The pdfMSym package (the PDF Math Symbols package) was created as an extension to the math macros provided by \TeX and \LaTeX. It provides more obscure symbols not found in popular preexisting and reimplements macros which were viewed as flawed.

A big part of the package was implemented through \pdfliteral{s} and other PDF primitives. So the pdfMSym package is intended for use with PDF\TeX, Lua\TeX, \Xe\TeX, and their \LaTeX counterparts. Unfortunately, some macros are not supported by \Xe\TeX.
1. An Introduction to PDFMSYM

The main motivator for creating PDFMSYM was \TeX’s poor implementation of the \overrightarrow macro which many times yields unsavory results. For example \overrightarrow{\text{ABC}} yields:

\[ \overrightarrow{ABC} \]

As you can see, the arrow overlaps with the ABC which is undesirable. This can be fixed by altering the \rightarrow macro, but I decided to make a more versatile alternative: the PDFMSYM alternative \vec:\n
\[ \vec{ABC} \]

Along with a few other features, PDFMSYM provides a simple interface for creating your own style of arrows. PDFMSYM requires the current font size in order to properly scale its symbols, which must be provided after \inputing pdfsym.tex. This can be done with the \pdfsymsetscalefactor macro. If your font is 12pt then you can load PDFMSYM like so:

\begin{verbatim}
\input pdfsym
\pdfsymsetscalefactor{12}
\end{verbatim}

It is imperative that you set the scale factor after loading pdfsym as otherwise almost none of the macros will work.

2. The Predefined Symbols

This section will simply be an exhaustive list of all the predefined symbols PDFMSYM provides.

2.1. Math Symbols

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\begin{align*}
\begin{array}{ll}
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\text{\scriptstyle} & A \land B \\
\text{\textstyle} & A \land B \\
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\end{array}
\end{align*}
\end{verbatim}

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\end{array}
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PDFMSYM also provides arbitrary length closed loop integrals via \texttt{oiNint\{N\}} which creates an \( N \) dimensional closed loop integral. Similarly \texttt{biNint} creates a similar integral sign but rectangular instead of elliptical. Finally there is also \texttt{iNint} which simply creates multiple integrals (this may be desirable instead of manually doing so since it properly set limits both with \texttt{limits} and \texttt{nolimits}).
Additionally, \lightning is provided as a textmode command and renders ⃗.

### 2.2. Vector Symbols

Each vector comes as a pair: the normal form and the short form. The normal form is meant to cover longer material while the short form covers shorter material.

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The \constvec macro has the following usage:

\constvec\langle vector macro\rangle\{\langle material\rangle\}

And it centers the vector macro above material as if it had the same height as $x$, cropping anything above that height. So for example \constvec\vecc\{abc\} yields $\overrightarrow{abc}$. This macro cannot be used in Xe\LaTeX.

### 2.3. Arrow Symbols

Each arrow comes as a triplet: the normal form, the long form, and the extendable form. The extendable form is similar to \xrightarrow and friends, an extendable arrow has the following use:

\xarrow\{\langle top material\rangle\}\{\langle bottom material\rangle\}

And creates an extended arrow to fit both the top and bottom material.
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2.4. Wide Accents

Wide accents provide variants to the commonly used accents like \texttt{\widehat} and \texttt{\widetilde}. Unlike these accents, PDFMSYM’s wide accents can grow arbitrarily large.

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2.5. Extendable Operators

Extendible operators extend to the width of the material in their limits. These operators should only be used in display mode, since they use the display modes of the operators. They are \texttt{\sum} and \texttt{\prod}:

\[
\sum_{abcdef} \quad \prod_{abcdef}
\]

These are not available in X\LaTeX. 
3. Defining Your Own Symbols

The following section outlines the interface which PDFMSYM utilizes to create its symbols. Some of the macros require knowledge of PDF’s native graphics operators, which is not explained here. For resources on that, consult Adobe’s PDF Reference, chapter 4 (Graphics).

3.1. The Macros

\texttt{\@linehead@type \{pdf code\}\{width\}} : This creates a “linehead” which is used to cap lines, like \texttt{\@rarrow} (\texttt{*}). \texttt{pdf code} is the actual code used to draw the symbol, and it should be noted that all necessary transformations to the linehead are done by \texttt{\@linehead@type} and should not be included in the code. This includes the setting of the width and transforming the coordinate system. The \texttt{width} is the width of the drawing of the \texttt{pdf code}.

This macro actually accepts more parameters, but they’re used internally and therefore aren’t necessary to explain. Therefore the only use this macro should be for is defining line heads. For example, the definition of \texttt{\@rarrow} is:

\texttt{\def\@rarrow \{\@linehead@type\{0 0 m 2 0 l 1 0 0 1 0 1.5 c 2 0 m 1 0 0 -1 0 -1.5 c S\}\{2\}}

The following is a table of all the predefined lineheads (scaled for visibility):

| \texttt{\@rarrow} | \texttt{\@larrow} | \texttt{\@rharp} | \texttt{\@lharp} | \texttt{\@rdharp} | \texttt{\@ldharp} | \texttt{\@linecap} | \texttt{\@mapcap} | \texttt{\@mapsfromcap} | \texttt{\@rsarrow} | \texttt{\@lsarrow} | \texttt{\@backuphook} | \texttt{\@frontuphook} | \texttt{\@backdownhook} | \texttt{\@frontdownhook} | \texttt{\@doublerarrow} | \texttt{\@doublelarrow} | \texttt{\@Rarrow} | \texttt{\@Larrow} | \texttt{\@Linecap} | \texttt{\@Rightcirclecap} | \texttt{\@Leftcirclecap} | \texttt{\@Rightsquarecap} | \texttt{\@Leftsquarecap} | \texttt{\@Rightribboncap} | \texttt{\@Leftribboncap} | \texttt{\@BigLinecap} | \texttt{\@Rightarrows} | \texttt{\@Leftarrows} | \texttt{\@Rightunderarrow} | \texttt{\@Leftunderarrow} | \texttt{\@Rightoverarrow} | \texttt{\@Leftoverarrow} | \texttt{\@TripleLinecap} | \texttt{\@TripleRarrow} | \texttt{\@TripleLarrow} |

\texttt{\@vecc@def \{(vector name)\}\{left cap\}\{right cap\}} : This creates a vector macro, like \texttt{\vecc}. This creates both the normal and short variations of the vector. For example, the definition of the \texttt{vecc} vectors is:

\texttt{\@vecc@def{vecc}\@linecap\@rarrow}

\texttt{\@undervecc@def \{(vector name)\}\{left cap\}\{right cap\}} : This creates an under-vector macro, like \texttt{\undervecc}. This creates both the normal and short variations of the vector. For example, the definition of the \texttt{undervecc} vectors is:

\texttt{\@undervecc@def{undervecc}\@linecap\@rarrow}

\texttt{\@arrow@def \{(arrow name)\}\{left cap\}\{right cap\}} : This creates an arrow macro, like \texttt{\varrightarrow}. This creates the normal, long, and extendable versions of the arrow. For example, the definition of the \texttt{varrightarrow} vectors is:

\texttt{\@arrow@def{varrightarrow}\@linecap\@rarrow}

\texttt{\@Arrow@def \{(arrow name)\}\{left cap\}\{right cap\}\{height displacement\}} : This creates a double-stroked arrow, like \texttt{\varRightarrow}. This macro creates the normal, long, and extendable versions of the arrow. \texttt{height displacement} is half the difference in height between the two strokes (the difference of height between one stroke and the center). For the default double stroke linecaps PDFMSYM defines, this should be 1. For example, the definition of \texttt{\varRightarrow} is:

\texttt{\@Arrow@def{varRightarrow}\@Linecap\@Rarrow{1}}

\texttt{\@multi@Arrow@def \{(arrow name)\}\{number strokes\}\{left cap\}\{right cap\}\{height displacement\}} : This creates an arrow with any number of strokes according to \texttt{number strokes}. Doing \texttt{\@multi@Arrow@def} with 1 or 2...
strokes is equivalent to \arrowdef or \Arrowdef, respectively. Similar to above, height displacement is half the difference between two adjacent strokes. For example, the definition of \varRightarrow is:

\multiArrowdef{\varRightarrow}{3}\@TripleLinecap\@TripleRarrow{1} \arrowdef

\Arrowdef \langle \text{left cap} \rangle \langle \text{right cap} \rangle \langle \text{length} \rangle : This draws a single-stroke arrow whose caps are \text{left cap} and \text{right cap} respectively and whose length is \text{length}. This is used by \arrowdef, for example \varRightarrow is defined to be

\arrowdef \langle \text{left cap} \rangle \langle \text{right cap} \rangle \langle \text{length} \rangle{1} \arrowdef

\MultiArrowdef \langle \text{number strokes} \rangle \langle \text{left cap} \rangle \langle \text{right cap} \rangle \langle \text{length} \rangle \langle \text{height displacement} \rangle : This draws an arrow with a specified number of strokes. The usage of the parameters is identical to theirs in \MultiArrowdef. This is used by \MultiArrowdef, for example \varRightarrow is defined to be:

\MultiArrowdef{3}\@TripleLinecap\@TripleRarrow{1.5} \arrowdef

\Wideaccent \langle \text{pdf code} \rangle : This creates a wide accent, like \varwidecheck. The width of the drawing by the \text{pdf code} should be 1, and it should be filled not stroked (since the accent is transformed to stretch over the material beneath it). Again this macro should only be used to define wide accents. For example, the definition of \varwidecheck is:

\def\varwidecheck{\@wideaccent{0 .3 .5 -.4 1 1 1.3 1 1.6 1 .5 .3 1 1.6 1 f}} \wideaccent

\PDFdrawingmacro \langle \text{name} \rangle \langle \text{pdf code} \rangle \langle \text{width} \rangle \langle \text{height} \rangle \langle \text{depth} \rangle \langle \text{horizontal skew} \rangle \langle \text{style scaling} \rangle : This creates a text mode symbol like \lightning. It is important that the \text{pdf code} fits inside the box created by \text{width}, \text{height}, and \text{depth} since the drawing is placed inside of an XForm and so anything outside the box will be cropped. The \text{horizontal skew} can be used to shift the symbol so that it fits horizontally inside the box. For example, the definition of \lightning is:

\PDFdrawingmacro{lightning} \% The lightning symbol is drawn upright
\pdfliteral{.86603 -.5 .5 .86603 0 0 cm \% and rotated 30 degrees
1 .1 .1 j .6 w
-3 10 m -3 4.133975 l 0 5.866025 l 0 0 l -1.125 1.5 1 0 0 1.125 1.5 1 S}
{4.2pt}{10.5pt}{.5pt}{.9pt} \PDFdrawingmacro

\PDFdrawingmathmacro \langle \text{name} \rangle \langle \text{pdf code} \rangle \langle \text{width} \rangle \langle \text{height} \rangle \langle \text{depth} \rangle \langle \text{skew} \rangle \langle \text{style scaling} \rangle : This creates a math mode symbol like \divs. The first few parameters are identical in use as \PDFdrawingmacro’s, and \text{style scaling} is used to set the scaling for the symbol in different math styles. \text{style scaling} should be three groups: the first group is the scaling used in textstyle, the second in scriptstyle, and the third in scriptscriptstyle. Each of these scalings should consist of two components: the fractional scaling and the decimal scaling. So for example if we’d like to scale it by 0.6 the scaling would be \{6 / 10\}{0.6}. This is necessary since \dimexpr doesn’t play with decimals nicely, but \pdfliteral requires them. For example, the definition of \divs is:

\PDFdrawingmathmacro{@divs}\{1.3 w 1 j
2.5 1 0 .1 re
2.5 5 0 .1 re
2.5 9 0 .1 re B\} \{5.4pt\}{10pt\}{0pt\}{.2pt}
\{1\}{1\}\{7 / 10\}{.7}\{11 / 20\}{.55}\PDdrawingmathmacro
\def\divs{\mathrel{\@divs}} \% Make divs a relation
\putsym \{\text{main symbol}\} \{\text{secondary symbol}\} : This centers the secondary symbol over the main symbol, and can be used to create symbols like \aint. Note that doing this creates a symbol which acts like an Ord on the left side and whatever type of atom main symbol is on the right (glue-wise). So it may be necessary to add some math atom “hackery” around the \putsym in order to get the target glue. For example, the definition of \aint is:

\def\aint{\mathop{}\mathclose{}\putsym\int-}

The \mathop{}\mathclose{} makes it act like an Op on the left (the \mathclose{} removes any glue added on the right of the \mathop). Usually the definition is simpler, but this is slightly more complicated since \int has specially placed limits. Another example, this time the definition of \bigcup is:

\def\bigcup{\mathop{\putsym\bigcup\cdot}}

\@skewedlim@op \{\langle\text{operator}\rangle\{\langle\text{sup1}\rangle\{\langle\text{sub1}\rangle\{\langle\text{sup2}\rangle\{\langle\text{sub2}\rangle\{\langle\text{sup3}\rangle\{\langle\text{sub3}\rangle\{\langle\text{default limit}\rangle\}}\}}\}}\}

This creates a large math operator with skewed limits, like \int. operator should be a math operator, sup1 and sub1 are the skews of the superscript and subscript of the operator, respectively under \nolimits. Similarly sup2 and sub2 are the skews for \limits, and sup3 and sub3 are the skews for the default limit (if this is not followed by \limits or \nolimits) which is given by default limit.

For example, \@oiNint is defined to be a macro which creates the shape of \oiNint (see below), and \oiNint is defined as

\def\oiNint#1{\@skewedlim@op{\mathop{\@oiNint{#1}}}{-4}{6}{-10}{10}{-4}{6}\nolimits}

\putexsym \{\langle\text{symbol}\rangle\{\langle\text{left cap}\rangle\{\langle\text{right cap}\rangle\{\langle\text{height displacement}\rangle\{\langle\text{skew}\rangle\}}\}

This draws a double stroked drawing on top of symbol whose caps are left cap and right cap with a height displacement (the half the space between strokes) of height displacement. skew alters the space between the end of symbol and where the double stroked drawing is drawn. For example, \oiNint, which gives the shape of \oiNint, is defined as

\def\oiNint#1{\putexsym{\iNint{#1}}\@BigLeftcirclecap\@BigRightcirclecap{2.5}{4}}

\iNint is a macro

\iNint\{N\}

which prints \text{N} integrals with a kern \iNint@kern@ between each one.

\@wide@operator \{\langle\text{name}\rangle\{\langle\text{operator}\rangle\{\langle\text{first cut}\rangle\{\langle\text{second cut}\rangle\}}\}

This creates an extendable operator of operator whose name is name, like \sum. first cut is a decimal value which is where on the width of operator to make the first slice, and similar for second cut. The extendable part of the new operator is the area between the two cuts. For example, the definition of \sum is:

\@wide@operator{\sum}{\sum}{.52}{.6}

You can see where the slices are for a wide operator using the \@show@slices macro, for example

\@show@slices{\sum}

gives:

\[ \sum \]

These macros are not available for X\LaTeX.

### 3.2. The Dimensions

For fine-tuning of symbols, it may be useful to familiarize oneself with the various dimensions pdfmsym utilizes for various purposes through its symbol definitions. Dimensions are all defined as macros, and are all dimensionless. If a dimension is defined as 1 then it corresponds to 1 in 10pt font.

\@font@scale The amount of scaling relative to 10pt, this is defined via pdfmsymsetscalefactor.

\vecc@w The height of the arrows, similarly there is \vecc@hw which must be equal to half of \vecc@w.
PDFMSYM leaves a space of \vecc@skew between the ends of material and the endpoints of the vector on top or below the material.

\vecc@X@s is the ratio of the scaling factor (as a decimal) of the X math style (X can be displaystyle, textstyle, etc.). Similarly \vecc@X@sf should be numerically equivalent to \vecc@X@s but written as a fraction. PDFMSYM scales (many, but not all, see \exsym@X@s and \exsym@X@sf) math macros according to these values.

The amount of space between material and the vector symbol above or below it.

The math kerning to be used around an arrow. \arrow@skip must be defined as glue, eg \mkern1mu.

The length of an arrow defined by \Arrow@def. \arrow@len is a unit, for example PDFMSYM defines it as 6. This length does not include the lengths of the arrow caps.

The length of a long arrow defined by \Arrow@def.

The length of a double stroked arrow defined by \@Arrow@def.

The length of a long double stroked arrow defined by \@Arrow@def.

The amount of extra arrow to add between the caps of an extendable arrow and when the above/below material begins.

Analogous to \vecc@skew but for extendable accents.

Analogous to \vecc@skip but for extendable accents.

Analogous to \vecc@X@s and \vecc@X@sf but used by \putexsym.

Analogous to \vecc@X@s and \vecc@X@sf but used by \putexsym.

The amount of kerning to put between integral signs in \iNint. This must be given as glue, eg. \mkern-10mu\mathchoice{\mkern-5mu}{}{}{}}.\}}{.}}