord}{largesymbols}{7D}
771 \DeclareMathAccent{\wwbar}{\mathord}{symbols}{53}

```

A number of symbols that used to be built from pieces are now available as ready-made characters:

```

772 \DeclareMathSymbol{\hbar}{\mathord}{symbols}{84}
773 \let\notin@undefined
774 \DeclareMathSymbol{\notin}{\mathrel}{symbols}{85}
775 \let\angle@undefined
776 \DeclareMathSymbol{\angle}{\mathord}{symbols}{86}
777 \let\models@undefined
778 \DeclareMathSymbol{\models}{\mathrel}{symbols}{88}
779 \let\bowtie@undefined
780 \DeclareMathSymbol{\bowtie}{\mathrel}{symbols}{89}
781 \let\cong@undefined
782 \DeclareMathSymbol{\cong}{\mathrel}{symbols}{8A}
783 \let\Longleftarrow@undefined
784 \DeclareMathSymbol{\Longleftarrow}{\mathrel}{symbols}{94}
785 \let\rightleftharpoons@undefined
786 \DeclareMathSymbol{\rightleftharpoons}{\mathrel}{symbols}{95}
787 \DeclareMathSymbol{\notless}{\mathrel}{symbols}{96}
788 \DeclareMathSymbol{\notleq}{\mathrel}{symbols}{97}
789 \DeclareMathSymbol{\notprec}{\mathrel}{symbols}{98}
790 \DeclareMathSymbol{\notpreceq}{\mathrel}{symbols}{99}
791 \DeclareMathSymbol{\notsubset}{\mathrel}{symbols}{9A}
792 \DeclareMathSymbol{\notsubsepeq}{\mathrel}{symbols}{9B}
793 \DeclareMathSymbol{\notsqsubsepeq}{\mathrel}{symbols}{9C}
794 \DeclareMathSymbol{\notgr}{\mathrel}{symbols}{9D}
795 \DeclareMathSymbol{\notgeq}{\mathrel}{symbols}{9E}
796 \DeclareMathSymbol{\notsucc}{\mathrel}{symbols}{9F}
797 \DeclareMathSymbol{\notsucceq}{\mathrel}{symbols}{160}
798 \DeclareMathSymbol{\notsupset}{\mathrel}{symbols}{161}
799 \DeclareMathSymbol{\notsupseteq}{\mathrel}{symbols}{162}

```

```

800 \DeclareMathSymbol{\notsqsupseteq} {\mathrel}{symbols}{163}
801 \let\neq\@undefined
802 \DeclareMathSymbol{\neq} {\mathrel}{symbols}{164}
803 \let\ne=\neq
804 \DeclareMathSymbol{\notequiv} {\mathrel}{symbols}{165}
805 \DeclareMathSymbol{\notsim} {\mathrel}{symbols}{166}
806 \DeclareMathSymbol{\notsimeq} {\mathrel}{symbols}{167}
807 \DeclareMathSymbol{\notapprox} {\mathrel}{symbols}{168}
808 \DeclareMathSymbol{\notcong} {\mathrel}{symbols}{169}
809 \DeclareMathSymbol{\notasymp} {\mathrel}{symbols}{170}

```

Part of the above symbols get alternative names, which follow the naming scheme of the AMS:

```

810 \let\nless=\notless
811 \let\nleq=\notleq
812 \let\nprec=\notprec
813 \let\npreceq=\notpreceq
814 \let\nsubset=\notsubset
815 \let\nsubseteq=\notsubseteq
816 \let\nsqsubseteq=\notsqsubseteq
817 \let\ngr=\notgr
818 \let\ngeq=\notgeq
819 \let\nsucc=\notsucc
820 \let\nsucceq=\notsucceq
821 \let\nsupset=\notsupset
822 \let\nsupseteq=\notsupseteq
823 \let\nsqsupseteq=\notsqsupseteq
824 \let\ncong=\notcong
825 \let\nasymp=\notasymp
826 \let\nequiv=\notequiv
827 \let\nsimeq=\notsimeq
828 \let\napprox=\notapprox

```

Unfortunately, the `amsmath` package provides its own definitions of the following symbols. We do not overwrite them, if `amslatex` was loaded before `mtpro2`. (`amsmath` was designed with only the standard CM fonts in mind; this constitutes sometimes a real problem!)

```

829 \@ifpackageloaded{amsmath}{\%
830   \let\doteq\@undefined
831   \let\hookrightarrow\@undefined
832   \let\hookrightarrow\@undefined
833   \let\longleftarrow\@undefined
834   \let\longrightarrow\@undefined
835   \let\Longleftarrow\@undefined
836   \let\Longrightarrow\@undefined
837   \let\mapsto\@undefined
838   \let\longmapsto\@undefined
839   \let\longleftarrow\@undefined
840   \DeclareMathSymbol{\doteq} {\mathrel}{symbols}{87}
841   \DeclareMathSymbol{\hookrightarrow} {\mathrel}{symbols}{8B}
842   \DeclareMathSymbol{\hookrightarrow} {\mathrel}{symbols}{8C}
843   \DeclareMathSymbol{\longleftarrow} {\mathrel}{symbols}{8D}

```

```

844 \DeclareMathSymbol{\longrightarrow}{\mathrel}{symbols}{"8E}
845 \DeclareMathSymbol{\Longleftarrow}{\mathrel}{symbols}{"8F}
846 \DeclareMathSymbol{\Longrightarrow}{\mathrel}{symbols}{"90}
847 \DeclareMathSymbol{\mapsto}{\mathrel}{symbols}{"91}
848 \DeclareMathSymbol{\longmapsto}{\mathrel}{symbols}{"92}
849 \DeclareMathSymbol{\longlefttrightarrow}{\mathrel}{symbols}{"93}
850 }

```

Alternatively, one might think of repeating the AMS-style definitions with our ready-made symbols patched in, if `amsmath` is detected.

Additional integral signs:

```

851 \DeclareMathSymbol{\iintop}{\mathop}{largesymbols}{"92}
852 \DeclareMathSymbol{\iiintop}{\mathop}{largesymbols}{"94}
853 \DeclareMathSymbol{\oiintop}{\mathop}{largesymbols}{"96}
854 \DeclareMathSymbol{\oiiintop}{\mathop}{largesymbols}{"98}
855 \DeclareMathSymbol{\cwointop}{\mathop}{largesymbols}{"9A}
856 \DeclareMathSymbol{\awointop}{\mathop}{largesymbols}{"9C}
857 \DeclareMathSymbol{\cwintop}{\mathop}{largesymbols}{"9E}
858 \DeclareMathSymbol{\barintop}{\mathop}{largesymbols}{170}
859 \DeclareMathSymbol{\slashintop}{\mathop}{largesymbols}{172}

```

The actual definitions of the user-level macros are deferred until `\begin{document}`.

6.4.4 Compatibility with `amsmath`

A large piece of code is deferred until `\begin{document}`:

```

860 \AtBeginDocument{%

```

In case `amsmath` is loaded, too, we make sure that the appropriate definition of the macro `\Relbar` is used; we also must make sure that things like `\mathrm{\hat{A}}` don't come out as garbage.

```

861 \ifpackageloaded{amsmath}{%
862   \let\Relbar\undefined
863   \DeclareMathSymbol{\Relbar}{\mathrel}{symbols}{"48}
864   \def\accentclass@{0}

```

The appropriate definitions of the big operators depend on whether or not `amsmath` is to be used:

```

865 \def\iint{\DOTSI\iintop\ilimits@}
866 \def\iiint{\DOTSI\iiintop\ilimits@}
867 \def\oiint{\DOTSI\oiintop\ilimits@}
868 \def\oiiint{\DOTSI\oiiintop\ilimits@}
869 \def\cwoint{\DOTSI\cwointop\ilimits@}
870 \def\awoint{\DOTSI\awointop\ilimits@}
871 \def\cwint{\DOTSI\cwintop\ilimits@}
872 \def\barint{\DOTSI\barintop\ilimits@}
873 \def\slashint{\DOTSI\slashintop\ilimits@}
874 \gdef\slsum{\DOTSB\slsumop\slimits@}
875 \gdef\slprod{\DOTSB\slprodop\slimits@}
876 \gdef\slcoprod{\DOTSB\slcoprodop\slimits@}
877 \gdef\upsum{\DOTSB\upsumop\slimits@}

```

```

878 \gdef\upprod{\DOTSB\upprodop\slimits@}
879 \gdef\upcoprod{\DOTSB\upcoprodop\slimits@}
880 }{%

```

Here come the definitions to be used without amsmath:

```

881 \def\iint{\iintop\nolimits}
882 \def\iiint{\iiintop\nolimits}
883 \def\oiint{\oiintop\nolimits}
884 \def\oiint{\oiintop\nolimits}
885 \def\cwoint{\cwointop\nolimits}
886 \def\awoint{\awointop\nolimits}
887 \def\cwint{\cwintop\nolimits}
888 \def\barint{\barintop\nolimits}
889 \def\slashint{\slashintop\nolimits}
890 \let\slsum\slsumop\let\slprod\slprodop\let\slcoprod\slcoprodop
891 \let\upsum\upsumop\let\upprod\upprodop\let\upcoprod\upcoprodop
892 }%

```

Finally, set up the definitions of `\sum`, `\prod` and `\coprod` according to the package options:

```

893 \ifmtp@slops
894 \let\sum\slsum\let\prod\slprod\let\coprod\slcoprod
895 \else
896 \let\sum\upsum\let\prod\upprod\let\coprod\upcoprod
897 \fi

```

`\dddot` and `\ddddot`, too, are defined only now with respect to amsmath:

```

898 \let\dddot@undefined\let\ddddot@undefined
899 \DeclareMathAccent{\dddot}{\mathord}{\symbols}{171}
900 \DeclareMathAccent{\ddddot}{\mathord}{\symbols}{172}
901 }

```

6.5 Large delimiters, accents and roots

The below code has been adopted from M. Spivak's plain \TeX packages `mtp.tex` and `mtp2.tex`

The macros for dealing with the multiple extension fonts. They assume that `\MTEXA@`, `\MTEXE@`, `\MTEXF@`, and `\MTEXG@` can be used to refer to the four extension fonts that have been loaded.

```

902 \newbox\prePbox@
903 \newbox\Pbox@
904 \newif\ifPEX@
905 \def\PEX@#1{\setbox\Pbox@\vbox{$$$left.\vcenter{\copy\prePbox@}\right)$$$}%
906 \setbox\Pbox@\vbox{\unvbox\Pbox@\unskip\unpenalty
907 \setbox\Pbox@\lastbox
908 \setbox\Pbox@\hbox{\unhbox\Pbox@\setbox\Pbox@\lastbox
909 \setbox\Pbox@\hbox{\unhbox\Pbox@\setbox\Pbox@\lastbox
910 \setbox\z@\hbox{#1}}%
911 \ifdim\dp\Pbox@>\dp\z@\global\PEX@true\else
912 \global\PEX@false\fi}}
913 \def\EXTtest#1{\setbox\prePbox@\hbox{$\displaystyle{#1}$}%

```



```

963 \ifspecdelim@
964 \LEFTRIGHT@.#2{\vphantom{\vc@nt@r{#3}}}%
965 \else
966 \left.%
967 \vphantom{\vc@nt@r{#3}}%
968 \right#2%
969 \fi}
970 \def\vcorrection#1{\vrule width\z@ height#1\relax}
971 \newcommand{\ccases}[1]{\{%
972 \def\arraystretch{1.2}%
973 \LEFTRIGHT\lcbbrace.{\,\,\array{@{}l@{\quad}l@{}}#1\endarray}%
974 }}

```

Notice the horizontal space which is added after the brace!

Wide ‘hat’ accents:

```

975 \newbox\HATbox@
976 \def\widehat{\mathpalette\@widehat}
977 \def\@widehat#1#2{\setbox\HATbox@\hbox{${#1}{#2}$}}%
978 \setbox0\hbox{\MTEXF@;}%
979 \ifdim\wd\HATbox@>\wd0
980 \def\HAT@{\textfont3=\MTEXG@}%
981 \else
982 \setbox0\hbox{\MTEXE@9}%
983 \ifdim\wd\HATbox@>\wd0
984 \def\HAT@{\textfont3=\MTEXF@}%
985 \else
986 \setbox0\hbox{\MTEXA@ d}%
987 \ifdim\wd\HATbox@>\wd0
988 \def\HAT@{\textfont3=\MTEXE@}%
989 \else
990 \def\HAT@{\textfont3=\MTEXA@}%
991 \fi
992 \fi
993 \fi
994 \hbox{\HAT@$\mathaccent"0362 {#1}{#2}$}}%

```

Wide tilde accents:

```

995 \newbox\TDbox@
996 \def\widetilde{\mathpalette\@widetilde}
997 \def\@widetilde#1#2{\setbox\TDbox@\hbox{${#1}{#2}$}}%
998 \setbox0\hbox{\MTEXF@ K}%
999 \ifdim\wd\TDbox@>\wd0
1000 \def\TD@{\textfont3=\MTEXG@}%
1001 \else
1002 \setbox0\hbox{\MTEXE@ I}%
1003 \ifdim\wd\TDbox@>\wd0
1004 \def\TD@{\textfont3=\MTEXF@}%
1005 \else
1006 \setbox0\hbox{\MTEXA@ d}%
1007 \ifdim\wd\TDbox@>\wd0
1008 \def\TD@{\textfont3=\MTEXE@}%
1009 \else
1010 \def\TD@{\textfont3=\MTEXA@}%

```



```

1011 \fi
1012 \fi
1013 \fi
1014 \hbox{\TD@$\mathaccent"0365 {#1{#2}}$}}

```

Wide ‘check’ accents:

```

1015 \newbox\CHbox@
1016 \def\widecheck{\mathpalette\@widecheck}
1017 \def\@widecheck#1#2{\setbox\CHbox@\hbox{$#1{#2}$}}%
1018 \setbox0\hbox{\MTEXF@}%
1019 \ifdim\wd\CHbox@>\wd0
1020 \def\CHECK@{\textfont3=\MTEXG@}%
1021 \else
1022 \setbox0\hbox{\MTEXE@ Y}%
1023 \ifdim\wd\CHbox@>\wd0
1024 \def\CHECK@{\textfont3=\MTEXF@}%
1025 \else
1026 \setbox0\hbox{\MTEXA@ z}%
1027 \ifdim\wd\CHbox@>\wd0
1028 \def\CHECK@{\textfont3=\MTEXE@}%
1029 \else
1030 \def\CHECK@{\textfont3=\MTEXA@}%
1031 \fi
1032 \fi
1033 \fi
1034 \hbox{\CHECK@$\mathaccent"037A {#1{#2}}$}}%

```

Lowered hat accents:

```

1035 \def\widehatdown#1#2{\setbox\HATbox@\hbox{$\displaystyle{#2}$}}%
1036 \setbox\z@\hbox{\MTEXF@;}%
1037 \ifdim\wd\HATbox@>\wd\z@
1038 \def\HAT@{\textfont3=\MTEXG@}%
1039 \else
1040 \setbox\z@\hbox{\MTEXE@9}%
1041 \ifdim\wd\HATbox@>\wd\z@
1042 \def\HAT@{\textfont3=\MTEXF@}%
1043 \else
1044 \setbox\z@\hbox{\MTEXA@ d}%
1045 \ifdim\wd\HATbox@>\wd\z@
1046 \def\HAT@{\textfont3=\MTEXE@}%
1047 \else
1048 \def\HAT@{\textfont3=\MTEXA@}%
1049 \fi
1050 \fi
1051 \fi
1052 \dimen@ \ht\HATbox@ \advance\dimen@ -#1\relax
1053 \ht\HATbox@ \dimen@
1054 \hbox{\HAT@$\mathaccent"0362 {\box\HATbox@}$}}%

```

Lowered tilde accent:

```

1055 \def\widetildedown#1#2{\setbox\TDbox@\hbox{$\displaystyle{#2}$}}%
1056 \setbox\z@\hbox{\MTEXF@ K}%
1057 \ifdim\wd\TDbox@>\wd\z@

```

```

1058 \def\TD@{\textfont3=\MTEXG@}%
1059 \else
1060 \setbox\z@\hbox{\MTEXE@ I}%
1061 \ifdim\wd\TDbox@>\wd\z@
1062 \def\TD@{\textfont3=\MTEXF@}%
1063 \else
1064 \setbox\z@\hbox{\MTEXA@ d}%
1065 \ifdim\wd\TDbox@>\wd\z@
1066 \def\TD@{\textfont3=\MTEXE@}%
1067 \else
1068 \def\TD@{\textfont3=\MTEXA@}%
1069 \fi
1070 \fi
1071 \fi
1072 \dimen@ \ht\TDbox@ \advance \dimen@ -#1 \relax
1073 \ht\TDbox@ \dimen@
1074 \hbox{\TD@ $\mathaccent"0365 {\box\TDbox@}$}}

```

Lowered check accent:

```

1075 \def\widecheckdown#1#2{\setbox\CHbox@\hbox{$\displaystyle{#2}$}%
1076 \setbox\z@\hbox{\MTEXF@[]}%
1077 \ifdim\wd\CHbox@>\wd\z@
1078 \def\CHECK@{\textfont3=\MTEXG@}%
1079 \else
1080 \setbox\z@\hbox{\MTEXE@ Y}%
1081 \ifdim\wd\CHbox@>\wd\z@
1082 \def\CHECK@{\textfont3=\MTEXF@}%
1083 \else
1084 \setbox\z@\hbox{\MTEXA@ z}%
1085 \ifdim\wd\CHbox@>\wd\z@
1086 \def\CHECK@{\textfont3=\MTEXE@}%
1087 \else
1088 \def\CHECK@{\textfont3=\MTEXA@}%
1089 \fi
1090 \fi
1091 \fi
1092 \dimen@ \ht\CHbox@ \advance \dimen@ -#1 \relax
1093 \ht\CHbox@ \dimen@
1094 \hbox{\CHECK@ $\mathaccent"037A {\box\CHbox@}$}}%

```

Large roots: The command `\SQRT` from the plain $\text{T}_{\text{E}}\text{X}$ package `mtp.tex` is named `\SQR@@T` here.

```

1095 \newbox\preSbox@
1096 \newbox\Sbox@
1097 \newif\ifSQEX@
1098 \def\SQEX@#1{\setbox\Sbox@\vbox{$$\radical"270370{\copy\preSbox@}$}$}%
1099 \setbox\Sbox@\vbox{\unvbox\Sbox@\unskip\unpenalty
1100 \setbox\Sbox@\lastbox\setbox\Sbox@\hbox{\unhbox\Sbox@\setbox\Sbox@\lastbox
1101 \setbox\Sbox@\hbox{\unhbox\Sbox@\setbox\Sbox@\lastbox\setbox\Sbox@\lastbox
1102 \setbox0\hbox{#1}}}%
1103 \ifdim\dp\Sbox@>\dp0\global\SQEX@true\else
1104 \global\SQEX@false\fi}}

```

```

1105 \newcount\SQcount@
1106 \def\SQtest@#1{\setbox\preSbox@\hbox{$\displaystyle{#1}$}%
1107 \SQEX@\MTEXA@ s}%
1108 \ifSQEX@
1109 {\textfont3=\MTEXE@\SQEX@\MTEXE@ u}}%
1110 \ifSQEX@
1111 {\textfont3=\MTEXF@\SQEX@\MTEXF@ u}}%
1112 \ifSQEX@
1113 \def\SQtest@@{\textfont3=\MTEXG@}\global\SQcount@3
1114 \else
1115 \def\SQtest@@{\textfont3=\MTEXF@}\global\SQcount@2
1116 \fi
1117 \else
1118 \def\SQtest@@{\textfont3=\MTEXE@}\global\SQcount@1
1119 \fi
1120 \else
1121 \def\SQtest@@{\textfont3=\MTEXA@}\global\SQcount@0
1122 \fi}
1123 \newbox\SQRTbox@
1124 \def\SQR@@T#1{\setbox\SQRTbox@\hbox{$\displaystyle{#1}$}%
1125 \SQtest@{#1}%
1126 \hbox{\SQtest@@$\displaystyle\radical"270370{\box\SQRTbox@}$}}

```

The names of the counters `\leftroot@` and `\uproot@` and the related commands `\leftroot` and `\uproot` had to be changed to uppercase, so as not to clash with the `amsmath` package. The syntax differs from `amsmath`, anyway.

```

1127 \newcount\UPROOT@
1128 \newcount\LEFTRoot@
1129 \def\LEFTRoot#1{\relax
1130   \ifmmode\LEFTRoot@#1\relax
1131   \else\PackageError{mtpro2}
1132     {\protect\LEFTRoot@space allowed only in math mode}
1133     {Type <return> to proceed; the command will be ignored.}
1134   \fi}
1135 \def\UPROOT#1{\relax
1136   \ifmmode\UPROOT@#1\relax
1137   \else\PackageError{mtpro2}
1138     {\protect\UPROOT@space allowed only in math mode}
1139     {Type <return> to proceed; the command will be ignored.}
1140   \fi}
1141 \def\ROOT#1\OF#2{\setbox\rootbox\hbox{$\m@th\scriptscriptstyle{#1}$}%
1142 \mathpalette\R@@T{#2}}
1143 \def\R@@T#1#2{\setbox\z@\hbox{$\UPROOT@\z@\LEFTRoot@\z@\m@th#1\SQR@@T{#2}$}%
1144 \dimen@ht\z@\advance\dimen@-\dp\z@
1145 \dimen@ii\dimen@
1146 \setbox\tw@\hbox{$\m@th#1\mskip\UPROOT@ mu$}\advance\dimen@ii by1.667\wd\tw@
1147 \setbox\tw@\hbox{$\m@th#1\mskip10mu$}%
1148 \ifcase\SQcount@\advance\dimen@3\wd\tw@\or\advance\dimen@1.5\wd\tw@\or
1149 \advance\dimen@\wd\tw@\fi
1150 \mkern1mu\kern.13\dimen@\mkern-\LEFTRoot@ mu
1151 \raise.5\dimen@ii\copy\rootbox % was .44
1152 \mkern-1mu\kern-.13\dimen@\mkern\LEFTRoot@ mu\box\z@\kern-\wd\rootbox

```

```
1153 \LEFTRROOT\z@\UPROOT\z@}
```

Finally the roots are given a more L^AT_EX-like syntax, so that one can say, e.g.,
`\SQRT[3]{...}` instead of `\ROOT 3 \OF ...`.

```
1154 \DeclareRobustCommand\SQRT{\@ifnextchar[\SQRT@\SQR@@T}
```

```
1155 \def\SQRT@[#1]{\ROOT #1\OF}
```

6.6 Extra-large operators

From Mike Spivak, 2006-01-26.

The following tool will be used in several places:

```
1156 \def\space@.{\futurelet\space@\relax}
```

```
1157 \space@. %
```

There must be a blank after the period, not a newline!

`\FNSS@` is a `\futurelet\next` skipping spaces; corresponds to something or other in L^AT_EX. (MS)

```
1158 \def\FNSS@#1{\let\FNSS@@#1\futurelet\next\FNSS@@@}
```

```
1159 \def\FNSS@@@{\ifx\next\space@\def\FNSS@@@. {\futurelet\next\FNSS@@@}\else
```

```
1160 \def\FNSS@@@. {\FNSS@@}\fi\FNSS@@@.}
```

```
1161 %
```

```
1162 {\catcode'\_ =12
```

```
1163 \global\let\sbxii=_}
```

```
1164 {\catcode'\_ =8
```

```
1165 \global\let\sbviii=_}
```

```
1166 %
```

```
1167 \newcount\limtype@
```

0 when `\limits` is used, 1 when `\nolimits` is used.

```
1168 \newcount\xlfont@
```

0 if using `mt2xl`, 1 if using `mt2xxx1`.

```
1169 \newcount\xlposition@
```

Position of character (or first half of character) on `mt2xl` or `mt2xxx1`.

```
1170 \newcount\xlposition@ii
```

If non-zero, position of other half of character.

```
1171 \newcount\optype@
```

0 for operators needing no italic correction, 1 for others.

```
1172 \newcount\x@count
```

0 for `\XL`, 1 for `\XXL`, 2 for `\XXXL`, 3 for `\xl`; used for calculating positioning of limits for operators needing italic correction. The definition of `\xl` is typical of all, except that `\xlposition@ii` is never needed for this size (or for `\XL` size).

```
1173 \def\xl{\xlposition@ii\z@\xlfont@\z@\x@count\thr@@\futurelet\next\xl@}
```

```
1174 \def\xl@{%
```

First come operators needing no italic correction.

```
1175 \optype@\z@
```

```

176 \limtype@\z@
177 \ifx\next\bigo\dot\xlposition@96\else
178 \ifx\next\bigo\plus\xlposition@97\else
179 \ifx\next\bigo\times\xlposition@98\else
180 \ifx\next\bigo\sqcup\xlposition@99\else
181 \ifx\next\bigo\cup\xlposition@100\else
182 \ifx\next\bigo\cap\xlposition@101\else
183 \ifx\next\bigo\uplus\xlposition@102\else
184 \ifx\next\bigo\wedge\xlposition@103\else
185 \ifx\next\bigo\vee\xlposition@104\else
186 \ifx\next\upsum\xlposition@105\else
187 \ifx\next\upprod\xlposition@106\else
188 \ifx\next\upcoprod\xlposition@107\else
189 \ifx\next\bigo\cupprod\xlposition@110\else
190 \ifx\next\bigo\capprod\xlposition@111\else
191 \ifx\next\bigo\varland\xlposition@122\else
192 \ifx\next\bigo\ast\xlposition@123\else

```

```

1193 \ifx\next\slsum\optype@ \@ne\xlposition@119\else
1194 \ifx\next\slprod\optype@ \@ne\xlposition@120\else
1195 \ifx\next\slcoprod\optype@ \@ne\xlposition@121\else

```

```

1196 \ifx\next\int\limtype@\@ne\optype@\@ne\xlposition@108\else
1197 \ifx\next\oint\limtype@\@ne\optype@\@ne\xlposition@109\else
1198 \ifx\next\cwoint\limtype@\@ne\optype@\@ne\xlposition@112\else
1199 \ifx\next\awoint\limtype@\@ne\optype@\@ne\xlposition@113\else
1200 \ifx\next\cwint\limtype@\@ne\optype@\@ne\xlposition@114\else
1201 \ifx\next\iint\limtype@\@ne\optype@\@ne\xlposition@115\else
1202 \ifx\next\iiint\limtype@\@ne\optype@\@ne\xlposition@116\else
1203 \ifx\next\oiint\limtype@\@ne\optype@\@ne\xlposition@117\else
1204 \ifx\next\oiint\limtype@\@ne\optype@\@ne\xlposition@118\else
1205 \ifx\next\barint\limtype@\@ne\optype@\@ne\xlposition@124\else
1206 \ifx\next\slashint\limtype@\@ne\optype@\@ne\xlposition@125\else
1207 \PackageError{mtpro2}%

```

Swallows the token after \x1:

53

```

1221 \def\next@##1{\getxlowerlim@}%
1222 \else\ifcat\sbviii@\noexpand\next
1223 \def\next@##1{\getxlowerlim@}%
1224 \else\ifcat^\noexpand\next
1225 \def\next@##1{\getxupperlim@}%
1226 \else
1227 \let\next@\uselims@

\uselims@ is what we will always do after getting the limits.

1228 \fi\fi\fi\fi\fi\fi
1229 \next@}
1230 \def\getxlowerlim@#1{\def\lowerlim@{#1}\FNSS@\getxupperlim@@}
1231 \def\getxupperlim@#1{\def\upperlim@{#1}\FNSS@\getxlowerlim@@}
1232 \def\getxupperlim@@{%
1233 \ifcat^\noexpand\next
1234 \def\next@##1##2{\def\upperlim@{##2}\uselims@}%
1235 \else
1236 \let\next@\uselims@ % have limits now
1237 \fi
1238 \next@}
1239 \def\getxlowerlim@@{%
1240 \ifx\next\sbxii@
1241 \def\next@##1##2{\def\lowerlim@{##2}\uselims@}%
1242 \else\ifx\next\sbviii@
1243 \def\next@##1##2{\def\lowerlim@{##2}\uselims@}%
1244 \else\ifcat\sbviii@\noexpand\next
1245 \def\next@##1##2{\def\lowerlim@{##2}\uselims@}%
1246 \else
1247 \let\next@\uselims@ % have limits now
1248 \fi\fi\fi\fi
1249 \next@}
1250 %
1251 \def\uselims@{\ifnum\optype@=\z@\xlargeop@\else\xlargeopic@\fi}
1252 %
1253 \def\xlargeop@{%
1254 \ifnum\limtype@=\z@
1255 \mathop{\hbox{$\vcenter{\hbox{%
1256 \ifnum\xlfont@=\z@\MTXL@\else\MTXXXL@\fi
1257 \char\xlposition@\relax
1258 \ifnum\xlposition@ii=\z@\else\char\xlposition@ii\relax\fi
1259 }}$}}_{\lowerlim@}^{\upperlim@}%
1260 \else
1261 \mathop{\hbox{$\vcenter{\hbox{%
1262 \ifnum\xlfont@=\z@\MTXL@\else\MTXXXL@\fi
1263 \char\xlposition@\relax
1264 \ifnum\xlposition@ii=\z@\else\char\xlposition@ii\relax\fi
1265 }}$}}}\nolimits_{\lowerlim@}^{\upperlim@}%
1266 \fi}

```

The definition of `\xlargeopic@` is complicated when there are limits, and the calculation uses `\maxXLscripts@`, which will store the maximum of the widths of the sub and superscripts. There is the additional complication that the amount to adjust the superscript differs for `\XL` and `\XXL`, and the adjustment is made in

terms of an extra `\fontdimen` in the `mtxxl` font, which measures the horizontal distance between the lowest and highest points of the integral sign (for the `\XXL` versions these are exactly twice the `\XL` versions). Fortunately, none of the characters needing `\xlargeopic@` need to be broken into two halves, so we don't have to worry about `\xlposition@ii`.

```

1267 \newdimen\maxXLscripts@
1268 %
1269 \def\xlargeopic@{%
1270 \def\thecharacter@{\ifnum\xlfont@=\z@\MTXL@\else\MTXXXL@\fi\char\xlposition@\relax}%
1271 \ifnum\limtype@=\@ne
1272 \setbox\z@\hbox{\thecharacter@/\}%
1273 \dimen@\wd\z@
1274 \setbox\z@\hbox{\thecharacter@}%
1275 \advance\dimen@-\wd\z@
1276 \mathop{\hbox{$\vcenter{\hbox{\thecharacter@}}$}}
1277 \nolimits_{\lowerlim@}^{\kern\dimen@\upperlim@}%
1278 \else
1279 \setbox\z@\hbox{\ifcase\x@count\kern\tw@\fontdimen8\MTXL@\or
1280 \kern4\fontdimen8\MTXL@\or\kern\tw@\fontdimen8\MTXXXL@\or\kern1.7\fontdimen8\MTXL@\fi}%
1281 \setbox\@ne\hbox{\thecharacter@}%
1282 \setbox\tw@\hbox{$\scriptstyle{\lowerlim@}$}%
1283 \setbox\thr@@\hbox{$\kern\wd\z@\scriptstyle{\upperlim@}$}%
1284 \maxXLscripts@\wd\thr@@\ifdim\maxXLscripts@<\wd\tw@\maxXLscripts@\wd\tw@\fi
1285 \dimen@ii.5\wd\tw@ \advance\dimen@ii-.5\wd\@ne
1286 \dimen@.5\wd\thr@@ \advance\dimen@-\wd\z@ \advance\dimen@-.5\wd\@ne
1287 \ifdim\dimen@>\z@ % if visible part of superscript extends to left of operator
1288 \ifdim\dimen@>\dimen@ii % if visible part of superscript to left of subscript
1289 % kern by - [1/2(\maxXLscripts@ - wd1) - \dimen@]
1290 \kern\dimen@\kern.5\wd\@ne\kern-.5\maxXLscripts@
1291 \else % only trim to subscript,
1292 % kern - [1/2(\maxXLscripts@ - wd1) - \dimen@ii]
1293 \kern\dimen@ii\kern.5\wd\@ne\kern-.5\maxXLscripts@
1294 \fi
1295 \else % visible part of superscript entirely to right of operator, so trim to subscript
1296 \ifdim\dimen@ii > \z@
1297 \kern\dimen@ii\kern.5\wd\@ne\kern-.5\maxXLscripts@
1298 \else
1299 \kern.5\wd\@ne\kern-.5\maxXLscripts@
1300 \fi
1301 \fi
1302 \setbox\@ne\hbox{\thecharacter@/\}\dimen@ii\wd\@ne
1303 \setbox\@ne\hbox{\thecharacter@}\advance\dimen@ii-\wd\@ne
1304 \mathop{\hbox{$\vcenter{\hbox{\thecharacter@}}$}}_{\lowerlim@}^{\kern\wd\z@\upperlim@}%
1305 \kern\dimen@ii

```

```

1306 \fi
1307 }

Other sizes almost completely analogous

1308 \def\XL{\xlposition@ii\z@\xcount\z@\futurelet\next\XL@}
1309 \def\XL@{\oatype@\z@\limtype@\z@
1310 \ifx\next\bigodot\xlposition@0\else
1311 \ifx\next\bigoplus\xlposition@1\else
1312 \ifx\next\bigotimes\xlposition@2\else
1313 \ifx\next\bigsqcup\xlposition@3\else
1314 \ifx\next\bigcup\xlposition@4\else
1315 \ifx\next\bigcap\xlposition@5\else
1316 \ifx\next\biguplus\xlposition@6\else
1317 \ifx\next\bigwedge\xlposition@7\else
1318 \ifx\next\bigvee\xlposition@8\else
1319 \ifx\next\upsum\xlposition@9\else
1320 \ifx\next\upprod\xlposition@10\else
1321 \ifx\next\upcoprod\xlposition@11\else
1322 \ifx\next\bigcupprod\xlposition@14\else
1323 \ifx\next\bigcapprod\xlposition@15\else
1324 \ifx\next\bigvarland\xlposition@26\else
1325 \ifx\next\bigast\xlposition@27\else
1326 \ifx\next\slsum\oatype@\@ne\xlposition@23\else
1327 \ifx\next\slprod\oatype@\@ne\xlposition@24\else
1328 \ifx\next\slcoprod\oatype@\@ne\xlposition@25\else
1329 \ifx\next\int\limtype@\@ne\oatype@\@ne\xlposition@12\else
1330 \ifx\next\oint\limtype@\@ne\oatype@\@ne\xlposition@13\else
1331 \ifx\next\coint\limtype@\@ne\oatype@\@ne\xlposition@16\else
1332 \ifx\next\awoint\limtype@\@ne\oatype@\@ne\xlposition@17\else
1333 \ifx\next\cwint\limtype@\@ne\oatype@\@ne\xlposition@18\else
1334 \ifx\next\iint\limtype@\@ne\oatype@\@ne\xlposition@19\else
1335 \ifx\next\iiint\limtype@\@ne\oatype@\@ne\xlposition@20\else
1336 \ifx\next\oiint\limtype@\@ne\oatype@\@ne\xlposition@21\else
1337 \ifx\next\oiint\limtype@\@ne\oatype@\@ne\xlposition@22\else
1338 \ifx\next\barint\limtype@\@ne\oatype@\@ne\xlposition@28\else
1339 \ifx\next\slashint\limtype@\@ne\oatype@\@ne\xlposition@29\else
1340 \PackageError{mtpro2}%
1341   {Invalid use of \protect\XL}%
1342   {\protect\XL\space can be applied to ‘large operators’ only.}%
1343 \fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi
1344 \fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi
1345 \def\next@##1{\futurelet\next\getxlimits}\next@}
1346 %
1347 \def\XXL{\xlposition@ii\z@\xcount\@ne\futurelet\next\XXL@}
1348 \def\XXL@{\oatype@\z@\limtype@\z@
1349 \ifx\next\bigodot\xlposition@48\else
1350 \ifx\next\bigoplus\xlposition@49\else
1351 \ifx\next\bigotimes\xlposition@50\else
1352 \ifx\next\bigsqcup\xlposition@51\else
1353 \ifx\next\bigcup\xlposition@52\else
1354 \ifx\next\bigcap\xlposition@53\else
1355 \ifx\next\biguplus\xlposition@54\else

```


[illegible]

```

1408 \ifx\next\cwoint\limtype@\@ne\optype@\@ne\xlposition@18\else
1409 \ifx\next\awoint\limtype@\@ne\optype@\@ne\xlposition@19\else
1410 \ifx\next\cwint\limtype@\@ne\optype@\@ne\xlposition@20\else
1411 \ifx\next\iint\limtype@\@ne\optype@\@ne\xlposition@21\else
1412 \ifx\next\iiint\limtype@\@ne\optype@\@ne\xlposition@22\else
1413 \ifx\next\oiint\limtype@\@ne\optype@\@ne\xlposition@23\else
1414 \ifx\next\oiint\limtype@\@ne\optype@\@ne\xlposition@24\else
1415 \ifx\next\barint\limtype@\@ne\optype@\@ne\xlposition@31\else
1416 \ifx\next\slashint\limtype@\@ne\optype@\@ne\xlposition@32\else
1417 \def\next@{\PackageError{mtp2}}%
1418   {\Invalid use of \protect\XXXL}%
1419   {\protect\XXXL\space can be applied to ‘large operators’ only.}}%
1420 \fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi
1421 \fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi
1422 \def\next@##1{\futurelet\next\getxlimits@}\next@}

```

6.7 Large over- and underbraces

The below code stems from from M. Spivak’s plain \TeX package `mtp2.tex` as of 2006-02-07:

```

1423 \def\underbrace#1{\setbox\z@\hbox{$\displaystyle#1$}%
1424   \dimen@ \tMTPsize\relax
1425   \expandafter\getpoints@\the\dimen@\getpoints@
1426   \dimen@\wd\z@
1427   \divide\dimen@\pointcount@
1428   \expandafter\getpoints@\the\dimen@\getpoints@
1429   \ifnum\pointcount@<4
1430     \ifdim\wd\z@<12pt
1431       \def\thebrace@{\hbox{\MTEXE@\char144}}%
1432     \else\ifdim\wd\z@<15pt
1433       \def\thebrace@{\hbox{\MTEXE@\char145}}%
1434     \else\ifdim\wd\z@<18pt
1435       \def\thebrace@{\hbox{\MTEXE@\char146}}%
1436     \else\ifdim\wd\z@<21pt
1437       \def\thebrace@{\hbox{\MTEXE@\char147}}%
1438     \else\ifdim\wd\z@<24pt
1439       \def\thebrace@{\hbox{\MTEXE@\char148}}%
1440     \else\ifdim\wd\z@<27pt
1441       \def\thebrace@{\hbox{\MTEXE@\char149}}%
1442     \else\ifdim\wd\z@<30pt
1443       \def\thebrace@{\hbox{\MTEXE@\char150}}%
1444     \else\ifdim\wd\z@<33pt
1445       \def\thebrace@{\hbox{\MTEXE@\char151}}%
1446     \else
1447       \def\thebrace@{\hbox{\MTEXE@\char152}}%
1448     \fi\fi\fi\fi\fi\fi\fi\fi
1449   \else
1450     \ifnum\pointcount@<12
1451       \advance\pointcount@149
1452     \def\thebrace@{\hbox{\MTEXE@\char\pointcount@}}%
1453   \else

```

```

1454 \ifnum\pointcount@<24
1455 \advance\pointcount@132
1456 \def\thebrace@{\hbox{\MTEXF@\char\pointcount@}}%
1457 \else
1458 \advance\pointcount@120
1459 \ifnum\pointcount@>149 \pointcount@149 \fi
1460 \def\thebrace@{\hbox{\MTEGX@\char\pointcount@}}%
1461 \fi
1462 \fi
1463 \fi
1464 \mathop{\vtop{\ialign{\hfil##\hfil\cr$\displaystyle#1$\cr\cr\noalign
1465 {\vskip3pt\nointerlineskip}\thebrace@\cr\noalign{\kern3pt}}}}\limits}%
1466 \def\overcbrace#1{\setbox\z@\hbox{$\displaystyle#1$}%
1467 \dimen@ \tMTPsize\relax
1468 \expandafter\getpoints@\the\dimen@\getpoints@
1469 \dimen@ \wd\z@
1470 \divide\dimen@\pointcount@
1471 \expandafter\getpoints@\the\dimen@\getpoints@
1472 \ifnum\pointcount@<4
1473 \ifdim\wd\z@<12pt
1474 \def\thebrace@{\hbox{\MTEXE@\char176}}%
1475 \else\ifdim\wd\z@<15pt
1476 \def\thebrace@{\hbox{\MTEXE@\char177}}%
1477 \else\ifdim\wd\z@<18pt
1478 \def\thebrace@{\hbox{\MTEXE@\char178}}%
1479 \else\ifdim\wd\z@<21pt
1480 \def\thebrace@{\hbox{\MTEXE@\char179}}%
1481 \else\ifdim\wd\z@<24pt
1482 \def\thebrace@{\hbox{\MTEXE@\char180}}%
1483 \else\ifdim\wd\z@<27pt
1484 \def\thebrace@{\hbox{\MTEXE@\char181}}%
1485 \else\ifdim\wd\z@<30pt
1486 \def\thebrace@{\hbox{\MTEXE@\char182}}%
1487 \else\ifdim\wd\z@<33pt
1488 \def\thebrace@{\hbox{\MTEXE@\char183}}%
1489 \else
1490 \def\thebrace@{\hbox{\MTEXE@\char184}}%
1491 \fi\fi\fi\fi\fi\fi\fi\fi\fi
1492 \else
1493 \ifnum\pointcount@<12
1494 \advance\pointcount@181
1495 \def\thebrace@{\hbox{\MTEXE@\char\pointcount@}}%
1496 \else
1497 \ifnum\pointcount@<24
1498 \advance\pointcount@148
1499 \def\thebrace@{\hbox{\MTEXF@\char\pointcount@}}%
1500 \else
1501 \advance\pointcount@136
1502 \ifnum\pointcount@>165 \pointcount@165 \fi
1503 \def\thebrace@{\hbox{\MTEGX@\char\pointcount@}}%
1504 \fi
1505 \fi

```

```

1506 \fi
1507 \mathop{\vbox{\ialign{\hfil##\hfil\cr\noalign{\kern3\p@\thebrace@crcr
1508 \noalign{\kern3\p@\nointerlineskip}$\displaystyle#1$\crrc}}}\limits}%

```

6.8 AMS symbols support

Support for AMS symbols is provided only if the full font set is available, and if it has not been disabled explicitly:

```
1509 \ifmt@ams
```

First, set up the related symbol font:

```

1510 \DeclareSymbolFont{AMSA}{U}{mt2sya}{m}{n}
1511 \SetSymbolFont{AMSA}{bold}{U}{mt2sya}{b}{n}
1512 \SetSymbolFont{AMSA}{heavy}{U}{mt2sya}{eb}{n}

```

Macros that are declared as warnings in basic L^AT_EX must be ‘deleted’, before we can re-declare them as math symbols:

```

1513 \global\let\squsubset\undefined
1514 \global\let\squsupset\undefined
1515 \global\let\mho\undefined
1516 \global\let\Diamond\undefined
1517 \global\let\leadsto\undefined

```

Now declare the actual symbols. Symbols that are already defined in the basic *MathTimeProfessional* fonts are commented out. We start with those symbols that come ‘normally’ from the AMS ‘A’ font.

Three symbols can be used both in text and math mode: we adopt their definitions from amssymb:

```

1518 \@ifundefined{checkmark}{%
1519 \edef\checkmark{\noexpand\mathhexbox{\hexnumber@\symAMSA}58}
1520 }{}
1521 \@ifundefined{circledR}{%
1522 \edef\circledR{\noexpand\mathhexbox{\hexnumber@\symAMSA}72}
1523 }{}
1524 \@ifundefined{maltese}{%
1525 \edef\maltese{\noexpand\mathhexbox{\hexnumber@\symAMSA}7A}
1526 }{}
1527 \@ifundefined{yen}{%
1528 \edef\yen{\noexpand\mathhexbox{\hexnumber@\symAMSA}55}
1529 }{}

```

The remaining symbols can be used only in math mode:

```

1530 \DeclareMathDelimiter{\ulcorner}{\mathopen}{AMSA}{"70}{AMSA}{"70}
1531 \DeclareMathDelimiter{\urcorner}{\mathclose}{AMSA}{"71}{AMSA}{"71}
1532 \DeclareMathDelimiter{\llcorner}{\mathopen}{AMSA}{"78}{AMSA}{"78}
1533 \DeclareMathDelimiter{\lrcorner}{\mathclose}{AMSA}{"79}{AMSA}{"79}
1534 \DeclareMathSymbol{\dashleftarrow}{\mathrel}{AMSA}{219}
1535 \DeclareMathSymbol{\dashrightarrow}{\mathrel}{AMSA}{220}
1536 \global\let\dasharrow\dashrightarrow
1537 \DeclareMathSymbol{\Diamond}{\mathbin}{AMSA}{DE}
1538 \DeclareMathSymbol{\leadsto}{\mathbin}{AMSA}{DD}
1539 \DeclareMathSymbol{\boxdot}{\mathbin}{AMSA}{00}

```

```

1540 \DeclareMathSymbol{\boxplus}      {\mathbin}{AMSa}{"01}
1541 \DeclareMathSymbol{\boxtimes}     {\mathbin}{AMSa}{"02}
1542 \DeclareMathSymbol{\square}       {\mathord}{AMSa}{"03}
1543 \DeclareMathSymbol{\blacksquare}  {\mathord}{AMSa}{"04}
1544 \DeclareMathSymbol{\centerdot}    {\mathbin}{AMSa}{"05}
1545 \DeclareMathSymbol{\lozenge}      {\mathord}{AMSa}{"06}
1546 \DeclareMathSymbol{\blacklozenge}{\mathord}{AMSa}{"07}
1547 \DeclareMathSymbol{\circlearrowright}{\mathrel}{AMSa}{"08}
1548 \DeclareMathSymbol{\circlearrowleft}{\mathrel}{AMSa}{"09}
1549 %\DeclareMathSymbol{\rightleftharpoons}{\mathrel}{AMSa}{"0A}
1550 \DeclareMathSymbol{\leftrightharpoons}{\mathrel}{AMSa}{"0B}
1551 \DeclareMathSymbol{\boxminus}      {\mathbin}{AMSa}{"0C}
1552 \DeclareMathSymbol{\Vdash}        {\mathrel}{AMSa}{"0D}
1553 \DeclareMathSymbol{\Vvdash}       {\mathrel}{AMSa}{"0E}
1554 \DeclareMathSymbol{\vDash}        {\mathrel}{AMSa}{"0F}
1555 \DeclareMathSymbol{\twoheadrightarrow}{\mathrel}{AMSa}{"10}
1556 \DeclareMathSymbol{\twoheadleftarrow}{\mathrel}{AMSa}{"11}
1557 \DeclareMathSymbol{\leftleftarrows}{\mathrel}{AMSa}{"12}
1558 \DeclareMathSymbol{\rightrightarrows}{\mathrel}{AMSa}{"13}
1559 \DeclareMathSymbol{\upuparrows}{\mathrel}{AMSa}{"14}
1560 \DeclareMathSymbol{\downdownarrows}{\mathrel}{AMSa}{"15}
1561 \DeclareMathSymbol{\upharpoonright}{\mathrel}{AMSa}{"16}
1562 \global\let\restriction\upharpoonright
1563 \DeclareMathSymbol{\downharpoonright}{\mathrel}{AMSa}{"17}
1564 \DeclareMathSymbol{\upharpoonleft}{\mathrel}{AMSa}{"18}
1565 \DeclareMathSymbol{\downharpoonleft}{\mathrel}{AMSa}{"19}
1566 \DeclareMathSymbol{\rightarrowtail}{\mathrel}{AMSa}{"1A}
1567 \DeclareMathSymbol{\leftarrowtail}{\mathrel}{AMSa}{"1B}
1568 \DeclareMathSymbol{\leftrightharpoons}{\mathrel}{AMSa}{"1C}
1569 \DeclareMathSymbol{\rightleftarrows}{\mathrel}{AMSa}{"1D}
1570 \DeclareMathSymbol{\Lsh}          {\mathrel}{AMSa}{"1E}
1571 \DeclareMathSymbol{\Rsh}          {\mathrel}{AMSa}{"1F}
1572 \DeclareMathSymbol{\rightsquigarrow}{\mathrel}{AMSa}{"20}
1573 \DeclareMathSymbol{\leftrightsquigarrow}{\mathrel}{AMSa}{"21}
1574 \DeclareMathSymbol{\looparrowleft}{\mathrel}{AMSa}{"22}
1575 \DeclareMathSymbol{\looparrowright}{\mathrel}{AMSa}{"23}
1576 \DeclareMathSymbol{\circeq}      {\mathrel}{AMSa}{"24}
1577 \DeclareMathSymbol{\succsim}      {\mathrel}{AMSa}{"25}
1578 \DeclareMathSymbol{\gtrsim}       {\mathrel}{AMSa}{"26}
1579 \DeclareMathSymbol{\gtrapprox}    {\mathrel}{AMSa}{"27}
1580 \DeclareMathSymbol{\multimap}     {\mathrel}{AMSa}{"28}
1581 \DeclareMathSymbol{\therefore}    {\mathrel}{AMSa}{"29}
1582 \DeclareMathSymbol{\because}      {\mathrel}{AMSa}{"2A}
1583 \DeclareMathSymbol{\doteqdot}     {\mathrel}{AMSa}{"2B}
1584 \global\let\Doteq\doteqdot
1585 \DeclareMathSymbol{\triangleq}    {\mathrel}{AMSa}{"2C}
1586 \DeclareMathSymbol{\precsim}      {\mathrel}{AMSa}{"2D}
1587 \DeclareMathSymbol{\lesssim}      {\mathrel}{AMSa}{"2E}
1588 \DeclareMathSymbol{\lessapprox}   {\mathrel}{AMSa}{"2F}
1589 \DeclareMathSymbol{\eqslantless}  {\mathrel}{AMSa}{"30}
1590 \DeclareMathSymbol{\eqslantgtr}   {\mathrel}{AMSa}{"31}
1591 \DeclareMathSymbol{\curlyeqprec}  {\mathrel}{AMSa}{"32}

```

```

1592 \DeclareMathSymbol{\curlyeqsucc} {\mathrel}{AMSA}{"33}
1593 \DeclareMathSymbol{\preccurlyeq} {\mathrel}{AMSA}{"34}
1594 \DeclareMathSymbol{\leqq} {\mathrel}{AMSA}{"35}
1595 \DeclareMathSymbol{\leqslant} {\mathrel}{AMSA}{"36}
1596 \DeclareMathSymbol{\lessgtr} {\mathrel}{AMSA}{"37}
1597 \DeclareMathSymbol{\backprime} {\mathord}{AMSA}{"38}
1598 \DeclareMathSymbol{\risingdotseq} {\mathrel}{AMSA}{"3A}
1599 \DeclareMathSymbol{\fallingdotseq} {\mathrel}{AMSA}{"3B}
1600 \DeclareMathSymbol{\succcurlyeq} {\mathrel}{AMSA}{"3C}
1601 \DeclareMathSymbol{\geqq} {\mathrel}{AMSA}{"3D}
1602 \DeclareMathSymbol{\geqslant} {\mathrel}{AMSA}{"3E}
1603 \DeclareMathSymbol{\gtrless} {\mathrel}{AMSA}{"3F}
1604 \DeclareMathSymbol{\sqsubset} {\mathrel}{AMSA}{"40}
1605 \DeclareMathSymbol{\sqsupset} {\mathrel}{AMSA}{"41}
1606 \DeclareMathSymbol{\vartriangleright} {\mathrel}{AMSA}{"42}
1607 \DeclareMathSymbol{\vartriangleleft} {\mathrel}{AMSA}{"43}
1608 \DeclareMathSymbol{\trianglerighteq} {\mathrel}{AMSA}{"44}
1609 \DeclareMathSymbol{\trianglelefteq} {\mathrel}{AMSA}{"45}
1610 \DeclareMathSymbol{\bigstar} {\mathord}{AMSA}{"46}
1611 \DeclareMathSymbol{\between} {\mathrel}{AMSA}{"47}
1612 \DeclareMathSymbol{\blacktriangledown} {\mathord}{AMSA}{"48}
1613 \DeclareMathSymbol{\blacktriangleright} {\mathrel}{AMSA}{"49}
1614 \DeclareMathSymbol{\blacktriangleleft} {\mathrel}{AMSA}{"4A}
1615 \DeclareMathSymbol{\vartriangle} {\mathrel}{AMSA}{"4D}
1616 \DeclareMathSymbol{\blacktriangle} {\mathord}{AMSA}{"4E}
1617 \DeclareMathSymbol{\triangledown} {\mathord}{AMSA}{"4F}
1618 \DeclareMathSymbol{\eqcirc} {\mathrel}{AMSA}{"50}
1619 \DeclareMathSymbol{\lesseqgtr} {\mathrel}{AMSA}{"51}
1620 \DeclareMathSymbol{\gtreqless} {\mathrel}{AMSA}{"52}
1621 \DeclareMathSymbol{\lesseqqgtr} {\mathrel}{AMSA}{"53}
1622 \DeclareMathSymbol{\gtreqqless} {\mathrel}{AMSA}{"54}
1623 \DeclareMathSymbol{\Rrightarrow} {\mathrel}{AMSA}{"56}
1624 \DeclareMathSymbol{\Lleftarrow} {\mathrel}{AMSA}{"57}
1625 \DeclareMathSymbol{\veebar} {\mathbin}{AMSA}{"59}
1626 \DeclareMathSymbol{\barwedge} {\mathbin}{AMSA}{"5A}
1627 \DeclareMathSymbol{\doublebarwedge} {\mathbin}{AMSA}{"5B}
1628 %\DeclareMathSymbol{\angle} {\mathord}{AMSA}{"5C}
1629 \DeclareMathSymbol{\measuredangle} {\mathord}{AMSA}{"5D}
1630 \DeclareMathSymbol{\sphericalangle} {\mathord}{AMSA}{"5E}
1631 \DeclareMathSymbol{\varpropto} {\mathrel}{AMSA}{"5F}
1632 \DeclareMathSymbol{\smallsmile} {\mathrel}{AMSA}{"60}
1633 \DeclareMathSymbol{\smallfrown} {\mathrel}{AMSA}{"61}
1634 \DeclareMathSymbol{\Subset} {\mathrel}{AMSA}{"62}
1635 \DeclareMathSymbol{\Supset} {\mathrel}{AMSA}{"63}
1636 \DeclareMathSymbol{\Cup} {\mathbin}{AMSA}{"64}
1637 \global\let\doublecup\Cup
1638 \DeclareMathSymbol{\Cap} {\mathbin}{AMSA}{"65}
1639 \global\let\doublecap\Cap
1640 \DeclareMathSymbol{\curlywedge} {\mathbin}{AMSA}{"66}
1641 \DeclareMathSymbol{\curlyvee} {\mathbin}{AMSA}{"67}
1642 \DeclareMathSymbol{\leftthreetimes} {\mathbin}{AMSA}{"68}
1643 \DeclareMathSymbol{\rightthreetimes} {\mathbin}{AMSA}{"69}

```

1644 \DeclareMathSymbol{\subseteq}	{\mathrel}{AMSA}{"6A}
1645 \DeclareMathSymbol{\supseteq}	{\mathrel}{AMSA}{"6B}
1646 \DeclareMathSymbol{\bumpeq}	{\mathrel}{AMSA}{"6C}
1647 \DeclareMathSymbol{\Bumpeq}	{\mathrel}{AMSA}{"6D}
1648 \DeclareMathSymbol{\lll}	{\mathrel}{AMSA}{"6E}
1649 \global\let\llless\lll	
1650 \DeclareMathSymbol{\ggg}	{\mathrel}{AMSA}{"6F}
1651 \global\let\gggtr\ggg	
1652 \DeclareMathSymbol{\circledS}	{\mathord}{AMSA}{"73}
1653 \DeclareMathSymbol{\pitchfork}	{\mathrel}{AMSA}{"74}
1654 \DeclareMathSymbol{\dotplus}	{\mathbin}{AMSA}{"75}
1655 \DeclareMathSymbol{\backsim}	{\mathrel}{AMSA}{"76}
1656 \DeclareMathSymbol{\backsimeq}	{\mathrel}{AMSA}{"77}
1657 \DeclareMathSymbol{\complement}	{\mathord}{AMSA}{"7B}
1658 \DeclareMathSymbol{\intercal}	{\mathbin}{AMSA}{"7C}
1659 \DeclareMathSymbol{\circledcirc}	{\mathbin}{AMSA}{"7D}
1660 \DeclareMathSymbol{\circledast}	{\mathbin}{AMSA}{"7E}
1661 \DeclareMathSymbol{\circleddash}	{\mathbin}{AMSA}{"7F}

The following symbols are not available on the CM AMS fonts:

1662 \DeclareMathSymbol{\updownarrows}	{\mathrel}{AMSA}{"DF}
1663 \DeclareMathSymbol{\downuparrows}	{\mathrel}{AMSA}{224}
1664 \DeclareMathSymbol{\updownharpoons}	{\mathrel}{AMSA}{225}
1665 \DeclareMathSymbol{\downupharpoons}	{\mathrel}{AMSA}{226}
1666 \DeclareMathSymbol{\upupharpoons}	{\mathrel}{AMSA}{227}
1667 \DeclareMathSymbol{\downdownharpoons}	{\mathrel}{AMSA}{228}
1668 \DeclareMathSymbol{\undercurvearrowleft}	{\mathrel}{AMSA}{229}
1669 \DeclareMathSymbol{\undercurvearrowright}	{\mathrel}{AMSA}{230}

These can be used to build longer dashed arrows as explained above:

1670 \DeclareMathSymbol{\midshaft}	{\mathord}{AMSA}{"39}
1671 \DeclareMathSymbol{\rarrowhead}	{\mathord}{AMSA}{"4B}
1672 \DeclareMathSymbol{\larrowhead}	{\mathord}{AMSA}{"4C}

The following symbols come normally from the ‘B’ font.

1673 \DeclareMathSymbol{\lvertneqq}	{\mathrel}{AMSA}{"80}
1674 \DeclareMathSymbol{\gvertneqq}	{\mathrel}{AMSA}{"81}
1675 \% \DeclareMathSymbol{\nleq}	{\mathrel}{AMSA}{"82}
1676 \% \DeclareMathSymbol{\ngeq}	{\mathrel}{AMSA}{"83}
1677 \% \DeclareMathSymbol{\nless}	{\mathrel}{AMSA}{"84}
1678 \% \DeclareMathSymbol{\ngtr}	{\mathrel}{AMSA}{"85}
1679 \% \DeclareMathSymbol{\nprec}	{\mathrel}{AMSA}{"86}
1680 \% \DeclareMathSymbol{\nsucc}	{\mathrel}{AMSA}{"87}
1681 \DeclareMathSymbol{\lneqq}	{\mathrel}{AMSA}{"88}
1682 \DeclareMathSymbol{\gneqq}	{\mathrel}{AMSA}{"89}
1683 \DeclareMathSymbol{\nleqslant}	{\mathrel}{AMSA}{"8A}
1684 \DeclareMathSymbol{\ngeqslant}	{\mathrel}{AMSA}{"8B}
1685 \DeclareMathSymbol{\lneq}	{\mathrel}{AMSA}{"8C}
1686 \DeclareMathSymbol{\gneq}	{\mathrel}{AMSA}{"8D}
1687 \DeclareMathSymbol{\npreceq}	{\mathrel}{AMSA}{"8E}
1688 \DeclareMathSymbol{\nsucceq}	{\mathrel}{AMSA}{"8F}
1689 \DeclareMathSymbol{\precnsim}	{\mathrel}{AMSA}{"90}
1690 \DeclareMathSymbol{\succnsim}	{\mathrel}{AMSA}{"91}

1691 \DeclareMathSymbol{\lnsim}	{\mathrel}{AMSA}{"92}
1692 \DeclareMathSymbol{\gnsim}	{\mathrel}{AMSA}{"93}
1693 \DeclareMathSymbol{\nleqq}	{\mathrel}{AMSA}{"94}
1694 \DeclareMathSymbol{\ngeqq}	{\mathrel}{AMSA}{"95}
1695 \DeclareMathSymbol{\precneqq}	{\mathrel}{AMSA}{"96}
1696 \DeclareMathSymbol{\succneqq}	{\mathrel}{AMSA}{"97}
1697 \DeclareMathSymbol{\precnapprox}	{\mathrel}{AMSA}{"98}
1698 \DeclareMathSymbol{\succnapprox}	{\mathrel}{AMSA}{"99}
1699 \DeclareMathSymbol{\lnapprox}	{\mathrel}{AMSA}{"9A}
1700 \DeclareMathSymbol{\gnapprox}	{\mathrel}{AMSA}{"9B}
1701 \DeclareMathSymbol{\nsim}	{\mathrel}{AMSA}{"9C}
1702 %\DeclareMathSymbol{\ncong}	{\mathrel}{AMSA}{"9D}
1703 \DeclareMathSymbol{\diagup}	{\mathord}{AMSA}{"9E}
1704 \DeclareMathSymbol{\diagdown}	{\mathord}{AMSA}{"9F}
1705 \DeclareMathSymbol{\varsubsetneq}	{\mathrel}{AMSA}{160}
1706 \DeclareMathSymbol{\varsupsetneq}	{\mathrel}{AMSA}{161}
1707 \DeclareMathSymbol{\nsubseteqq}	{\mathrel}{AMSA}{162}
1708 \DeclareMathSymbol{\nsupseteqq}	{\mathrel}{AMSA}{163}
1709 \DeclareMathSymbol{\subsetneqq}	{\mathrel}{AMSA}{164}
1710 \DeclareMathSymbol{\supsetneqq}	{\mathrel}{AMSA}{165}
1711 \DeclareMathSymbol{\varsubsetneqq}	{\mathrel}{AMSA}{166}
1712 \DeclareMathSymbol{\varsupsetneqq}	{\mathrel}{AMSA}{167}
1713 \DeclareMathSymbol{\subsetneq}	{\mathrel}{AMSA}{168}
1714 \DeclareMathSymbol{\supsetneq}	{\mathrel}{AMSA}{169}
1715 \DeclareMathSymbol{\nsubseteq}	{\mathrel}{AMSA}{170}
1716 \DeclareMathSymbol{\nsupseteq}	{\mathrel}{AMSA}{171}
1717 \DeclareMathSymbol{\nparallel}	{\mathrel}{AMSA}{172}
1718 \DeclareMathSymbol{\nmid}	{\mathrel}{AMSA}{173}
1719 \DeclareMathSymbol{\nshortmid}	{\mathrel}{AMSA}{174}
1720 \DeclareMathSymbol{\nshortparallel}	{\mathrel}{AMSA}{175}
1721 \DeclareMathSymbol{\nvdash}	{\mathrel}{AMSA}{176}
1722 \DeclareMathSymbol{\nVdash}	{\mathrel}{AMSA}{177}
1723 \DeclareMathSymbol{\nvDash}	{\mathrel}{AMSA}{178}
1724 \DeclareMathSymbol{\nVDash}	{\mathrel}{AMSA}{179}
1725 \DeclareMathSymbol{\ntrianglerighteq}	{\mathrel}{AMSA}{180}
1726 \DeclareMathSymbol{\ntrianglelefteq}	{\mathrel}{AMSA}{181}
1727 \DeclareMathSymbol{\ntriangleleft}	{\mathrel}{AMSA}{182}
1728 \DeclareMathSymbol{\ntriangleright}	{\mathrel}{AMSA}{183}
1729 \DeclareMathSymbol{\nleftarrow}	{\mathrel}{AMSA}{184}
1730 \DeclareMathSymbol{\nrightarrow}	{\mathrel}{AMSA}{185}
1731 \DeclareMathSymbol{\nLeftarrow}	{\mathrel}{AMSA}{186}
1732 \DeclareMathSymbol{\nRightarrow}	{\mathrel}{AMSA}{187}
1733 \DeclareMathSymbol{\nLeftrightarrow}	{\mathrel}{AMSA}{188}
1734 \DeclareMathSymbol{\nLeftrightarrow}	{\mathrel}{AMSA}{189}
1735 \DeclareMathSymbol{\divideontimes}	{\mathbin}{AMSA}{190}
1736 \DeclareMathSymbol{\varnothing}	{\mathord}{AMSA}{191}
1737 \DeclareMathSymbol{\nexists}	{\mathord}{AMSA}{192}
1738 \DeclareMathSymbol{\Finv}	{\mathord}{AMSA}{193}
1739 \DeclareMathSymbol{\Game}	{\mathord}{AMSA}{194}
1740 \DeclareMathSymbol{\mho}	{\mathord}{AMSA}{195}
1741 \DeclareMathSymbol{\eth}	{\mathord}{AMSA}{196}
1742 \DeclareMathSymbol{\eqsim}	{\mathrel}{AMSA}{197}


```

1743 \DeclareMathSymbol{\beth}          {\mathord}{AMSA}{198}
1744 \DeclareMathSymbol{\gimel}        {\mathord}{AMSA}{199}
1745 \DeclareMathSymbol{\daleth}        {\mathord}{AMSA}{200}
1746 \DeclareMathSymbol{\lessdot}       {\mathbin}{AMSA}{201}
1747 \DeclareMathSymbol{\gtrdot}        {\mathbin}{AMSA}{202}
1748 \DeclareMathSymbol{\ltimes}         {\mathbin}{AMSA}{203}
1749 \DeclareMathSymbol{\rtimes}         {\mathbin}{AMSA}{204}
1750 \DeclareMathSymbol{\shortmid}       {\mathrel}{AMSA}{205}
1751 \DeclareMathSymbol{\shortparallel}  {\mathrel}{AMSA}{206}
1752 \let\smallsetminus=setdif
1753 \DeclareMathSymbol{\thicksim}       {\mathrel}{AMSA}{207}
1754 \DeclareMathSymbol{\thickapprox}    {\mathrel}{AMSA}{208}
1755 \DeclareMathSymbol{\approx}         {\mathrel}{AMSA}{209}
1756 \DeclareMathSymbol{\succapprox}    {\mathrel}{AMSA}{210}
1757 \DeclareMathSymbol{\precapprox}    {\mathrel}{AMSA}{211}
1758 \DeclareMathSymbol{\curvearrowleft}{\mathrel}{AMSA}{212}
1759 \DeclareMathSymbol{\curvearrowright}{\mathrel}{AMSA}{213}
1760 %\DeclareMathSymbol{\digamma}       {\mathord}{AMSA}{"7A}
1761 %\DeclareMathSymbol{\varkappa}       {\mathord}{AMSA}{"7B}
1762 \newcommand{\Bbbk}{\mathbb{k}}
1763 %\DeclareMathSymbol{\hslash}         {\mathord}{AMSA}{"7D}
1764 %\DeclareMathSymbol{\hbar}           {\mathord}{AMSA}{"7E}
1765 \DeclareMathSymbol{\backepsilon}    {\mathrel}{AMSA}{214}
1766 \DeclareMathSymbol{\nsqsubset}      {\mathrel}{AMSA}{215}
1767 \DeclareMathSymbol{\nsqsupset}      {\mathrel}{AMSA}{216}
1768 %\DeclareMathSymbol{\nsqsubseteq}    {\mathrel}{AMSA}{217}
1769 %\DeclareMathSymbol{\nsqsupseteq}    {\mathrel}{AMSA}{218}

```

To make mtpams fully compatible with amssymb, certain symbols must be given alternative names (which are known from L^AT_EX 2.09 or from the latexsym package, respectively).

```

1770 \let\Box\square
1771 \let\lhd\vartriangleleft
1772 \let\rhd\vartriangleright
1773 \let\unrhd\trianglerighteq
1774 \let\unlhd\trianglelefteq
1775 \let\Join\bowtie
1776 \fi

```

6.9 Math font sizes

MathTimeProfessional, unlike most other Type 1 font families, has several design sizes. As a result, we can make the subscripts and superscripts (almost) as small as with standard T_EX.

```

1777 \def\defaultscriptratio{.7}
1778 \def\defaultscriptscriptratio{.55}
1779 \DeclareMathSizes{5}{5}{5}{5}
1780 \DeclareMathSizes{6}{6}{5}{5}
1781 \DeclareMathSizes{7}{7}{5}{5}
1782 \DeclareMathSizes{8}{8}{6}{5}
1783 \DeclareMathSizes{9}{9}{7}{5.5}

```

```

1784 \DeclareMathSizes{\@xpt}{\@xpt}{7}{5.5}
1785 \DeclareMathSizes{\@xipt}{\@xipt}{8}{6}
1786 \DeclareMathSizes{\@xipt}{\@xipt}{8}{6}
1787 \DeclareMathSizes{\@xivpt}{\@xivpt}{\@xpt}{7}
1788 \DeclareMathSizes{\@xvipt}{\@xvipt}{\@xipt}{\@xpt}
1789 \DeclareMathSizes{\@xxpt}{\@xxpt}{\@xivpt}{\@xipt}
1790 \DeclareMathSizes{\@xxvpt}{\@xxvpt}{\@xxpt}{\@xvipt}

```

6.10 Encoding-specific text commands

Some encoding-specific commands default to the OML or OMS encoding. As these encodings are not used with *MathTimeProfessional*, we need to change the defaults.

These ones used to default to OML:

```

1791 \DeclareTextSymbolDefault{\textless}{LMP1}
1792 \DeclareTextSymbolDefault{\textgreater}{LMP1}
1793 \DeclareTextAccentDefault{\t}{LMP2}

```

After re-declaring the default encoding we must not forget to declare the very symbol, otherwise calling the command will generate a loop. Or to quote David:

Hmm, otherwise you waste an hour or two staring at `\tracingall` output trying to work out what the heck is happening.

```

1794 \DeclareTextSymbol{\textless}{LMP1}{'\<}
1795 \DeclareTextSymbol{\textgreater}{LMP1}{'\>}
1796 \DeclareTextAccent{\t}{LMP2}{65}

```

These ones used to default to OMS:

```

1797 \DeclareTextSymbolDefault{\textasteriskcentered}{LMP2}
1798 \DeclareTextSymbolDefault{\textbackslash}{LMP2}
1799 \DeclareTextSymbolDefault{\textbar}{LMP2}
1800 \DeclareTextSymbolDefault{\textbraceleft}{LMP2}
1801 \DeclareTextSymbolDefault{\textbraceright}{LMP2}
1802 \DeclareTextSymbolDefault{\textbullet}{LMP2}
1803 \DeclareTextSymbolDefault{\textperiodcentered}{LMP2}
1804 \DeclareTextAccentDefault{\textcircled}{LMP2}
1805 \DeclareTextSymbol{\textasteriskcentered}{LMP2}{3}
1806 \DeclareTextSymbol{\textbackslash}{LMP2}{110}
1807 \DeclareTextSymbol{\textbar}{LMP2}{106}
1808 \DeclareTextSymbol{\textbraceleft}{LMP2}{102}
1809 \DeclareTextSymbol{\textbraceright}{LMP2}{103}
1810 \DeclareTextSymbol{\textbullet}{LMP2}{15}
1811 \DeclareTextSymbol{\textperiodcentered}{LMP2}{1}
1812 \DeclareTextCommand{\textcircled}{LMP2}[1]{\%
1813   \oalign{\%
1814     \hfil \raise .07ex\hbox {\upshape#1}\hfil \crr
1815     \char13}}

```

The remaining symbols need *not* be redefined, if the `textcomp` package is also loaded.

```

1816 \@ifpackageloaded{textcomp}{\%

```

```

1817 \DeclareTextSymbolDefault{\textdagger}{LMP1}
1818 \DeclareTextSymbolDefault{\textdaggerdbl}{LMP1}
1819 \DeclareTextSymbolDefault{\textsection}{LMP1}
1820 \DeclareTextSymbolDefault{\textparagraph}{LMP1}
1821 \DeclareTextSymbol{\textdagger}{LMP1}{"8E}
1822 \DeclareTextSymbol{\textdaggerdbl}{LMP1}{"8F}
1823 \DeclareTextSymbol{\textsection}{LMP1}{"90}
1824 \DeclareTextSymbol{\textparagraph}{LMP1}{"91}}

```

6.11 Encoding-specific math commands

`\mathsterling` and `\mathunderscore` come from the ‘operators’ font. The default definitions supplied by L^AT_EX match OT1, so the commands must be re-defined, if the encoding is LY1 or T1.

```

1825 \def\@tempa{LY1}
1826 \ifx\encodingdefault\@tempa
1827   \DeclareMathSymbol{\mathsterling}{\mathord}{operators}{163}
1828   \let\mathunderscore\@undefined
1829   \DeclareMathSymbol{\mathunderscore}{\mathord}{operators}{95}
1830 \else
1831   \def\@tempa{T1}
1832   \ifx\encodingdefault\@tempa
1833     \DeclareMathSymbol{\mathsterling}{\mathord}{operators}{191}
1834     \let\mathunderscore\@undefined
1835     \DeclareMathSymbol{\mathunderscore}{\mathord}{operators}{95}
1836   \fi
1837 \fi

```

6.12 Subscript correction

We provide a definition for `_` as active character. This definition in itself is not changing L^AT_EX’s behavior, as by default `_` has category code 8, i.e., subscript character. Only if we change this `\catcode` or if we change the `\mathcode` of `_` T_EX is going to look at it.

With m_Tpro2 the implementation we once had inherited from Y&Y’s math-time package is given up. The new code, which was written by Mike Spivak, has the advantage that constructs such as `_\mathrm{...}` and `_\text{...}` can be used just like in standard L^AT_EX—even though this is not explicitly advertised.

```

1838 \begingroup
1839 \catcode'\_ =13
1840 \gdef_{\futurelet\next\s@@b}
1841 \endgroup

```

Once again, the macro `\space@` is used, which was defined at the beginning of section 6.6.

```

1842 \def\s@@b{\ifcat\relax\noexpand\next\expandafter\s@b\else
1843 \expandafter\s@@b@fi}
1844 \def\s@@b#1{\s@b{\futurelet\next\s@b#1}}
1845 \def\s@b{%
1846 \ifx\next\space@\def\next@.{\futurelet\next\s@b}\else

```

```

1847 \def\next@.{%
1848 \ifx\next f\mkern-\thr@@ mu\else
1849 \ifx\next j\mkern-\tw@ mu\else
1850 \ifx\next p\mkern-\tw@ mu\else
1851 \ifx\next t\mkern\@ne mu\else
1852 \ifx\next y\mkern-\@ne mu\else
1853 \ifx\next A\mkern-\tw@ mu\else
1854 \ifx\next B\mkern-\@ne mu\else
1855 \ifx\next D\mkern-\@ne mu\else
1856 \ifx\next H\mkern-\@ne mu\else
1857 \ifx\next I\mkern-\@ne mu\else
1858 \ifx\next K\mkern-\@ne mu\else
1859 \ifx\next L\mkern-\@ne mu\else
1860 \ifx\next M\mkern-\@ne mu\else
1861 \ifx\next P\mkern-\@ne mu\else
1862 \ifx\next X\mkern-\tw@ mu\else
1863 \fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi}%
1864 \fi
1865 \next@.}

```

Finally we set the `\mathcode` of `_` to ‘active’. However, as long as its `\catcode` is not changed, this `\mathcode` is never looked at; in other words: we can now turn the feature on and off by changing the `\catcode` to 12, which is done in the option code.

```

1866 \mathcode'\_=\string"8000

```

6.13 Alternative z

We want $\$z\$$ to use character 0xB4 alternatively, but we want this to happen only in the default math alphabet. For this purpose we define two macros for the ‘normal’ and the alternative z :

```

1867 \DeclareMathSymbol{\mtp@z}{\mathalpha}{letters}{‘z}
1868 \DeclareMathSymbol{\mtp@@z}{\mathalpha}{letters}{"B4}

```

The option `zswash` makes z active in math mode by changing its `\mathcode` appropriately. The below definition of this active character causes z to expand to the alternative z in the default math alphabet and to the normal letter z otherwise:

```

1869 \begingroup
1870 \lccode'\~='z
1871 \lowercase{\gdef ~{\ifnum\the\mathgroup=\m@ne \mtp@@z \else \mtp@z \fi}}
1872 \endgroup
1873 \</mtp>

```

7 The font definitions files

Font definitions for the math ‘core’ fonts are integrated into the package. Only the extra math alphabets keep their FD files, so that they can be used w/o the package, too.

7.1 LucidaNewMath-Symbols

We can no longer rely on `oms1by.fd` to exist; besides, that file would not work any more with the current Lucida distribution, because it is using obsolete font names.

```
1874 (*oms1bm)
1875 \DeclareFontFamily{OMS}{l1bm}{\skewchar\font48}
1876 \DeclareFontShape{OMS}{l1bm}{m}{n}{<->s * [.9]hlcry}{-}{}
1877 \DeclareFontShape{OMS}{l1bm}{b}{n}{<->s * [.9]hlcdy}{-}{}
1878 (/oms1bm)
```

7.2 MathTime Plus Script

The script alphabet from the *MathTime* Plus font set may be useful in conjunction with *MathTimeProfessional*, too. The `.fd` file generated here should equal the one from FMI's *mathtime* bundle.

```
1879 (*Umtms)
1880 \DeclareFontFamily{U}{mtms}{\skewchar\font42}
1881 \DeclareFontShape{U}{mtms}{m}{n}{<->mtms}{-}{}
1882 \DeclareFontShape{U}{mtms}{b}{n}{<->mtmsb}{-}{}
1883 (/Umtms)
```

7.3 Times-compatible Math Script and Fraktur fonts

These fonts belong to the complete font set; yet the `fd` files are always generated. With *MathTimeProfessional II* the new 'Curly' font is assigned to the upright (n) shape.

```
1884 (*umt2ms)
1885 \DeclareFontFamily{U}{mt2ms}{-}%
1886 \DeclareFontShape{U}{mt2ms}{m}{n}{<-7>mt2mcf<7-9>mt2mcs<9->mt2mct}{-}%
1887 \DeclareFontShape{U}{mt2ms}{m}{it}{<-7>mt2msf<7-9>mt2mss<9->mt2mst}{-}%
1888 \DeclareFontShape{U}{mt2ms}{b}{it}{<-7>mt2bmsf<7-9>mt2bmss<9->mt2bmst}{-}%
1889 (/umt2ms)

1890 (*umt2mf)
1891 \DeclareFontFamily{U}{mt2mf}{-}%
1892 \DeclareFontShape{U}{mt2mf}{m}{n}{<-7>mt2mff<7-9>mt2mfs<9->mt2mft}{-}%
1893 \DeclareFontShape{U}{mt2mf}{b}{n}{<-7>mt2bmff<7-9>mt2bmfs<9->mt2bmft}{-}%
1894 (/umt2mf)
```

7.4 Times-compatible Blackboard and Holey Bold fonts

These fonts belong to the complete font set; yet, the `fd` files are always generated.

```
1895 (*umt2bb)
1896 \DeclareFontFamily{U}{mt2bb}{-}%
1897 \DeclareFontShape{U}{mt2bb}{m}{n}{<-7>mt2bbf<7-9>mt2bbs<9->mt2bbt}{-}%
1898 \DeclareFontShape{U}{mt2bb}{m}{it}{<-7>mt2bbif<7-9>mt2bbis<9->mt2bbit}{-}%
1899 \DeclareFontShape{U}{mt2bb}{b}{n}{<-7>mt2bbdf<7-9>mt2bbds<9->mt2bbdt}{-}%
1900 (/umt2bb)
```

```

1901 ⟨*umt2hrb⟩
1902 \DeclareFontFamily{U}{mt2hrb}{}%
1903 \DeclareFontShape{U}{mt2hrb}{m}{n}{<-7>mt2hrbf<7-9>mt2hrbs<9->mt2hrbt}{}%
1904 \DeclareFontShape{U}{mt2hrb}{m}{it}{<-7>mt2hbif<7-9>mt2hbis<9->mt2hbit}{}%
1905 \DeclareFontShape{U}{mt2hrb}{b}{n}{<-7>mt2hrbdf<7-9>mt2hrbds<9->mt2hrbdt}{}%
1906 ⟨/umt2hrb⟩

```

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