The flexisym package

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User's guide

For now, the user's guide is in breqn.

Implementation

1 flexisym

```
⟨*package⟩
\ProvidesPackage{flexisym}[2008/07/23 v0.97]
\let\@xp\expandafter \let\@nx\noexpand
\edef\do{%
  \@nx\AtEndOfPackage{%
    \catcode\number`\"=\number\catcode`\"
    \relax
  }%
}
\do \let\do\relax
\catcode`\"=12
\let\@sym\@gobble
\DeclareOption{robust}{%
  \def\@sym#1{%
    \ifx\protect\@typeset@protect \else\protect#1\@xp\@gobblefour\fi
  }%
}
\def\mg@bin{2}% binary operators
\def\mg@rel{2}% relations
%%\def\mg@nre{B}% negated relations
\def\mg@del{3}% delimiters
%%\def\mg@arr{B}% arrows
\def\mg@acc{0}% accents
\def\mg@cop{3}% cumulative operators (sum, int)
```

```
\def\mg@latin{1}% (Latin) letters
\def\mg@greek{1}% (lowercase) Greek
\def\mg@Greek{0}% (capital) Greek
%%\def\mg@bflatin{4}% bold upright Latin letters ?
%%\def\mg@Bbb{B}% blackboard bold
\def\mg@cal{2}% script/calligraphic
%%\def\mg@frak{5}% Fraktur letters
\def\mg@digit{0}% decimal digits % 1 = oldstyle, 0 = capital
\expandafter\let\csname MathChar \endcsname\mathchar
\expandafter\let\csname Delimiter \endcsname\delimiter
\expandafter\let\csname Radical \endcsname\radical
\newcommand{\MathChar}{}
\edef\MathChar{\csname MathChar \endcsname\noexpand\string}
\newcommand{\Delimiter}{}
\edef\Delimiter{\csname Delimiter \endcsname\noexpand\string}
\newcommand{\Radical}{}
\edef\Radical{\csname Radical \endcsname\noexpand\string}
\let\sumlimits\displaylimits
\let\intlimits\nolimits
\let\namelimits\displaylimits
\edef\m@Ord#1#2#3{\csname MathChar \endcsname"0#1#2#3 }
\edef\m@Var#1#2#3{\csname MathChar \endcsname"7#1#2#3 }
\edef\m@Bin#1#2#3{\csname MathChar \endcsname"2#1#2#3 }
\edef\m@Rel#1#2#3{\csname MathChar \endcsname"3#1#2#3 }
\edef\m@Pun#1#2#3{\csname MathChar \endcsname"6#1#2#3 }
\edef\m@COs#1#2#3{\csname MathChar \endcsname"1#1#2#3 \sumlimits}
\edef\m@COi#1#2#3{\csname MathChar \endcsname"1#1#2#3 \intlimits}
\def\delim@a#1#2#3#4{\ifx\relax#1#2#3#4\else#1\fi #2#3#4}
\def\delim@b#1#2#3#4{\ifx\relax#1#2#3#4\else#1\fi }
\def\@tempa{%
  \@nx\@xp\@nx\delim@a\@nx\csname sd@##1##2##3\@nx\endcsname ##1##2##3 }
\edef\m@DeL#1#2#3{\csname Delimiter \endcsname"4\@tempa}
\edef\m@DeR#1#2#3{\csname Delimiter \endcsname"5\@tempa}
\edef\m@DeB#1#2#3{\csname Delimiter \endcsname"0\@tempa}
\edef\m@DeA#1#2#3{\csname Delimiter \endcsname"3\@tempa}
\edef\m@Rad#1#2#3{\csname Radical \endcsname"\@tempa}
\def\do#1#2{\@xp\def\csname sd@#1\endcsname{#2}}
\do{300}{028}
\do{301}{029}
\do{302}{05B}
\do{303}{05D}
\do{304}{262}
\do{305}{263}
\do{306}{264}
\do{307}{265}
\do{308}{266}
\do{309}{267}
\do{30A}{268}
\do{30B}{269}
\do{30C}{26A}
```

```
\do{30D}{26B}
\do{30E}{13D}
\do{30F}{26E}
\do{340}{37A}
\do{341}{37B}
\do{33A}{33A}
\do{33B}{33B}
\do{33E}{33E}
\do{33C}{26A}
\do{33D}{26B}
\do{378}{222}
\do{379}{223}
\do{33F}{26C}
\do{37E}{22A}
\do{37F}{22B}
\do{377}{26D}
\do{30F}{26E}
\def\m@Acc#1#2#3#4{\mathaccent"#1#2#3{#4}}
\def\@symAcc{\@sym}
\let\@symtype\@firstofone
\def\@symOrd#1#2{\@symtype\mathord{\OrdSymbol{#2}}}
\def\@symVar{\@symOrd}
\def\@symBin#1#2{\@symtype\mathbin{\OrdSymbol{#2}}}
\def\@symRel#1#2{\@symtype\mathrel{\OrdSymbol{#2}}}
\def\@symPun#1#2{\@symtype\mathpunct{\OrdSymbol{#2}}}
\def\@symCOi#1#2{\@symtype{\mathop{\OrdSymbol{#2}}\intlimits}}
\def\@symCOs#1#2{\@symtype{\mathop{\OrdSymbol{#2}}\sumlimits}}
\def\@symOpe#1#2{\@symtype\mathopen{\OrdSymbol{#2}}}
\def\@symClo#1#2{\@symtype\mathclose{\OrdSymbol{#2}}}
\def\@symDeL#1#2{\@symtype\mathopen{\OrdSymbol{#2}}}
\def\@symDeR#1#2{\@symtype\mathclose{\OrdSymbol{#2}}}
\def\@symDeB#1#2{\@symtype\mathord{\OrdSymbol{#2}}}
\def\@symInn#1#2{\@symtype\mathinner{\OrdSymbol{#2}}}
\def\@xnce#1{\@xp\@nx\csname#1\endcsname}
\let\sym@global\global
\def\DeclareFlexSymbol#1#2#3#4{%
  \begingroup
  \edef\@tempb{\@nx\@sym\@nx#1\@xnce{m@#2}\@xnce{mg@#3}#4}%
  \ifcat\@nx#1\relax
    \sym@global\let#1\@tempb
  \else
    \sym@global\mathcode`#1="8000\relax
    \lccode`\~=`#1\relax
    \lowercase{\sym@global\let~\@tempb}%
  \fi
  \endgroup
}
\def\DeclareFlexCompoundSymbol#1#2#3{%
  \@xp\DeclareRobustCommand\@xp#1\@xp{\csname @sym#2\endcsname#1{#3}}%
  \sym@global\let#1#1\relax
```

```
}
\DeclareRobustCommand\textchar{\text@char\textfont}
\DeclareRobustCommand\scriptchar{\text@char\scriptfont}%
\def\text@char@a{\?\endgroup}%
\def\text@char@sym#1#2#3{%
  \begingroup
    \let\@sym\relax % defense against infinite loops
    \the\text@script@char#3%
    \afterassignment\text@char@a
    \chardef\?="%
}
\def\text@char#1#2{\begingroup\check@mathfonts
  \let\text@script@char#1\let\@sym\text@char@sym
  \let\@symtype\@secondoftwo \let\OrdSymbol\@firstofone
  \let\ifmmode\iftrue \everymath{$\@gobble}%$
  \def\mkern{\muskip\z@}\let\mskip\mkern
  \ifcat\relax\noexpand#2#2%
  \else
    \lccode`\~=\expandafter`\string#2\relax
    \lowercase{~}%
  \fi
  \endgroup
}
\providecommand\textprime{}
\DeclareRobustCommand\textprime{\leavevmode
  \raise.8ex\hbox{\text@char\scriptfont\prime}%
}
\@ifundefined{resetMathstrut@}{}{%
  \def\resetMathstrut@{%
    \setbox\z@\hbox{\textchar\vert}%
    \ht\Mathstrutbox@\ht\z@ \dp\Mathstrutbox@\dp\z@
  }%
}
\@ifundefined{rightarrowfill@}{}{%
  \def\rightarrowfill@#1{\m@th\setboxz@h{$#1\relbar$}\ht\z@\z@
    $#1\copy\z@\mkern-6mu\cleaders
    \hbox{$#1\mkern-2mu\box\z@\mkern-2mu$}\hfill
    \mkern-6mu\OrdSymbol{\rightarrow}$}
  \def\leftarrowfill@#1{\m@th\setboxz@h{$#1\relbar$}\ht\z@\z@
    $#1\OrdSymbol{\leftarrow}\mkern-6mu\cleaders
    \hbox{$#1\mkern-2mu\copy\z@\mkern-2mu$}\hfill
    \mkern-6mu\box\z@$}
  \def\leftrightarrowfill@#1{\m@th\setboxz@h{$#1\relbar$}\ht\z@\z@
    $#1\OrdSymbol{\leftarrow}\mkern-6mu\cleaders
    \hbox{$#1\mkern-2mu\box\z@\mkern-2mu$}\hfill
    \mkern-6mu\OrdSymbol{\rightarrow}$}
}
\def\binrel@sym#1#2#3#4#5{%
  \xdef\binrel@@##1{%
    \ifx\m@Ord#2\@nx\@symOrd
```

```
    \else\ifx\m@Var#2\@nx\@symVar
    \else\ifx\m@COs#2\@nx\@symCOs
    \else\ifx\m@COi#2\@nx\@symCOi
    \else\ifx\m@Bin#2\@nx\@symBin
    \else\ifx\m@Rel#2\@nx\@symRel
    \else\ifx\m@Pun#2\@nx\@symPun
    \else\@nx\@symErr \fi\fi\fi\fi\fi\fi\fi
  ?{\@nx\OrdSymbol{##1}}}%
}
\def\binrel@a{%
  \def\@symOrd##1##2{\gdef\binrel@@####1{\@symOrd##1{\OrdSymbol{####1}}}}%
  \def\@symVar##1##2{\gdef\binrel@@####1{\@symVar##1{\OrdSymbol{####1}}}}%
  \def\@symCOs##1##2{\gdef\binrel@@####1{\@symCOs##1{\OrdSymbol{####1}}}}%
  \def\@symCOi##1##2{\gdef\binrel@@####1{\@symCOi##1{\OrdSymbol{####1}}}}%
  \def\@symBin##1##2{\gdef\binrel@@####1{\@symBin##1{\OrdSymbol{####1}}}}%
  \def\@symRel##1##2{\gdef\binrel@@####1{\@symRel##1{\OrdSymbol{####1}}}}%
  \def\@symPun##1##2{\gdef\binrel@@####1{\@symPun##1{\OrdSymbol{####1}}}}%
}
\def\binrel@#1{%
  \setbox\z@\hbox{$%
    \let\mathchoice\@gobblethree
    \let\@sym\binrel@sym \binrel@a
    #1$}%
}
\def\@symextension{sym}
\newcommand\usesymbols[1]{%
  \@for\@tempb:=#1\do{%
    \@xp\@onefilewithoptions\@xp{\@tempb}[][]\@symextension
  }%
}
\newcommand\ProvidesSymbols[1]{\ProvidesFile{#1.sym}}
\DeclareRobustCommand{\not}[1]{\@symRel\not{\OrdSymbol{\notRel#1}}}
\DeclareRobustCommand{\OrdSymbol}[1]{%
  \begingroup\mathchars@reset#1\endgroup
}
\def\mathchars@reset{\let\@sym\@sym@ord \let\@symtype\@symtype@ord
  \let\OrdSymbol\relax}
\def\@symtype@ord#1#{}% a strange sort of \@gobble
\def\@sym@ord#1#2{\@xp\@sym@ord@a\string#2\@nil}%
\begingroup
\lccode`\.=`\@ \lowercase{\endgroup
\def\@sym@ord@a#1.}#2#3\@nil#4#5#6{%
  \csname MathChar \endcsname"0%
    \if D#2\@xp\delim@b\csname sd@#4#5#6\endcsname#4#5#6
    \else #4#5#6
    \fi
}
```

Before declaring any math characters active, we have to take care of a small problem with amsmath v2.x, if it is loaded before flexisym. `\std@minus` and

`\std@equal` are defined as
```
\mathchardef\std@minus\mathcode`\-\relax
\mathchardef\std@equal\mathcode`\=\relax
```

in `amsmath.sty` and again `\AtBeginDocument`. The latter is because

> In case some alternative math fonts are loaded later. [`amsmath.dtx`]

The problem arises because flexisym sets the mathcode of all symbols to 32768 which is illegal for a `\mathchardef`.

We have to remove the assignments from the `\AtBeginDocument` hook as they will cause an error there.

```
\@ifpackageloaded{amsmath}{%
  \begingroup
```

Split the contents of `\@begindocumenthook` by reading what we search for as a delimited argument and ensure these two assignments do not take place. It is questionable if anything reasonable can be done to them. In the case of a package such as mathpazo which defines

```
\DeclareMathSymbol{=}{\mathrel}{upright}{"3D}
```

the `\Relbar` will look wrong if we don't use the correct symbol. The way to solve this is define additional `.sym` files which contain the definition of `\relbar` and `\Relbar` needed. We need those additional files anyway for things like `\joinord`.

```
  \long\def\next#1\mathchardef\std@minus\mathcode`\-\relax
                  \mathchardef\std@equal\mathcode`\=\relax#2\flexi@stop{%
    \toks@{#1#2}%
    \xdef\@begindocumenthook{\the\toks@}%
  }%
  \expandafter\next\@begindocumenthook\flexi@stop
  \endgroup
}{}
```

There is problem when using `\DeclareMathOperator` as the operators defined call a command `\newmcodes@` which relies on the mathcode of `-` being less than 32768. We delay the definition `\AtBeginDocument` in case amssymb hasn't been loaded yet.

```
\AtBeginDocument{%
\def\newmcodes@{%
  \mathcode `\'39\mathcode `\*42\mathcode `\."613A
  \ifnum\mathcode`\-=45
  \else
```

The extra check. Don't do anything if `-` is math active.

```
    \ifnum\mathcode`\-=32768
    \else
      \mathchardef \std@minus \mathcode `\-\relax
    \fi
```

```
  \fi
  \mathcode `\-45 \mathcode `\/47\mathcode `\:"603A\relax
}%
}
```

And we then continue with the options.

```
\DeclareOption{mathstyleoff}{%
  \PassOptionsToPackage{noactivechars}{mathstyle}}
\DeclareOption{cmbase}{\usesymbols{cmbase}}
\DeclareOption{mathpazo}{\usesymbols{mathpazo}}
\DeclareOption{mathptmx}{\usesymbols{mathptmx}}
\ExecuteOptions{cmbase}
\ProcessOptions\relax
\renewcommand{\lnot}{\neg}
\renewcommand{\land}{\wedge}
\renewcommand{\lor}{\vee}
\renewcommand{\le}{\leq}
\renewcommand{\ge}{\geq}
\renewcommand{\ne}{\neq}
\renewcommand{\owns}{\ni}
\renewcommand{\gets}{\leftarrow}
\renewcommand{\to}{\rightarrow}
\renewcommand{\|}{\Vert}
\RequirePackage{mathstyle}
⟨/package⟩\endinput
```

2 cmbase, mathpazo, mathptmx

For each math font package we define a corresponding symbol file with extension `sym`. The Computer Modern base is called `cmbase` and `mathpazo` and `mathptmx` corresponds to the packages. The definitions are almost identical as they mostly concern the positions in the math font encodings. Look for differences in `\joinord`, `\relbar` and `\Relbar`. If you inspect the source code, you'll see that the support for mathptmx didn't require any work but I thought it better to create a `sym` file to maintain a uniform interface.

> **Open question on `!` and `?`: maybe they should have type 'Pun' instead of 'DeR'. Need to search for uses in math in AMS archives. Or, maybe add a special 'Clo' type for them: non-extensible closing delimiter.**

Default mathgroup setup.

```
⟨∗cmbase | mathpazo | mathptmx⟩
⟨cmbase⟩\ProvidesSymbols{cmbase}[2007/12/19 v0.92]
⟨mathpazo⟩\ProvidesSymbols{mathpazo}[2007/12/19 v0.2]
⟨mathptmx⟩\ProvidesSymbols{mathptmx}[2007/12/19 v0.2]
\@xp\xdef\csname mg@OT1\endcsname{\hexnumber@\symoperators}
\@xp\xdef\csname mg@OML\endcsname{\hexnumber@\symletters}
```

```
\@xp\xdef\csname mg@OMS\endcsname{\hexnumber@\symsymbols}
\@xp\xdef\csname mg@OMX\endcsname{\hexnumber@\symlargesymbols}
\gdef\mg@bin{\mg@OMS}
\gdef\mg@del{\mg@OMX}
\xdef\mg@digit{\@xp\@nx\csname mg@OT1\endcsname}
\gdef\mg@latin{\mg@OML}
\global\let\mg@Latin\mg@latin
\global\let\mg@greek\mg@latin
\global\let\mg@Greek\mg@digit
\global\let\mg@rel\mg@bin
\global\let\mg@ord\mg@bin
\global\let\mg@cop\mg@del
```

Symbols from the 128-character `cmr` encoding. Paren and square bracket delimiters from this encoding are covered by the definitions in the `cmex` section, however.

```
\DeclareFlexSymbol{!}     {Pun}{OT1}{21}
\DeclareFlexSymbol{+}     {Bin}{OT1}{2B}
\DeclareFlexSymbol{:}     {Rel}{OT1}{3A}
\DeclareFlexSymbol{\colon}{Pun}{OT1}{3A}
\DeclareFlexSymbol{;}     {Pun}{OT1}{3B}
\DeclareFlexSymbol{=}     {Rel}{OT1}{3D}
\DeclareFlexSymbol{?}     {Pun}{OT1}{3F}
```

$\mathcal{AMS}$TEX, and therefore the amsmath package, make the uppercase Greek letters class 0 (nonvariable) instead of 7 (variable), to eliminate the glaring inconsistency with lowercase Greek. (In plain TEX, `{\bf\Delta}` works, while `{\bf\delta}` doesn't.) Let us try to make them both variable (fonts permitting) instead of nonvariable.

```
\DeclareFlexSymbol{\Gamma}  {Var}{Greek}{00}
\DeclareFlexSymbol{\Delta}  {Var}{Greek}{01}
\DeclareFlexSymbol{\Theta}  {Var}{Greek}{02}
\DeclareFlexSymbol{\Lambda} {Var}{Greek}{03}
\DeclareFlexSymbol{\Xi}     {Var}{Greek}{04}
\DeclareFlexSymbol{\Pi}     {Var}{Greek}{05}
\DeclareFlexSymbol{\Sigma}  {Var}{Greek}{06}
\DeclareFlexSymbol{\Upsilon}{Var}{Greek}{07}
\DeclareFlexSymbol{\Phi}    {Var}{Greek}{08}
\DeclareFlexSymbol{\Psi}    {Var}{Greek}{09}
\DeclareFlexSymbol{\Omega}  {Var}{Greek}{0A}
```

Decimal digits.

```
\DeclareFlexSymbol{0}{Var}{digit}{30}
\DeclareFlexSymbol{1}{Var}{digit}{31}
\DeclareFlexSymbol{2}{Var}{digit}{32}
\DeclareFlexSymbol{3}{Var}{digit}{33}
\DeclareFlexSymbol{4}{Var}{digit}{34}
\DeclareFlexSymbol{5}{Var}{digit}{35}
\DeclareFlexSymbol{6}{Var}{digit}{36}
\DeclareFlexSymbol{7}{Var}{digit}{37}
```

```
\DeclareFlexSymbol{8}{Var}{digit}{38}
\DeclareFlexSymbol{9}{Var}{digit}{39}
```

Symbols from the 128-character `cmmi` encoding.

```
\DeclareFlexSymbol{,}{Pun}{OML}{3B}
\DeclareFlexSymbol{.}{Ord}{OML}{3A}
\DeclareFlexSymbol{/}{Ord}{OML}{3D}
\DeclareFlexSymbol{<}{Rel}{OML}{3C}
\DeclareFlexSymbol{>}{Rel}{OML}{3E}
```

To do: make the Var property of lc Greek work properly.

```
\DeclareFlexSymbol{\alpha}{Var}{greek}{0B}
\DeclareFlexSymbol{\beta}{Var}{greek}{0C}
\DeclareFlexSymbol{\gamma}{Var}{greek}{0D}
\DeclareFlexSymbol{\delta}{Var}{greek}{0E}
\DeclareFlexSymbol{\epsilon}{Var}{greek}{0F}
\DeclareFlexSymbol{\zeta}{Var}{greek}{10}
\DeclareFlexSymbol{\eta}{Var}{greek}{11}
\DeclareFlexSymbol{\theta}{Var}{greek}{12}
\DeclareFlexSymbol{\iota}{Var}{greek}{13}
\DeclareFlexSymbol{\kappa}{Var}{greek}{14}
\DeclareFlexSymbol{\lambda}{Var}{greek}{15}
\DeclareFlexSymbol{\mu}{Var}{greek}{16}
\DeclareFlexSymbol{\nu}{Var}{greek}{17}
\DeclareFlexSymbol{\xi}{Var}{greek}{18}
\DeclareFlexSymbol{\pi}{Var}{greek}{19}
\DeclareFlexSymbol{\rho}{Var}{greek}{1A}
\DeclareFlexSymbol{\sigma}{Var}{greek}{1B}
\DeclareFlexSymbol{\tau}{Var}{greek}{1C}
\DeclareFlexSymbol{\upsilon}{Var}{greek}{1D}
\DeclareFlexSymbol{\phi}{Var}{greek}{1E}
\DeclareFlexSymbol{\chi}{Var}{greek}{1F}
\DeclareFlexSymbol{\psi}{Var}{greek}{20}
\DeclareFlexSymbol{\omega}{Var}{greek}{21}
\DeclareFlexSymbol{\varepsilon}{Var}{greek}{22}
\DeclareFlexSymbol{\vartheta}{Var}{greek}{23}
\DeclareFlexSymbol{\varpi}{Var}{greek}{24}
\DeclareFlexSymbol{\varrho}{Var}{greek}{25}
\DeclareFlexSymbol{\varsigma}{Var}{greek}{26}
\DeclareFlexSymbol{\varphi}{Var}{greek}{27}
```

Note that in plain TEX `\imath` and `\jmath` are not variable-font. But if a `j` changes font to, let's say, sans serif or calligraphic, a dotless `j` in the same context should change font in the same way.

```
\DeclareFlexSymbol{\imath}{Var}{OML}{7B}
\DeclareFlexSymbol{\jmath}{Var}{OML}{7C}
\DeclareFlexSymbol{\ell}{Ord}{OML}{60}
\DeclareFlexSymbol{\wp}{Ord}{OML}{7D}
\DeclareFlexSymbol{\partial}{Ord}{OML}{40}
\DeclareFlexSymbol{\flat}{Ord}{OML}{5B}
\DeclareFlexSymbol{\natural}{Ord}{OML}{5C}
```

```
\DeclareFlexSymbol{\sharp}{Ord}{OML}{5D}
\DeclareFlexSymbol{\triangleleft}{Bin}{OML}{2F}
\DeclareFlexSymbol{\triangleright}{Bin}{OML}{2E}
\DeclareFlexSymbol{\star}{Bin}{OML}{3F}
\DeclareFlexSymbol{\smile}{Rel}{OML}{5E}
\DeclareFlexSymbol{\frown}{Rel}{OML}{5F}
\DeclareFlexSymbol{\leftharpoonup}{Rel}{OML}{28}
\DeclareFlexSymbol{\leftharpoondown}{Rel}{OML}{29}
\DeclareFlexSymbol{\rightharpoonup}{Rel}{OML}{2A}
\DeclareFlexSymbol{\rightharpoondown}{Rel}{OML}{2B}
\DeclareFlexSymbol{a}{Var}{latin}{61}
\DeclareFlexSymbol{b}{Var}{latin}{62}
\DeclareFlexSymbol{c}{Var}{latin}{63}
\DeclareFlexSymbol{d}{Var}{latin}{64}
\DeclareFlexSymbol{e}{Var}{latin}{65}
\DeclareFlexSymbol{f}{Var}{latin}{66}
\DeclareFlexSymbol{g}{Var}{latin}{67}
\DeclareFlexSymbol{h}{Var}{latin}{68}
\DeclareFlexSymbol{i}{Var}{latin}{69}
\DeclareFlexSymbol{j}{Var}{latin}{6A}
\DeclareFlexSymbol{k}{Var}{latin}{6B}
\DeclareFlexSymbol{l}{Var}{latin}{6C}
\DeclareFlexSymbol{m}{Var}{latin}{6D}
\DeclareFlexSymbol{n}{Var}{latin}{6E}
\DeclareFlexSymbol{o}{Var}{latin}{6F}
\DeclareFlexSymbol{p}{Var}{latin}{70}
\DeclareFlexSymbol{q}{Var}{latin}{71}
\DeclareFlexSymbol{r}{Var}{latin}{72}
\DeclareFlexSymbol{s}{Var}{latin}{73}
\DeclareFlexSymbol{t}{Var}{latin}{74}
\DeclareFlexSymbol{u}{Var}{latin}{75}
\DeclareFlexSymbol{v}{Var}{latin}{76}
\DeclareFlexSymbol{w}{Var}{latin}{77}
\DeclareFlexSymbol{x}{Var}{latin}{78}
\DeclareFlexSymbol{y}{Var}{latin}{79}
\DeclareFlexSymbol{z}{Var}{latin}{7A}
\DeclareFlexSymbol{A}{Var}{Latin}{41}
\DeclareFlexSymbol{B}{Var}{Latin}{42}
\DeclareFlexSymbol{C}{Var}{Latin}{43}
\DeclareFlexSymbol{D}{Var}{Latin}{44}
\DeclareFlexSymbol{E}{Var}{Latin}{45}
\DeclareFlexSymbol{F}{Var}{Latin}{46}
\DeclareFlexSymbol{G}{Var}{Latin}{47}
\DeclareFlexSymbol{H}{Var}{Latin}{48}
\DeclareFlexSymbol{I}{Var}{Latin}{49}
\DeclareFlexSymbol{J}{Var}{Latin}{4A}
\DeclareFlexSymbol{K}{Var}{Latin}{4B}
\DeclareFlexSymbol{L}{Var}{Latin}{4C}
\DeclareFlexSymbol{M}{Var}{Latin}{4D}
\DeclareFlexSymbol{N}{Var}{Latin}{4E}
```

```
\DeclareFlexSymbol{O}{Var}{Latin}{4F}
\DeclareFlexSymbol{P}{Var}{Latin}{50}
\DeclareFlexSymbol{Q}{Var}{Latin}{51}
\DeclareFlexSymbol{R}{Var}{Latin}{52}
\DeclareFlexSymbol{S}{Var}{Latin}{53}
\DeclareFlexSymbol{T}{Var}{Latin}{54}
\DeclareFlexSymbol{U}{Var}{Latin}{55}
\DeclareFlexSymbol{V}{Var}{Latin}{56}
\DeclareFlexSymbol{W}{Var}{Latin}{57}
\DeclareFlexSymbol{X}{Var}{Latin}{58}
\DeclareFlexSymbol{Y}{Var}{Latin}{59}
\DeclareFlexSymbol{Z}{Var}{Latin}{5A}
```

The `\ldotPun` glyph is used in constructing the `\ldots` symbol. It is just a period with a different math symbol class. `\lhookRel` and `\rhookRel` are used in a similar way for building hooked arrow symbols.

```
\DeclareFlexSymbol{\ldotPun}{Pun}{OML}{3A}
\def\ldotp{\ldotPun}
\DeclareFlexSymbol{\lhookRel}{Rel}{OML}{2C}
\DeclareFlexSymbol{\rhookRel}{Rel}{OML}{2D}
```

Symbols from the 128-character `cmsy` encoding.

```
\DeclareFlexSymbol{*}{Bin}{bin}{03} % \ast
\DeclareFlexSymbol{-}{Bin}{bin}{00}
\DeclareFlexSymbol{|}{Ord}{OMS}{6A}
\DeclareFlexSymbol{\aleph}{Ord}{ord}{40}
\DeclareFlexSymbol{\Re}{Ord}{ord}{3C}
\DeclareFlexSymbol{\Im}{Ord}{ord}{3D}
\DeclareFlexSymbol{\infty}{Ord}{ord}{31}
\DeclareFlexSymbol{\prime}{Ord}{ord}{30}
\DeclareFlexSymbol{\emptyset}{Ord}{ord}{3B}
\DeclareFlexSymbol{\nabla}{Ord}{ord}{72}
\DeclareFlexSymbol{\top}{Ord}{ord}{3E}
\DeclareFlexSymbol{\bot}{Ord}{ord}{3F}
\DeclareFlexSymbol{\triangle}{Ord}{ord}{34}
\DeclareFlexSymbol{\forall}{Ord}{ord}{38}
\DeclareFlexSymbol{\exists}{Ord}{ord}{39}
\DeclareFlexSymbol{\neg}{Ord}{ord}{3A}
\DeclareFlexSymbol{\clubsuit}{Ord}{ord}{7C}
\DeclareFlexSymbol{\diamondsuit}{Ord}{ord}{7D}
\DeclareFlexSymbol{\heartsuit}{Ord}{ord}{7E}
\DeclareFlexSymbol{\spadesuit}{Ord}{ord}{7F}
\DeclareFlexSymbol{\smallint}{COs}{OMS}{73}
```

Binary operators.

```
\DeclareFlexSymbol{\bigtriangleup}{Bin}{bin}{34}
\DeclareFlexSymbol{\bigtriangledown}{Bin}{bin}{35}
\DeclareFlexSymbol{\wedge}{Bin}{bin}{5E}
\DeclareFlexSymbol{\vee}{Bin}{bin}{5F}
\DeclareFlexSymbol{\cap}{Bin}{bin}{5C}
\DeclareFlexSymbol{\cup}{Bin}{bin}{5B}
```

```
\DeclareFlexSymbol{\ddagger}{Bin}{bin}{7A}
\DeclareFlexSymbol{\dagger}{Bin}{bin}{79}
\DeclareFlexSymbol{\sqcap}{Bin}{bin}{75}
\DeclareFlexSymbol{\sqcup}{Bin}{bin}{74}
\DeclareFlexSymbol{\uplus}{Bin}{bin}{5D}
\DeclareFlexSymbol{\amalg}{Bin}{bin}{71}
\DeclareFlexSymbol{\diamond}{Bin}{bin}{05}
\DeclareFlexSymbol{\bullet}{Bin}{bin}{0F}
\DeclareFlexSymbol{\wr}{Bin}{bin}{6F}
\DeclareFlexSymbol{\div}{Bin}{bin}{04}
\DeclareFlexSymbol{\odot}{Bin}{bin}{0C}
\DeclareFlexSymbol{\oslash}{Bin}{bin}{0B}
\DeclareFlexSymbol{\otimes}{Bin}{bin}{0A}
\DeclareFlexSymbol{\ominus}{Bin}{bin}{09}
\DeclareFlexSymbol{\oplus}{Bin}{bin}{08}
\DeclareFlexSymbol{\mp}{Bin}{bin}{07}
\DeclareFlexSymbol{\pm}{Bin}{bin}{06}
\DeclareFlexSymbol{\circ}{Bin}{bin}{0E}
\DeclareFlexSymbol{\bigcirc}{Bin}{bin}{0D}
\DeclareFlexSymbol{\setminus}{Bin}{bin}{6E}
\DeclareFlexSymbol{\cdot}{Bin}{bin}{01}
\DeclareFlexSymbol{\ast}{Bin}{bin}{03}
\DeclareFlexSymbol{\times}{Bin}{bin}{02}
```

Relation symbols.

```
\DeclareFlexSymbol{\propto}{Rel}{rel}{2F}
\DeclareFlexSymbol{\sqsubseteq}{Rel}{rel}{76}
\DeclareFlexSymbol{\sqsupseteq}{Rel}{rel}{77}
\DeclareFlexSymbol{\parallel}{Rel}{rel}{6B}
\DeclareFlexSymbol{\mid}{Rel}{rel}{6A}
\DeclareFlexSymbol{\dashv}{Rel}{rel}{61}
\DeclareFlexSymbol{\vdash}{Rel}{rel}{60}
\DeclareFlexSymbol{\nearrow}{Rel}{rel}{25}
\DeclareFlexSymbol{\searrow}{Rel}{rel}{26}
\DeclareFlexSymbol{\nwarrow}{Rel}{rel}{2D}
\DeclareFlexSymbol{\swarrow}{Rel}{rel}{2E}
\DeclareFlexSymbol{\Leftrightarrow}{Rel}{rel}{2C}
\DeclareFlexSymbol{\Leftarrow}{Rel}{rel}{28}
\DeclareFlexSymbol{\Rightarrow}{Rel}{rel}{29}
\DeclareFlexSymbol{\leq}{Rel}{rel}{14}
\DeclareFlexSymbol{\geq}{Rel}{rel}{15}
\DeclareFlexSymbol{\succ}{Rel}{rel}{1F}
\DeclareFlexSymbol{\prec}{Rel}{rel}{1E}
\DeclareFlexSymbol{\approx}{Rel}{rel}{19}
\DeclareFlexSymbol{\succeq}{Rel}{rel}{17}
\DeclareFlexSymbol{\preceq}{Rel}{rel}{16}
\DeclareFlexSymbol{\supset}{Rel}{rel}{1B}
\DeclareFlexSymbol{\subset}{Rel}{rel}{1A}
\DeclareFlexSymbol{\supseteq}{Rel}{rel}{13}
\DeclareFlexSymbol{\subseteq}{Rel}{rel}{12}
```

```
\DeclareFlexSymbol{\in}{Rel}{rel}{32}
\DeclareFlexSymbol{\ni}{Rel}{rel}{33}
\DeclareFlexSymbol{\gg}{Rel}{rel}{1D}
\DeclareFlexSymbol{\ll}{Rel}{rel}{1C}
\DeclareFlexSymbol{\leftrightarrow}{Rel}{rel}{24}
\DeclareFlexSymbol{\leftarrow}{Rel}{rel}{20}
\DeclareFlexSymbol{\rightarrow}{Rel}{rel}{21}
\DeclareFlexSymbol{\sim}{Rel}{rel}{18}
\DeclareFlexSymbol{\simeq}{Rel}{rel}{27}
\DeclareFlexSymbol{\perp}{Rel}{rel}{3F}
\DeclareFlexSymbol{\equiv}{Rel}{rel}{11}
\DeclareFlexSymbol{\asymp}{Rel}{rel}{10}
```

The `\notRel` glyph is a special zero-width glyph intended only for use in constructing negated symbols. `\mapstoRel` and `\cdotPun` have similar but more restricted applications.

```
\DeclareFlexSymbol{\notRel}{Rel}{rel}{36}
\DeclareFlexSymbol{\mapstoOrd}{Ord}{OMS}{37}
\DeclareFlexSymbol{\cdotOrd}{Ord}{OMS}{01}
\def\cdotp{\mathpunct{\cdotOrd}}
```

Symbols from the 128-character `cmex` encoding. `COs` stands for 'cumulative operator (sum-like)'. `COi` stands for 'cumulative operator (integral-like)'. These typically differ only in the default placement of limits. `cop` stands for 'cumulative operator math group'.

```
\DeclareFlexSymbol{\coprod}{COs}{cop}{60}
\DeclareFlexSymbol{\bigvee}{COs}{cop}{57}
\DeclareFlexSymbol{\bigwedge}{COs}{cop}{56}
\DeclareFlexSymbol{\biguplus}{COs}{cop}{55}
\DeclareFlexSymbol{\bigcap}{COs}{cop}{54}
\DeclareFlexSymbol{\bigcup}{COs}{cop}{53}
\DeclareFlexSymbol{\int}{COi}{cop}{52}
\DeclareFlexSymbol{\prod}{COs}{cop}{51}
\DeclareFlexSymbol{\sum}{COs}{cop}{50}
\DeclareFlexSymbol{\bigotimes}{COs}{cop}{4E}
\DeclareFlexSymbol{\bigoplus}{COs}{cop}{4C}
\DeclareFlexSymbol{\bigodot}{COs}{cop}{4A}
\DeclareFlexSymbol{\oint}{COi}{cop}{48}
\DeclareFlexSymbol{\bigsqcup}{COs}{cop}{46}
```

Delimiter symbols. `DeL` stands for 'delimiter (left)'. `DeR` stands for 'delimiter (right)'. `DeB` stands for 'delimiter (bidirectional)'. The principal encoding point for an extensible delimiter is the first link in the list of linked sizes as specified in the font metric information. For a math encoding such as OT1/OML/OMS/OMX where not all sizes of a given delimiter reside in a given font, the extra encoding point for the smallest delimiter must be supplied by defining

```
\sd@GXX
```

where G is the mathgroup and XX is the hexadecimal glyph position.

```
\DeclareFlexSymbol{\rangle}{DeR}{del}{0B}
\DeclareFlexSymbol{\langle}{DeL}{del}{0A}
\DeclareFlexSymbol{\rbrace}{DeR}{del}{09}
\DeclareFlexSymbol{\lbrace}{DeL}{del}{08}
\DeclareFlexSymbol{\rceil}{DeR}{del}{07}
\DeclareFlexSymbol{\lceil}{DeL}{del}{06}
\DeclareFlexSymbol{\rfloor}{DeR}{del}{05}
\DeclareFlexSymbol{\lfloor}{DeL}{del}{04}
\DeclareFlexSymbol{(}{DeL}{del}{00}
\DeclareFlexSymbol{)}{DeR}{del}{01}
\DeclareFlexSymbol{[}{DeL}{del}{02}
\DeclareFlexSymbol{]}{DeR}{del}{03}
\DeclareFlexSymbol{\lVert}{DeL}{del}{0D}
\DeclareFlexSymbol{\rVert}{DeR}{del}{0D}
\DeclareFlexSymbol{\lvert}{DeL}{del}{0C}
\DeclareFlexSymbol{\rvert}{DeR}{del}{0C}
\DeclareFlexSymbol{\Vert}{DeB}{del}{0D}
\DeclareFlexSymbol{\vert}{DeB}{del}{0C}
```

Maybe make the vert bars mathord instead of delimiter, to discourage poor usage.

```
\DeclareFlexSymbol{|}{DeB}{del}{0C}
\DeclareFlexSymbol{/}{DeB}{del}{0E}
```

These wacky delimiters need to be supported I guess for compabitility reasons. The DeA delimiter type is a special case used only for these arrows.

```
\DeclareFlexSymbol{\lmoustache}{DeL}{del}{40}
\DeclareFlexSymbol{\rmoustache}{DeR}{del}{41}
\DeclareFlexSymbol{\lgroup}{DeL}{del}{3A}
\DeclareFlexSymbol{\rgroup}{DeR}{del}{3B}
\DeclareFlexSymbol{\bracevert}{DeB}{del}{3E}
\DeclareFlexSymbol{\arrowvert}{DeB}{del}{3C}
\DeclareFlexSymbol{\Arrowvert}{DeB}{del}{3D}
\DeclareFlexSymbol{\uparrow}{DeA}{del}{78}
\DeclareFlexSymbol{\downarrow}{DeA}{del}{79}
\DeclareFlexSymbol{\updownarrow}{DeA}{del}{3F}
\DeclareFlexSymbol{\Uparrow}{DeA}{del}{7E}
\DeclareFlexSymbol{\Downarrow}{DeA}{del}{7F}
\DeclareFlexSymbol{\Updownarrow}{DeA}{del}{77}
\DeclareFlexSymbol{\backslash}{DeB}{del}{0F}
```

3 Some compound symbols

The following symbols are not robust in standard LaTeX because they use `#` or `\mathpalette` (which is not robust and contains a `#` in its expansion): `\angle`, `\cong`, `\notin`, `\rightleftharpoons`.

In this definition of `\hbar`, the symbol is cobbled together from a math italic h and the cmr overbar accent glyph.

```
\DeclareFlexSymbol{\hbarOrd}{Ord}{OT1}{16}
\DeclareFlexCompoundSymbol{\hbar}{Ord}{\hbarOrd\mkern-9mu h}
```

For `\surd`, the interior symbol gets math class 1 (cumulative operator) to make the glyph vertically centered on the math axis, but the desired horizontal spacing is the spacing for a mathord. (Couldn't it just be class mathopen, though?)

```
\DeclareFlexSymbol{\surdOrd}{Ord}{OMS}{70}
\DeclareFlexCompoundSymbol{\surd}{Ord}{\mathop{\surdOrd}}
```

As shown in this definition of `\angle`, rule dimens are not allowed to use mathunits, unfortunately.

```
\DeclareFlexCompoundSymbol{\angle}{Ord}{%
  \vbox{\ialign{%
      $\m@th\scriptstyle##$\crcr
      \notRel\mathrel{\mkern14mu}\crcr
      \noalign{\nointerlineskip}%
      \mkern2.5mu\leaders\hrule \@height.34pt\hfill\mkern2.5mu\crcr
  }}%
}
```

The `\not` function, which is defined in the flexisym package, requires a suitably defined `\notRel` symbol.

```
\DeclareFlexCompoundSymbol{\neq}{Rel}{\not{=}}
```

.

```
\DeclareFlexCompoundSymbol{\mapsto}{Rel}{\mapstoOrd\rightarrow}
```

The `\@vereq` function ends by centering the whole construction on the math axis, unlike `\buildrel` where the base symbol remains at its normal altitude. Furthermore, `\@vereq` leaves the math style of the top symbol as given instead of downsizing to scriptstyle.

```
\DeclareFlexCompoundSymbol{\cong}{Rel}{\mathpalette\@vereq\sim}
```

The `\m@th` in the `fontmath.ltx` definition of `\notin` is superfluous unless `\c@ncel` doesn't include it (which was perhaps true in an older version of `plain.tex`?).

```
\providecommand*\joinord{}
⟨cmbase | mathptmx⟩\renewcommand*\joinord{\mkern-3mu }
⟨mathpazo⟩\renewcommand*\joinord{\mkern-3.45mu }
\DeclareFlexCompoundSymbol{\notin}{Rel}{\mathpalette\c@ncel\in}
\DeclareFlexCompoundSymbol{\rightleftharpoons}{Rel}{\mathpalette\rlh@{}}
\DeclareFlexCompoundSymbol{\doteq}{Rel}{\buildrel\textstyle.\over=}
\DeclareFlexCompoundSymbol{\hookrightarrow}{Rel}{\lhookRel\joinord\rightarrow}
\DeclareFlexCompoundSymbol{\hookleftarrow}{Rel}{\leftarrow\joinord\rhookRel}
\DeclareFlexCompoundSymbol{\bowtie}{Rel}{\triangleright\joinord\triangleleft}
\DeclareFlexCompoundSymbol{\models}{Rel}{\vert\joinord=}
\DeclareFlexCompoundSymbol{\Longrightarrow}{Rel}{\Relbar\joinord\Rightarrow}
\DeclareFlexCompoundSymbol{\longrightarrow}{Rel}{\relbar\joinord\rightarrow}
\DeclareFlexCompoundSymbol{\Longleftarrow}{Rel}{\Leftarrow\joinord\Relbar}
\DeclareFlexCompoundSymbol{\longleftarrow}{Rel}{\leftarrow\joinord\relbar}
\DeclareFlexCompoundSymbol{\longmapsto}{Rel}{\mapstochar\longrightarrow}
\DeclareFlexCompoundSymbol{\longleftrightarrow}{Rel}{\leftarrow\joinord\rightarrow}
\DeclareFlexCompoundSymbol{\Longleftrightarrow}{Rel}{\Leftarrow\joinord\Rightarrow}
```

Here is what you get from the old definition of `\iff`.

```
\glue 2.77771 plus 2.77771
\glue(\thickmuskip) 2.77771 plus 2.77771
\OMS/cmsy/m/n/10 (
\hbox(0.0+0.0)x-1.66663
.\kern -1.66663
\OMS/cmsy/m/n/10 )
\penalty 500
\glue 2.77771 plus 2.77771
\glue(\thickmuskip) 2.77771 plus 2.77771
```

Looks like it could be simplified slightly. But it's not so easy as it looks to do it without screwing up the line breaking possibilities.

```
\renewcommand*\iff{%
  \mskip\thickmuskip\Longleftrightarrow\mskip\thickmuskip
}
```

Some dotly symbols.

```
\DeclareFlexCompoundSymbol{\cdots}{Inn}{\cdotp\cdotp\cdotp}%
\DeclareFlexCompoundSymbol{\vdots}{Ord}{%
  \vbox{\baselineskip4\p@ \lineskiplimit\z@
    \kern6\p@\hbox{.}\hbox{.}\hbox{.}}}
\DeclareFlexCompoundSymbol{\ddots}{Inn}{%
  \mkern1mu\raise7\p@
  \vbox{\kern7\p@\hbox{.}}\mkern2mu%
  \raise4\p@\hbox{.}\mkern2mu\raise\p@\hbox{.}\mkern1mu%
}
```

.

```
\def\relbar{\begingroup \def\smash@{tb}% in case amsmath is loaded
    \mathpalette\mathsm@sh{\mathchar"200 }\endgroup}
```

For `\Relbar` we take an equal sign of class 0 (Ord) from the operator family. For cmr and mathptmx we know this is family 0.

```
⟨cmbase | mathptmx⟩\def\Relbar{\mathchar"3D }
```

For the mathpazo setup we need to use the equal sign from cmr and so must insert class 0 and use the symbol from the upright symbols.

```
⟨mathpazo⟩\edef\Relbar{\mathchar\string"\hexnumber@\symupright3D }
```

Done.

```
⟨/cmbase | mathpazo | mathptmx⟩
```

Various synonyms such as `\le` for `\leq` and `\to` for `\rightarrow` are defined in flexisym with `\def` instead of `\let`, for slower execution speed but smaller chance of synchronization problems.

```
⟨*msabm⟩
\ProvidesSymbols{msabm}[2001/09/08 v0.91]
\RequirePackage{amsfonts}\relax
\@xp\xdef\csname mg@MSA\endcsname{\hexnumber@\symAMSa}%
\@xp\xdef\csname mg@MSB\endcsname{\hexnumber@\symAMSb}%
```

```
\DeclareFlexSymbol{\boxdot}       {Bin}{MSA}{00}
\DeclareFlexSymbol{\boxplus}      {Bin}{MSA}{01}
\DeclareFlexSymbol{\boxtimes}     {Bin}{MSA}{02}
\DeclareFlexSymbol{\square}       {Ord}{MSA}{03}
\DeclareFlexSymbol{\blacksquare}  {Ord}{MSA}{04}
\DeclareFlexSymbol{\centerdot}    {Bin}{MSA}{05}
\DeclareFlexSymbol{\lozenge}      {Ord}{MSA}{06}
\DeclareFlexSymbol{\blacklozenge} {Ord}{MSA}{07}
\DeclareFlexSymbol{\circlearrowright}   {Rel}{MSA}{08}
\DeclareFlexSymbol{\circlearrowleft}    {Rel}{MSA}{09}
```

In amsfonts.sty:

```
%%\DeclareFlexSymbol{\rightleftharpoons}{Rel}{MSA}{0A}
\DeclareFlexSymbol{\leftrightharpoons}  {Rel}{MSA}{0B}
\DeclareFlexSymbol{\boxminus}     {Bin}{MSA}{0C}
\DeclareFlexSymbol{\Vdash}        {Rel}{MSA}{0D}
\DeclareFlexSymbol{\Vvdash}       {Rel}{MSA}{0E}
\DeclareFlexSymbol{\vDash}        {Rel}{MSA}{0F}
\DeclareFlexSymbol{\twoheadrightarrow}  {Rel}{MSA}{10}
\DeclareFlexSymbol{\twoheadleftarrow}   {Rel}{MSA}{11}
\DeclareFlexSymbol{\leftleftarrows}     {Rel}{MSA}{12}
\DeclareFlexSymbol{\rightrightarrows}   {Rel}{MSA}{13}
\DeclareFlexSymbol{\upuparrows}         {Rel}{MSA}{14}
\DeclareFlexSymbol{\downdownarrows} {Rel}{MSA}{15}
\DeclareFlexSymbol{\upharpoonright} {Rel}{MSA}{16}
 \let\restriction\upharpoonright
\DeclareFlexSymbol{\downharpoonright}   {Rel}{MSA}{17}
\DeclareFlexSymbol{\upharpoonleft}  {Rel}{MSA}{18}
\DeclareFlexSymbol{\downharpoonleft}{Rel}{MSA}{19}
\DeclareFlexSymbol{\rightarrowtail} {Rel}{MSA}{1A}
\DeclareFlexSymbol{\leftarrowtail}  {Rel}{MSA}{1B}
\DeclareFlexSymbol{\leftrightarrows}{Rel}{MSA}{1C}
\DeclareFlexSymbol{\rightleftarrows}{Rel}{MSA}{1D}
\DeclareFlexSymbol{\Lsh}            {Rel}{MSA}{1E}
\DeclareFlexSymbol{\Rsh}            {Rel}{MSA}{1F}
\DeclareFlexSymbol{\rightsquigarrow}  {Rel}{MSA}{20}
\DeclareFlexSymbol{\leftrightsquigarrow}{Rel}{MSA}{21}
\DeclareFlexSymbol{\looparrowleft}  {Rel}{MSA}{22}
\DeclareFlexSymbol{\looparrowright} {Rel}{MSA}{23}
\DeclareFlexSymbol{\circeq}       {Rel}{MSA}{24}
\DeclareFlexSymbol{\succsim}      {Rel}{MSA}{25}
\DeclareFlexSymbol{\gtrsim}       {Rel}{MSA}{26}
\DeclareFlexSymbol{\gtrapprox}    {Rel}{MSA}{27}
\DeclareFlexSymbol{\multimap}     {Rel}{MSA}{28}
\DeclareFlexSymbol{\therefore}    {Rel}{MSA}{29}
\DeclareFlexSymbol{\because}      {Rel}{MSA}{2A}
\DeclareFlexSymbol{\doteqdot}     {Rel}{MSA}{2B}
 \let\Doteq\doteqdot
\DeclareFlexSymbol{\triangleq}    {Rel}{MSA}{2C}
\DeclareFlexSymbol{\precsim}      {Rel}{MSA}{2D}
```

```
\DeclareFlexSymbol{\lesssim}      {Rel}{MSA}{2E}
\DeclareFlexSymbol{\lessapprox}   {Rel}{MSA}{2F}
\DeclareFlexSymbol{\eqslantless}  {Rel}{MSA}{30}
\DeclareFlexSymbol{\eqslantgtr}   {Rel}{MSA}{31}
\DeclareFlexSymbol{\curlyeqprec}  {Rel}{MSA}{32}
\DeclareFlexSymbol{\curlyeqsucc}  {Rel}{MSA}{33}
\DeclareFlexSymbol{\preccurlyeq}  {Rel}{MSA}{34}
\DeclareFlexSymbol{\leqq}         {Rel}{MSA}{35}
\DeclareFlexSymbol{\leqslant}     {Rel}{MSA}{36}
\DeclareFlexSymbol{\lessgtr}      {Rel}{MSA}{37}
\DeclareFlexSymbol{\backprime}    {Ord}{MSA}{38}
\DeclareFlexSymbol{\risingdotseq} {Rel}{MSA}{3A}
\DeclareFlexSymbol{\fallingdotseq}{Rel}{MSA}{3B}
\DeclareFlexSymbol{\succcurlyeq}  {Rel}{MSA}{3C}
\DeclareFlexSymbol{\geqq}         {Rel}{MSA}{3D}
\DeclareFlexSymbol{\geqslant}     {Rel}{MSA}{3E}
\DeclareFlexSymbol{\gtrless}      {Rel}{MSA}{3F}
```

in amsfonts.sty

```
%% \DeclareFlexSymbol{\sqsubset}    {Rel}{MSA}{40}
%% \DeclareFlexSymbol{\sqsupset}    {Rel}{MSA}{41}
\DeclareFlexSymbol{\vartriangleright}{Rel}{MSA}{42}
\DeclareFlexSymbol{\vartriangleleft} {Rel}{MSA}{43}
\DeclareFlexSymbol{\trianglerighteq} {Rel}{MSA}{44}
\DeclareFlexSymbol{\triangleleftteq}  {Rel}{MSA}{45}
\DeclareFlexSymbol{\bigstar}    {Ord}{MSA}{46}
\DeclareFlexSymbol{\between}    {Rel}{MSA}{47}
\DeclareFlexSymbol{\blacktriangledown}  {Ord}{MSA}{48}
\DeclareFlexSymbol{\blacktriangleright} {Rel}{MSA}{49}
\DeclareFlexSymbol{\blacktriangleleft}  {Rel}{MSA}{4A}
\DeclareFlexSymbol{\vartriangle}        {Rel}{MSA}{4D}
\DeclareFlexSymbol{\blacktriangle}      {Ord}{MSA}{4E}
\DeclareFlexSymbol{\triangledown}       {Ord}{MSA}{4F}
\DeclareFlexSymbol{\eqcirc}       {Rel}{MSA}{50}
\DeclareFlexSymbol{\lesseqgtr}    {Rel}{MSA}{51}
\DeclareFlexSymbol{\gtreqless}    {Rel}{MSA}{52}
\DeclareFlexSymbol{\lesseqqgtr}   {Rel}{MSA}{53}
\DeclareFlexSymbol{\gtreqqless}   {Rel}{MSA}{54}
\DeclareFlexSymbol{\Rrightarrow}  {Rel}{MSA}{56}
\DeclareFlexSymbol{\Lleftarrow}   {Rel}{MSA}{57}
\DeclareFlexSymbol{\veebar}       {Bin}{MSA}{59}
\DeclareFlexSymbol{\barwedge}     {Bin}{MSA}{5A}
\DeclareFlexSymbol{\doublebarwedge} {Bin}{MSA}{5B}
```

In amsfonts.sty

```
%%\DeclareFlexSymbol{\angle}        {Ord}{MSA}{5C}
\DeclareFlexSymbol{\measuredangle}  {Ord}{MSA}{5D}
\DeclareFlexSymbol{\sphericalangle} {Ord}{MSA}{5E}
\DeclareFlexSymbol{\varpropto}    {Rel}{MSA}{5F}
\DeclareFlexSymbol{\smallsmile}   {Rel}{MSA}{60}
\DeclareFlexSymbol{\smallfrown}   {Rel}{MSA}{61}
```

```
\DeclareFlexSymbol{\Subset}       {Rel}{MSA}{62}
\DeclareFlexSymbol{\Supset}       {Rel}{MSA}{63}
\DeclareFlexSymbol{\Cup}          {Bin}{MSA}{64}
 \let\doublecup\Cup
\DeclareFlexSymbol{\Cap}          {Bin}{MSA}{65}
 \let\doublecap\Cap
\DeclareFlexSymbol{\curlywedge}   {Bin}{MSA}{66}
\DeclareFlexSymbol{\curlyvee}     {Bin}{MSA}{67}
\DeclareFlexSymbol{\leftthreetimes} {Bin}{MSA}{68}
\DeclareFlexSymbol{\rightthreetimes}{Bin}{MSA}{69}
\DeclareFlexSymbol{\subseteqq}    {Rel}{MSA}{6A}
\DeclareFlexSymbol{\supseteqq}    {Rel}{MSA}{6B}
\DeclareFlexSymbol{\bumpeq}       {Rel}{MSA}{6C}
\DeclareFlexSymbol{\Bumpeq}       {Rel}{MSA}{6D}
\DeclareFlexSymbol{\lll}          {Rel}{MSA}{6E}
 \let\llless\lll
\DeclareFlexSymbol{\ggg}          {Rel}{MSA}{6F}
 \let\gggtr\ggg
\DeclareFlexSymbol{\circledS}     {Ord}{MSA}{73}
\DeclareFlexSymbol{\pitchfork}    {Rel}{MSA}{74}
\DeclareFlexSymbol{\dotplus}      {Bin}{MSA}{75}
\DeclareFlexSymbol{\backsim}      {Rel}{MSA}{76}
\DeclareFlexSymbol{\backsimeq}    {Rel}{MSA}{77}
\DeclareFlexSymbol{\complement}   {Ord}{MSA}{7B}
\DeclareFlexSymbol{\intercal}     {Bin}{MSA}{7C}
\DeclareFlexSymbol{\circledcirc}  {Bin}{MSA}{7D}
\DeclareFlexSymbol{\circledast}   {Bin}{MSA}{7E}
\DeclareFlexSymbol{\circleddash}  {Bin}{MSA}{7F}
```

Begin AMSb declarations

```
\DeclareFlexSymbol{\lvertneqq}    {Rel}{MSB}{00}
\DeclareFlexSymbol{\gvertneqq}    {Rel}{MSB}{01}
\DeclareFlexSymbol{\nleq}         {Rel}{MSB}{02}
\DeclareFlexSymbol{\ngeq}         {Rel}{MSB}{03}
\DeclareFlexSymbol{\nless}        {Rel}{MSB}{04}
\DeclareFlexSymbol{\ngtr}         {Rel}{MSB}{05}
\DeclareFlexSymbol{\nprec}        {Rel}{MSB}{06}
\DeclareFlexSymbol{\nsucc}        {Rel}{MSB}{07}
\DeclareFlexSymbol{\lneqq}        {Rel}{MSB}{08}
\DeclareFlexSymbol{\gneqq}        {Rel}{MSB}{09}
\DeclareFlexSymbol{\nleqslant}    {Rel}{MSB}{0A}
\DeclareFlexSymbol{\ngeqslant}    {Rel}{MSB}{0B}
\DeclareFlexSymbol{\lneq}         {Rel}{MSB}{0C}
\DeclareFlexSymbol{\gneq}         {Rel}{MSB}{0D}
\DeclareFlexSymbol{\npreceq}      {Rel}{MSB}{0E}
\DeclareFlexSymbol{\nsucceq}      {Rel}{MSB}{0F}
\DeclareFlexSymbol{\precnsim}     {Rel}{MSB}{10}
\DeclareFlexSymbol{\succnsim}     {Rel}{MSB}{11}
\DeclareFlexSymbol{\lnsim}        {Rel}{MSB}{12}
\DeclareFlexSymbol{\gnsim}        {Rel}{MSB}{13}
```

```
\DeclareFlexSymbol{\nleqq}         {Rel}{MSB}{14}
\DeclareFlexSymbol{\ngeqq}         {Rel}{MSB}{15}
\DeclareFlexSymbol{\precneqq}      {Rel}{MSB}{16}
\DeclareFlexSymbol{\succneqq}      {Rel}{MSB}{17}
\DeclareFlexSymbol{\precnapprox}   {Rel}{MSB}{18}
\DeclareFlexSymbol{\succnapprox}   {Rel}{MSB}{19}
\DeclareFlexSymbol{\lnapprox}      {Rel}{MSB}{1A}
\DeclareFlexSymbol{\gnapprox}      {Rel}{MSB}{1B}
\DeclareFlexSymbol{\nsim}          {Rel}{MSB}{1C}
\DeclareFlexSymbol{\ncong}         {Rel}{MSB}{1D}
\DeclareFlexSymbol{\diagup}        {Ord}{MSB}{1E}
\DeclareFlexSymbol{\diagdown}      {Ord}{MSB}{1F}
\DeclareFlexSymbol{\varsubsetneq}    {Rel}{MSB}{20}
\DeclareFlexSymbol{\varsupsetneq}    {Rel}{MSB}{21}
\DeclareFlexSymbol{\nsubseteqq}      {Rel}{MSB}{22}
\DeclareFlexSymbol{\nsupseteqq}      {Rel}{MSB}{23}
\DeclareFlexSymbol{\subsetneqq}      {Rel}{MSB}{24}
\DeclareFlexSymbol{\supsetneqq}      {Rel}{MSB}{25}
\DeclareFlexSymbol{\varsubsetneqq}   {Rel}{MSB}{26}
\DeclareFlexSymbol{\varsupsetneqq}   {Rel}{MSB}{27}
\DeclareFlexSymbol{\subsetneq}       {Rel}{MSB}{28}
\DeclareFlexSymbol{\supsetneq}       {Rel}{MSB}{29}
\DeclareFlexSymbol{\nsubseteq}       {Rel}{MSB}{2A}
\DeclareFlexSymbol{\nsupseteq}       {Rel}{MSB}{2B}
\DeclareFlexSymbol{\nparallel}       {Rel}{MSB}{2C}
\DeclareFlexSymbol{\nmid}            {Rel}{MSB}{2D}
\DeclareFlexSymbol{\nshortmid}       {Rel}{MSB}{2E}
\DeclareFlexSymbol{\nshortparallel}  {Rel}{MSB}{2F}
\DeclareFlexSymbol{\nvdash}          {Rel}{MSB}{30}
\DeclareFlexSymbol{\nVdash}          {Rel}{MSB}{31}
\DeclareFlexSymbol{\nvDash}          {Rel}{MSB}{32}
\DeclareFlexSymbol{\nVDash}          {Rel}{MSB}{33}
\DeclareFlexSymbol{\ntrianglerighteq}{Rel}{MSB}{34}
\DeclareFlexSymbol{\ntrianglelefteq}{Rel}{MSB}{35}
\DeclareFlexSymbol{\ntriangleleft}   {Rel}{MSB}{36}
\DeclareFlexSymbol{\ntriangleright}  {Rel}{MSB}{37}
\DeclareFlexSymbol{\nleftarrow}      {Rel}{MSB}{38}
\DeclareFlexSymbol{\nrightarrow}     {Rel}{MSB}{39}
\DeclareFlexSymbol{\nLeftarrow}      {Rel}{MSB}{3A}
\DeclareFlexSymbol{\nRightarrow}     {Rel}{MSB}{3B}
\DeclareFlexSymbol{\nLeftrightarrow}{Rel}{MSB}{3C}
\DeclareFlexSymbol{\nleftrightarrow}{Rel}{MSB}{3D}
\DeclareFlexSymbol{\divideontimes}   {Bin}{MSB}{3E}
\DeclareFlexSymbol{\varnothing}      {Ord}{MSB}{3F}
\DeclareFlexSymbol{\nexists}         {Ord}{MSB}{40}
\DeclareFlexSymbol{\Finv}            {Ord}{MSB}{60}
\DeclareFlexSymbol{\Game}            {Ord}{MSB}{61}
```

In amsfonts.sty:

```
%%\DeclareFlexSymbol{\mho}           {Ord}{MSB}{66}
```

```
\DeclareFlexSymbol{\eth}             {Ord}{MSB}{67}
\DeclareFlexSymbol{\eqsim}           {Rel}{MSB}{68}
\DeclareFlexSymbol{\beth}            {Ord}{MSB}{69}
\DeclareFlexSymbol{\gimel}           {Ord}{MSB}{6A}
\DeclareFlexSymbol{\daleth}          {Ord}{MSB}{6B}
\DeclareFlexSymbol{\lessdot}         {Bin}{MSB}{6C}
\DeclareFlexSymbol{\gtrdot}          {Bin}{MSB}{6D}
\DeclareFlexSymbol{\ltimes}          {Bin}{MSB}{6E}
\DeclareFlexSymbol{\rtimes}          {Bin}{MSB}{6F}
\DeclareFlexSymbol{\shortmid}        {Rel}{MSB}{70}
\DeclareFlexSymbol{\shortparallel}   {Rel}{MSB}{71}
\DeclareFlexSymbol{\smallsetminus}   {Bin}{MSB}{72}
\DeclareFlexSymbol{\thicksim}        {Rel}{MSB}{73}
\DeclareFlexSymbol{\thickapprox}     {Rel}{MSB}{74}
\DeclareFlexSymbol{\approxeq}        {Rel}{MSB}{75}
\DeclareFlexSymbol{\succapprox}      {Rel}{MSB}{76}
\DeclareFlexSymbol{\precapprox}      {Rel}{MSB}{77}
\DeclareFlexSymbol{\curvearrowleft}  {Rel}{MSB}{78}
\DeclareFlexSymbol{\curvearrowright}{Rel}{MSB}{79}
\DeclareFlexSymbol{\digamma}         {Ord}{MSB}{7A}
\DeclareFlexSymbol{\varkappa}        {Ord}{MSB}{7B}
\DeclareFlexSymbol{\Bbbk}            {Ord}{MSB}{7C}
\DeclareFlexSymbol{\hslash}          {Ord}{MSB}{7D}
```

In amsfonts.sty:

```
%%\DeclareFlexSymbol{\hbar}          {Ord}{MSB}{7E}
\DeclareFlexSymbol{\backepsilon}     {Rel}{MSB}{7F}
```

⟨/msabm⟩