The interval package

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(on behalf of By the Danish \TeX collective)

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Motivation

In mathematics there are two syntax’ when it comes to specifying open and closed intervals.

The first use parantheses to mark an open end

\[a, b\] \(a, b\) \([a, b)\) \((a, b)\),

while the other use brackets throughout

\([a, b]\) \([a, b]\) \([a, b]\) \([a, b]\).

The former poses no problem in \TeX, but the later does, as, e.g., a closing bracket is being used in place of an opening fence, and thus have the wrong category when it comes to spacing:

\[] \(a, \nabla\) \([+\nabla]\) versus \([a, \nabla]\) \([c\nabla]\).

One could use \texttt{\textbackslash mathopen\{\}}-\texttt{\textbackslash mathclose\{\}}+c

to solve the problem, but then \texttt{\textbackslash left\ldots\textbackslash right} can no longer be used to auto scale the fences.

The \texttt{\textbackslash interval} command

The following is the result of a discussion on the Danish \TeX Users groups mailing list. Kudos to Martin Heller, for proposing the original version using \texttt{pgfkeys}.

We provide a macro and a way to globally configure it

\texttt{\textbackslash interval\{\textbackslash{\textbackslash options}\}\{\textbackslash{\textbackslash start}\}\{\textbackslash{\textbackslash end}\}\{\textbackslash textbackslash intervalconfig\{\textbackslash{\textbackslash options}\}\}}

We note that the interval separator symbol is hidden inside the \texttt{\textbackslash interval} macro and can be changed using an option.

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Configuration options

**separator symbol**
symbol that separates the start and end of the interval. Default: \{,\}, note that as comma is the separating character in the options specification, the symbol is enclosed in braces, these are automatically removed.

**left open fence**
Default: \]

**left closed fence**
Default: []

**right open fence**
Default: [

**right closed fence**
Default: ]

**soft open fences**
This is just a fast way of saying

- `left open fence=(,`
- `right open fence=)`

**colorize**
Default: ⟨empty⟩. When rewriting an existing document into using the \interval macro to keep track of which have been rewritten and which has not. This can be done using

\usepackage{xcolor}
\intervalconfig{ colorize=\color{red} }

It will colorize the entire interval including the fences.

Usage options

By default \interval\langle start\rangle\langle end\rangle will produce a closed interval. Other types are provided via options:

**open**
an open interval

**open left**
interval open on the left side

**open right**
interval open on the right side

**scaled**
auto scale interval fences

**scaled=(scaler)**

scale fences using ⟨scaler⟩, i.e. using scaled=\Big
As some might be guessed, the interval package depends on the pgfkeys package to handle its key-value configuration.

**Short hands**

For convenience the following short hands are provided as of version 0.4.

\[
\ointerval{\langle\text{options}\rangle}{\langle\text{start}\rangle}{\langle\text{end}\rangle}
\]

is short for

\[
\interval[open,\langle\text{options}\rangle]{\langle\text{start}\rangle}{\langle\text{end}\rangle}
\]

\[
\linterval{\langle\text{options}\rangle}{\langle\text{start}\rangle}{\langle\text{end}\rangle}
\]

is short for

\[
\interval[open left,\langle\text{options}\rangle]{\langle\text{start}\rangle}{\langle\text{end}\rangle}
\]

\[
\rinterval{\langle\text{options}\rangle}{\langle\text{start}\rangle}{\langle\text{end}\rangle}
\]

is short for

\[
\interval[open right,\langle\text{options}\rangle]{\langle\text{start}\rangle}{\langle\text{end}\rangle}
\]

**Examples**

\[
\begin{align*}
& A \in \interval{a}{b} \\
& A \in \interval[open]{a}{b} \\
& A \in \interval[open left]{a}{b} \\
& A \in \interval[open right, \text{scaled}]{a}{\frac{1}{2} b} = B \\
& A \in \interval[\text{scaled=big}]{a}{b} \\
& A \in \ointerval{a}{b} \\
& A \in \rinterval{a}{b}
\end{align*}
\]

And using soft open fences:

\[
\begin{align*}
& A \in [a, b] \\
& A \in (a, b] \\
& A \in [a, b) \\
& A \in \left[ a, \frac{1}{2} b \right] = B \\
& A \in [a, \frac{1}{2} b] \\
& A \in [a, b)
\end{align*}
\]