1 Introduction

The amsopn package provides a command \texttt{\textbackslash DeclareMathOperator} for defining new ‘math operator names’ similar to the standard function names \texttt{\textbackslash sin}, \texttt{\textbackslash lim}, \texttt{\textbackslash max}, etc.

Standard file identification.

\texttt{\textbackslash NeedsTeXFormat\{LaTeX2e\}}% LaTeX 2.09 can’t be used (nor non-LaTeX)
\texttt{\{1994/12/01\}}% LaTeX date must December 1994 or later
\texttt{\textbackslash ProvidesPackage\{amsopn\}\{2016/03/08 v2.02 operator names\}}

What \texttt{\nolimits@} does is keep a \texttt{\limits} typed by the user from having any effect. This is used for operator names whose standard usage is never to have limits.

\texttt{\nolimits@\texttt{\{\textbackslash ifnextchar\limits\{\nolimits\texttt{@\textbackslash gobble}\}\{\nolimits\}}}\}}

In operator names, it is sometimes desired to have text-mode punctuation characters such as \texttt{-/\ldots}. Because the body of an operator name is set in math mode, these few punctuation characters will not come out right (wrong symbol/and or wrong spacing). The purpose of \texttt{\newmcodes@} is to make them act like their normal text versions.

Where practical, we use decimal numbers to cut down main mem usage (“not needed). use \texttt{\Umathcodedefnum} with xetex and LuaTeX to avoid problems using \texttt{\mathcode} if \texttt{-} has already been defined using \texttt{\mathcode}.

\texttt{\begingroup \catcode’\"=12
\texttt{\{\textbackslash ifx\Umathcode\@undefined\texttt{\gdef\newmcodes@\\{\textbackslash mathcode‘/39\mathcode‘/42\mathcode‘."613A% Define \texttt{\std@minus} for \texttt{\relbar} use; otherwise there are problems with arrows constructed with relbar.
\texttt{\{\texttt{\mathcode‘\"=45 \texttt{\else \texttt{\mathchardef\std@minus\mathcode‘\texttt{-}\texttt{-relax}}\texttt{\fi}
\texttt{\mathcode‘\"=45\mathcode‘/47\mathcode‘."603A\texttt{relax}}}
\else
  \gdef\newmcodes@{\mathcode\'39\mathcode\'42\mathcode.613A%\ifnum\Umathcodenum'=45 \else
    \Umathcharnumdef\std@minus\Umathcodenum'\relax
  \fi\mathcode'\-45\mathcode'\/47\mathcode'.603A\relax}
\fi
\endgroup

The command \texttt{\operatorname} prints its argument as a `math operator’ like \texttt{\sin} or \texttt{\det}, with proper font and spacing.

\texttt{\DeclareRobustCommand{\operatorname}{%}
  \@ifstar{\qopname\newmcodes@ m}{\qopname\newmcodes@ o}}%}

In the interior of the \texttt{\mathop} we need a null object (we choose a zero kern for minimum waste of main mem) in order to guard against the case where \texttt{#3} is a single letter; \TeX{} will seize it and center it on the math axis if there is nothing else inside the \texttt{\mathop} atom.

\texttt{\DeclareRobustCommand{\qopname}{%}
  \mathop{#1\kern\z@\operator@font#3}\
  \csname n#2limits\endcsname} \texttt{\DeclareMathOperator} defines the first argument to be an operator name whose text is the second argument. The star form means that the operator name should take limits (like \texttt{\max} or \texttt{\lim}).

\texttt{\newcommand{\DeclareMathOperator}{%}
  \@ifstar{\@declmathop m}{\@declmathop o}}%

In the basic set of operator names (below) we did not use \texttt{\DeclareRobustCommand} because of the hash table cost. But we use it here to minimize the chances of trouble, since we are producing a user-defined command.

\texttt{\long\def\declmathop#1#2#3{%}
  \@ifdefinable{#2}{%}
    \DeclareRobustCommand{#1}{\qopname\newmcodes@#1{#3}}}\texttt{\DefineMathOperator} defines the first argument to be an operator name whose text is the second argument. The star form means that the operator name should take limits (like \texttt{\max} or \texttt{\lim}).

\texttt{\newcommand{\DeclareMathOperator}{%}
  \@ifstar{\@declmathop m}{\@declmathop o}}%

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\texttt{\long\def\declmathop#1#2#3{%}
  \@ifdefinable{#2}{%}
    \DeclareRobustCommand{#1}{\qopname\newmcodes@#1{#3}}}
This command is provided to allow the document styles to decide in which way math operators like ‘max’ or ‘log’ are typeset. The default is to set them in ⟨math group⟩ zero of the current math version. The original name was \operatorfont, retained for compatibility; the second name was added to make it more accessible so that users can call this font for use in special constructs that are not ordinary operator names but conceptually related.

For backwards compatibility we keep this old command name for the time being:

{\def\operatornamewithlimits{{\operatorname{\oslash}}} \def\operatorname{\mathgroup{\symoperators}}}
\def\varinjlim{% 
  \mathop{\mathpalette\varlim@{\rightarrowfill@\textstyle}}\nmlimits@ 
}\def\varprojlim{% 
  \mathop{\mathpalette\varlim@{\leftarrowfill@\textstyle}}\nmlimits@ 
}\def\varliminf{% 
  \mathop{\mathpalette\varlim@{}\nmlimits@} 
}\def\varlimsup{% 
  \mathop{\mathpalette\varlim@{}\nmlimits@} 
}\let\nmlimits@\displaylimits
\DeclareOption{namelimits}{\let\nmlimits@\displaylimits}
\DeclareOption{nonamelimits}{\let\nmlimits@\nolimits}
\ProcessOptions\relax

If we don't load the \texttt{amsgen} package then the use of \texttt{\ex@} in \texttt{\varlim@} will lead to trouble.
\RequirePackage{amsgen}\relax

The usual \texttt{\endinput} to ensure that random garbage at the end of the file doesn't get copied by \texttt{docstrip}.
\endinput