The \texttt{commath} \LaTeX{} package v0.3

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Abstract

The \texttt{commath}-package provides some commands which help you to format formulas flexibly.

1 Introduction

The purpose of the \texttt{commath}-package is to provide some commands which are supposed to produce better formatting and/or provide a more convenient way of input. For example, the \texttt{commath}-package provides commands for delimiters for which the size is determined automatically by default or can be controlled by an integer argument. Thus, the size of delimiters can be adapted to the formula by just changing one integer argument.

2 Acknowledgements

I want to thank Simon Dreher and Luca Trevisani for useful feedback and hints.

3 Requirements

The \texttt{commath}-package requires the \texttt{ifthen}-package and the \texttt{amsmath}-package to be installed. If they were not loaded before they are loaded by the \texttt{commath}-package.
4 Command overview

\dif is a command for the differential operator. It is simply an upface d to clarify that it is an operator. E.g.:
\[ \dif x \quad dx \]

\Dif is a command for a derivative operator (e.g. Malliavin derivative ...). It is simply an upface D to clarify that it is an operator. E.g.:
\[ \Dif X \quad DX \]

\od\{optional argument\}\{first argument\}\{second argument\} is a command for ordinary derivatives. The first argument denotes the function and the second argument denotes the variable with respect to which the derivative is taken. The optional argument denotes the order of differentiation. The style (text style/display style) is determined automatically. E.g.:
\[ \od{f}{x} \quad \frac{df}{dx} \]
\[ \od[2]{f}{x} \quad \frac{d^2f}{dx^2} \]

The \tod-command is essentially the same as the \od-command except that the style is set to text style.

The \dod-command is essentially the same as the \od-command except that the style is set to display style.

\pd\{optional argument\}\{first argument\}\{second argument\} is a command for partial derivatives. The first argument denotes the function and the second argument denotes the variable with respect to which the derivative is taken. The optional argument denotes the order of differentiation. The style (text style/display style) is determined automatically. E.g.:
\[ \pd{f}{x} \quad \frac{\partial f}{\partial x} \]
\[ \pd[2]{f}{x} \quad \frac{\partial^2 f}{\partial x^2} \]

The \tpd-command is essentially the same as the \pd-command except that the style is set to text style.

The \dpd-command is essentially the same as the \pd-command except that the style is set to display style.

\md\{first argument\}...\{sixth argument\} is a command for mixed partial derivatives. The first argument denotes the function and the second argument denotes the total order of differentiation. The third and the fifth argument are the variables with respect to which we want to differentiate and the fourth and the sixth argument are the corresponding orders of differentiation. The style (text style/display style) is determined automatically. E.g.:
\[ \md{f}{5}{x}{2}{y}{3} \quad \frac{\partial^5 f}{\partial x^2 \partial y^3} \]
The \texttt{\textbackslash m}d\texttt{-command is essentially the same as the \texttt{\textbackslash m}d\texttt{-command except that the style is set to text style.}

The \texttt{\textbackslash d}md\texttt{-command is essentially the same as the \texttt{\textbackslash m}d\texttt{-command except that the style is set to display style.}

\texttt{\textbackslash del\{optional argument\}\{first argument\}}\texttt{is a command for delimiters (normal parathesis). The value for the optional argument ranges from 0 to 4 with higher values resulting in larger delimiters. The default value for the optional argument is -1 which results in automatic sizing for the parenthesis.}\texttt{\textbackslash del}\texttt{\{optional argument\}\{first argument\}}\texttt{\textbackslash del\{0\}\{x\}}\texttt{\textbackslash del\{1\}\{x\}}\texttt{\textbackslash del\{2\}\{x\}}\texttt{\textbackslash del\{3\}\{x\}}\texttt{\textbackslash del\{4\}\{x\}}\texttt{\texttt{\textbackslash cbr\{optional argument\}\{first argument\}}\texttt{is a command for curly braces. The value for the optional argument ranges from 0 to 4 with higher values resulting in larger braces. The default value for the optional argument is -1 which results in automatic sizing for the braces.}\texttt{\textbackslash cbr}\texttt{\{optional argument\}\{first argument\}}\texttt{\textbackslash cbr\{0\}\{x\}}\texttt{\textbackslash cbr\{1\}\{x\}}\texttt{\textbackslash cbr\{2\}\{x\}}\texttt{\textbackslash cbr\{3\}\{x\}}\texttt{\textbackslash cbr\{4\}\{x\}}\texttt{\texttt{\textbackslash set is the same as \textbackslash cbr}\texttt{\texttt{\textbackslash sbr\{optional argument\}\{first argument\}}\texttt{is a command for square brackets. The value for the optional argument ranges from 0 to 4 with higher values resulting in larger brackets. The default value for the optional argument is -1 which results in automatic sizing for the brackets.}\texttt{\textbackslash sbr\{optional argument\}\{first argument\}}\texttt{\textbackslash sbr\{0\}\{x\}}\texttt{\textbackslash sbr\{1\}\{x\}}\texttt{\textbackslash sbr\{2\}\{x\}}\texttt{\textbackslash sbr\{3\}\{x\}}\texttt{\textbackslash sbr\{4\}\{x\}}
In the following we present commands for all kinds of intervals. The last two letters will imply whether the left and right boundary are open or closed respectively. The value for the optional argument ranges from 0 to 4 with higher values resulting in larger delimiters. The default value for the optional argument is -1 which results in automatic sizing for the delimiters.

\texttt{intoo} \texttt{[optional argument]}\{first argument\} produces an interval where the left and right boundaries are open.
E.g.:
\begin{verbatim}
\texttt{\intoo{x}} (x)
\texttt{\intoo[0]{x}} (x)
\texttt{\intoo[1]{x}} (x)
\texttt{\intoo[2]{x}} (x)
\texttt{\intoo[3]{x}} (x)
\texttt{\intoo[4]{x}} (x)
\end{verbatim}

\texttt{intcc} \texttt{[optional argument]}\{first argument\} produces an interval where the left and right boundaries are closed.
E.g.:
\begin{verbatim}
\texttt{\intcc{x}} [x]
\texttt{\intcc[0]{x}} [x]
\texttt{\intcc[1]{x}} [x]
\texttt{\intcc[2]{x}} [x]
\texttt{\intcc[3]{x}} [x]
\texttt{\intcc[4]{x}} [x]
\end{verbatim}

\texttt{intoc} \texttt{[optional argument]}\{first argument\} produces an interval where the left boundary is open and right boundary is closed.
E.g.:
\texttt{\textbackslash intoc\{x\}} \quad (x)
\texttt{\textbackslash intoc[0]\{x\}} \quad (x)
\texttt{\textbackslash intoc[1]\{x\}} \quad (x)
\texttt{\textbackslash intoc[2]\{x\}} \quad (x)
\texttt{\textbackslash intoc[3]\{x\}} \quad (x)
\texttt{\textbackslash intoc[4]\{x\}} \quad (x)

\texttt{\textbackslash intco\{optional argument\}\{first argument\}} produces an interval where the left boundary is closed and right boundary is open.
E.g.:
\texttt{\textbackslash intco\{x\}} \quad \texttt{\intco\{0\}\{x\}} \quad \texttt{\intco\{1\}\{x\}} \quad \texttt{\intco\{2\}\{x\}} \quad \texttt{\intco\{3\}\{x\}} \quad \texttt{\intco\{4\}\{x\}}

\texttt{\textbackslash eval\{optional argument\}\{first argument\}} is a command for the notation of an expression denoted by the first argument evaluated at a particular condition. The value for the optional argument ranges from 0 to 4 with higher values resulting in larger delimiters. The default value for the optional argument is -1 which results in automatic sizing for the delimiters.
E.g.:
\texttt{\textbackslash eval\{f(\textbackslash\epsilon)\\}_\{\epsilon=0\}} \quad f(\epsilon)_{\epsilon=0}
\texttt{\textbackslash eval[0]\{f(\textbackslash\epsilon)\\}_\{\epsilon=0\}} \quad f(\epsilon)_{\epsilon=0}
\texttt{\textbackslash eval[1]\{f(\textbackslash\epsilon)\\}_\{\epsilon=0\}} \quad f(\epsilon)_{\epsilon=0}
\texttt{\textbackslash eval[2]\{f(\textbackslash\epsilon)\\}_\{\epsilon=0\}} \quad f(\epsilon)_{\epsilon=0}
\texttt{\textbackslash eval[3]\{f(\textbackslash\epsilon)\\}_\{\epsilon=0\}} \quad f(\epsilon)_{\epsilon=0}
\texttt{\textbackslash eval[4]\{f(\textbackslash\epsilon)\\}_\{\epsilon=0\}} \quad f(\epsilon)_{\epsilon=0}

\texttt{\textbackslash sVert\{optional argument\}} is essentially the same as \texttt{eval}. Use \texttt{sVert} for readability if you don’t need automatic sizing of the vert bar.
E.g.:
There is also one command included in the package which fixes the alignment of := in mathmode.

\envert[optional argument]{first argument} is a command which enclose the argument in vert-bar delimiters.  
E.g.:  
\envert{x} \mid x \mid  
\envert[0]{x} \mid x \mid  
\envert[1]{x} \mid x \mid  
\envert[2]{x} \mid x \mid  
\envert[3]{x} \mid x \mid  
\envert[4]{x} \mid x \mid  

The \abs-command is the same as the \envert-command.
\enVert{x} \quad ||x||
\enVert[0]{x} \quad ||x||
\enVert[1]{x} \quad ||x||
\enVert[2]{x} \quad ||x||
\enVert[3]{x} \quad ||x||
\enVert[4]{x} \quad ||x||

The \texttt{\textbackslash norm}-command is the same as the \texttt{\textbackslash enVert}-command.

\fullfunction{\texttt{\textbackslash fullfunction}}{\texttt{\textbackslash \texttt{first argument}}}...{\texttt{\textbackslash fifth argument}} is a command which nicely formats a function. The first argument denotes the function name, the second the domain and the third the image of the function. The forth is the parameter which is mapped to the expression denoted by argument five. E.g.: \fullfunction{\texttt{f}}{\mathbb R}{\mathbb R}{x}{\sqrt{x}} results in

\begin{align*}
f & : \mathbb R \rightarrow \mathbb R \\
x & \mapsto \sqrt{x}
\end{align*}

\texttt{\textbackslash thmref}{\texttt{\textbackslash \texttt{first argument}}} is a command to reference theorems where the first argument is the label of the corresponding theorem. The result of \texttt{\textbackslash thmref}{\texttt{label}} will be Theorem (number of the label) and analogously for the subsequent commands. The number of the theorem is not separated from the word Theorem by e.g. a linebreak.

\texttt{\textbackslash exref}{\texttt{\textbackslash \texttt{first argument}}} is a command to reference examples where the first argument is the label of the corresponding example.

\texttt{\textbackslash defnref}{\texttt{\textbackslash \texttt{first argument}}} is a command to reference definitions where the first argument is the label of the corresponding definition.

\texttt{\textbackslash secref}{\texttt{\textbackslash \texttt{first argument}}} is a command to reference sections where the first argument is the label of the corresponding section.

\texttt{\textbackslash lemref}{\texttt{\textbackslash \texttt{first argument}}} is a command to reference lemmas where the first argument is the label of the corresponding lemma.

\texttt{\textbackslash propref}{\texttt{\textbackslash \texttt{first argument}}} is a command to reference propositions where the first argument is the label of the corresponding proposition.

\texttt{\textbackslash remref}{\texttt{\textbackslash \texttt{first argument}}} is a command to reference remarks where the first argument is the label of the corresponding remark.
\texttt{\textbackslash figref\{first argument\}} is a command to reference figures where the first argument is the label of the corresponding figure.

\texttt{\textbackslash colref\{first argument\}} is a command to reference corollaries where the first argument is the label of the corresponding corollary.

\texttt{\textbackslash appref\{first argument\}} is a command to reference the Appendix where the first argument is the label of the corresponding Appendix.

\texttt{\textbackslash assref\{first argument\}} is a command to reference assumptions where the first argument is the label of the corresponding Assumption.
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