The interval package

Lars Madsen*
(on behalf of By the Danish TEX collective)

February 20, 2014

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

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

while the other use brackets throughout

$$[a,b] \qquad]a,b] \qquad [a,b[\qquad]a,b[,$$

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:

$$]-a,b[+c \qquad \text{versus} \qquad]-a,b[+c.$$

One could use

```
\mathopen{]}-a,b\mathclose{[}+c
```

to solve the problem, but then `\left`...`\right` can no longer be used to auto scale the fences.

The `\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 pgfkeys.

We provide a macro and a way to globally configure it

`\interval[`⟨*options*⟩`]{`⟨*start*⟩`}{`⟨*end*⟩`}`
`\intervalconfig{`⟨*options*⟩`}`

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

*Email: daleif@imf.au.dk, version: v0.2

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=)
```

Usage options

By default `\interval{`⟨*start*⟩`}{`⟨*end*⟩`}` 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.

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,
  scaled]{a}{\frac12b}=B\\
&A\in\interval[scaled=\big]{a}{b}
\end{align*}
```

$$
\begin{aligned}
A &\in [a, b] \\
A &\in]a, b[\\
A &\in]a, b] \\
A &\in \left[a, \frac{1}{2}b\right[= B \\
A &\in \big[a, b\big]
\end{aligned}
$$

And using soft open fences:

```
\intervalconfig{
  soft open fences,
  separator symbol=;,
}
\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,
  scaled]{a}{\frac12b}=B\\
&A\in\interval[scaled=\big]{a}{b}
\end{align*}
```

$$
\begin{aligned}
A &\in [a; b] \\
A &\in (a; b) \\
A &\in (a; b] \\
A &\in \left[a; \frac{1}{2}b\right) = B \\
A &\in \big[a; b\big]
\end{aligned}
$$