`lymath` package : semantic low level math formulas

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1 Miscellaneous

1.1 Semi-colon and spacing

```
Same spacing around the semi-colon in $A(x;y)$. So cute !
```

Same spacing around the semi-colon in $A(x\,;y)$. So cute !

2 Sets

2.1 Different kind of sets

2.1.1 Sets for geometry

Example of use

```
You can semantically write $\geoset{C}$, $\geoset{D}$ and $\geoset{d}$,
but you can't write things like \verb+$\geoset{ABC}$+.
```

You can semantically write $\mathscr{C}$, $\mathscr{D}$ and $\mathscr{d}$, but you can't write things like `$\geoset{ABC}$`.

Technical IDs

`\geoset (1 Argument)`

— `Argument:` one single `ASCII` letter indicating a geometrical set.

2.1.2 Sets for probability

Example of use

```
You can semantically write $\probaset{E}$ and $\probaset{G}$
but you can't write things like \verb+$\probaset{ABC}$+.
```

You can semantically write $\mathcal{E}$ and $\mathcal{G}$ but you can't write things like `$\probaset{ABC}$`.

Technical IDs

`\probaset (1 Argument)`

— `Argument:` one single `ASCII` upper letter indicating a probabilistic set.

2.1.3 Sets for rings and fields theory

Example of use

```
You can semantically write $\fieldset{A}$, $\fieldset{K}$, $\fieldset{h}$
and $\fieldset{k}$, but you can’t write things like \verb+$\fieldset{ABC}$+.
```

You can semantically write $\mathbb{A}$, $\mathbb{K}$, $\mathbb{h}$ and $\mathbb{k}$, but you can’t write things like `$\fieldset{ABC}$`.

Technical IDs

`\fieldset (1 Argument)`

— `Argument:` either one of the letters `h` and `k`, or one single `ASCII` upper letter indicating a field or ring like set.

2.1.4 Classical sets

```
You can directly use $\nullset$, $\NN$, $\ZZ$, $\DD$, $\QQ$, $\RR$, $\CC$,
$\HH$ and $\OO$.
```

You can directly use $\varnothing$, $\mathbb{N}$, $\mathbb{Z}$, $\mathbb{D}$, $\mathbb{Q}$, $\mathbb{R}$, $\mathbb{C}$, $\mathbb{H}$ and $\mathbb{O}$.

2.1.5 Classical sets with suffixes

```
It is easy to type $\RRn$, $\RRp$, $\RRs$, $\RRsn$ and $\RRsp$.
```

It is easy to type $\mathbb{R}_-$, $\mathbb{R}_+$, $\mathbb{R}^*$, $\mathbb{R}_-^*$ and $\mathbb{R}_+^*$.

We have used suffixes `n` for `Negative`, `p` for `Positive`, and `s` for `Star` with the additional composite suffixes `sn` et `sp`.

Note that you can’t use `$\CCn$` for $\mathbb{C}_-$ because the set $\mathbb{C}$ doesn’t have any standard powerful ordered structure. Take a look at the next section to see how to write $\mathbb{C}_-$ if you need it.

The following table shows when you can add one of the suffixes `n`, `p`, `s`, `sn` and `sp`.

TABLE 1 – Suffixes

	n	p	s	sn	sp
N			×		
Z	×	×	×	×	×
D	×	×	×	×	×
Q	×	×	×	×	×
R	×	×	×	×	×
C			×		
H			×		
O			×		

2.1.6 Suffixes on demand

Example of use

```
You can indeed write things like $\specialset{\CC}{n}$ or $\specialset{\HH}{sp}$.
There is also $\specialset*{\probaset{P}}{n}$ with another formatting.
```

You can indeed write things like $\mathbb{C}_-$ or $\mathbb{H}_+^*$. There is also $\mathcal{P}_{\leq 0}$ with another formatting.

Technical IDs

`\specialset (2 Arguments)`
`\specialset* (2 Arguments)`

— `Argument #1:` the set to be ”suffixed”.

— `Argument #2:` one of the suffixes `n`, `p`, `s`, `sn` and `sp`.

2.2 Intervals

2.2.1 Real intervals - French (?) notation

Example of use #1

```
In $\intervalOC{a}{b} = ]a ; b] = \intervalOC{a}{b}$, you can see that the macro
used solves a spacing problem, and that the delimiters are a little bigger.

% The syntax refers to O-pened and C-losed but CC and OO are reduced to C and O.
```

In $\left]a\,;b\right] =]a\,;b] = \left]a\,;b\right]$, you can see that the macro used solves a spacing problem, and that the delimiters are a little bigger.

Example of use #2

```
You can use the star version of a macro if you want the delimiters to stretch
vertically.

$\displaystyle \intervalC{ \frac{1}{2} }{ 1^{2^{3}} }
            = [ \frac{1}{2} ; 1^{2^{3}} ]
            = \intervalC*{ \frac{1}{2} }{ 1^{2^{3}} }$
```

You can use the star version of a macro if you want the delimiters to stretch vertically.
$\displaystyle [\frac{1}{2} ; 1^{2^{3}}] = [\frac{1}{2} ; 1^{2^{3}}] = \left[\frac{1}{2} ; 1^{2^{3}}\right]$

Technical IDs

For all the macros above, the star version produces intervals with delimiters that fit vertically with the bounds of the interval.

`\intervalCO` (2 Arguments)
`\intervalCO*` (2 Arguments)

— `Argument #1`: lower bound a of the interval $[a ; b[$.

— `Argument #2`: upper bound b of the interval $[a ; b[$.

`\intervalC` (2 Arguments)
`\intervalC*` (2 Arguments)

— `Argument #1`: lower bound a of the interval $[a ; b]$.

— `Argument #2`: upper bound b of the interval $[a ; b]$.

`\intervalO` (2 Arguments)
`\intervalO*` (2 Arguments)

— `Argument #1`: lower bound a of the interval $]a ; b[$.

— `Argument #2`: upper bound b of the interval $]a ; b[$.

`\intervalOC` (2 Arguments)
`\intervalOC*` (2 Arguments)

— `Argument #1`: lower bound a of the interval $]a ; b]$.

— `Argument #2`: upper bound b of the interval $]a ; b]$.

2.2.2 Real intervals - American notation

Example of use

```
A semi-closed interval $\intervalPC{a}{b} = (a ; b]$ and an opened one
$\intervalP{a}{b} = (a ; b)$.

% The syntax refers to P-arenthesis.
```

A semi-closed interval $\left(a\,;b\right] = (a\,;b]$ and an opened one $\left(a\,;b\right) = (a\,;b)$.

Technical IDs

For all the macros above, the star version produces intervals with delimiters that fit vertically with the bounds of the interval.

`\intervalCP (2 Arguments)`
`\intervalCP* (2 Arguments)`

— `Argument #1:` lower bound a of the interval $\left[a\,;b\right)$.

— `Argument #2:` upper bound b of the interval $\left[a\,;b\right)$.

`\intervalP (2 Arguments)`
`\intervalP* (2 Arguments)`

— `Argument #1:` lower bound a of the interval $\left(a\,;b\right)$.

— `Argument #2:` upper bound b of the interval $\left(a\,;b\right)$.

`\intervalPC (2 Arguments)`
`\intervalPC* (2 Arguments)`

— `Argument #1:` lower bound a of the interval $\left(a\,;b\right]$.

— `Argument #2:` upper bound b of the interval $\left(a\,;b\right]$.

2.2.3 Discrete intervals of integers

Example of use

```
By definition, $\ZintervalC{-1}{4} = \{ -1 ; 0 ; 1 ; 2 ; 3 ; 4 \}$. So we also have
$\ZintervalC{-1}{4} = \ZintervalO{-2}{5}$.

% The syntax refers to Z the set of integers.
```

By definition, $[\![-1\,;4]\!] = \{-1\,;0\,;1\,;2\,;3\,;4\}$. So we also have $[\![-1\,;4]\!] =]\!]-2\,;5[\![$.

Technical IDs

For all the macros above, the star version produces intervals with delimiters that fit vertically with the bounds of the interval.

`\ZintervalCO (2 Arguments)`
`\ZintervalCO* (2 Arguments)`

— `Argument #1:` lower bound a of the interval $[\![a\,;b[\![$.

— `Argument #2:` upper bound b of the interval $[\![a\,;b[\![$.

`\ZintervalC (2 Arguments)`
`\ZintervalC* (2 Arguments)`

— `Argument #1:` lower bound a of the interval $[\![a\,;b]\!]$.

— `Argument #2:` upper bound b of the interval $[\![a\,;b]\!]$.

`\ZintervalO (2 Arguments)`
`\ZintervalO* (2 Arguments)`

— `Argument #1:` lower bound a of the interval $]\!]a\,;b[\![$.

— `Argument #2:` upper bound b of the interval $]\!]a\,;b[\![$.

`\ZintervalOC (2 Arguments)`
`\ZintervalOC* (2 Arguments)`

— `Argument #1:` lower bound a of the interval $]\!]a\,;b]\!]$.

— `Argument #2:` upper bound b of the interval $]\!]a\,;b]\!]$.

3 Analysis

3.1 Constants

3.1.1 Classical constants

Complete list

```
List of all classical constants where $\ttau = \frac{\ppi}{2}$ is the youngest one:
$\ggamma$, $\ppi$, $\ttau$, $\ee$, $\ii$, $\jj$ and $\kk$.
```

List of all classical constants where $\tau = \frac{\pi}{2}$ is the youngest one : γ, π, τ, $\mathbf{e}$, $\mathbf{i}$, $\mathbf{j}$ and $\mathbf{k}$.

Remark. Take care that `{\Large $\ppi \neq \pi$}` produces $\pi \neq \pi$. As you can see, the symbols are not the same. Indeed, this is true for all the greek constants.

3.1.2 User's latine constants

Example of use

```
It is easy to write $\ct{a} x^2 + \ct{b} x + \ct{c}$ instead of $a x^2 + b x + c$
such as to stress the fact that $\ct{a}$, $\ct{b}$ and $\ct{c}$ are constants.
```

It is easy to write $\mathbf{a}x^2 + \mathbf{b}x + \mathbf{c}$ instead of $ax^2 + bx + c$ such as to stress the fact that $\mathbf{a}$, $\mathbf{b}$ and $\mathbf{c}$ are constants.

Technical IDs

`\ct (1 Argument)`

— `Argument:` a latine text, and not a formula, indicated one constant.

3.2 Special functions

3.2.1 Some examples of use

```
Some additional special functions :
$\ch x \neq ch x$, $\ppcm(x;y)$, $\lg x =\logb{2} x$ and $\expb{6} y$.
```

Some additional special functions : $\operatorname{ch} x \neq chx$, $\operatorname{ppcm}(x\,;y)$, $\lg x = \log_2 x$ and $\exp_6 y$.

3.2.2 Functions without parameter

All the following macros don't have any parameter.

`\pgcd`	`\ppcm`	`\ch`	`\sh`
`\th`	`\ach`	`\ash`	`\ath`
`\arccosh`	`\arcsinh`	`\arctanh`	`\acos`
`\asin`	`\atan`		

3.2.3 Functions with parameters

The complete list

All the following macros have at least one parameter.

`\expb` (1 parameter) `\logb` (1 parameter)

Technical IDs

`\expb (1 Argument)`
`\logb (1 Argument)`

— `Argument:` the base of the exponential or the logarithm

3.3 Extended notations for special sequences

Example of use

```
Sometimes we need to write $\seqplus{F}{1}{2}$ or $\hypergeo{F}{1}{2}$
and crazy men really (?) love $\suprageo{F}{1}{2}{3}{4}$.
```

Sometimes we need to write F_1^2 or ${}_1F_2$ and crazy men really (?) love ${}^4_1F^3_2$.

Technical IDs

`\seqplus (2 Arguments)`

— `Argument #1:` the right exponent like expression.

— `Argument #2:` the right indice.

`\hypergeo (2 Arguments)`

— `Argument #1:` the left indice.

— `Argument #2:` the right indice.

`\suprageo (4 Arguments)`

— `Argument #1:` the left indice.

— `Argument #2:` the right indice.

— `Argument #3:` the right exponent.

— `Argument #4:` the left exponent.

3.4 Differential calculus

3.4.1 The ∂ and d operators

Example of use

```
You can write $\dd{x}$ and $\pp{t}$ and also $ \dd[5]{x}$ or $\pp[n]{x}$.
```

You can write $\mathrm{d}x$ and ∂t and also $\mathrm{d}^5 x$ or $\partial^n x$.

Technical IDs

`\dd [1 Option] (1 Argument)`
`\pp [1 Option] (1 Argument)`

— `Option:` if used, this argument will be the exponent of the symbol ∂ or d.

— `Argument:` the variable of differentiation at the right of the symbol ∂ or d.

3.4.2 Total derivation

Example of use #1

```
$\displaystyle f'(a)
             = \derpow{f} (a)
             = \derfrac{f}{x} (a)
             = \dersub{f}{x} (a)$
```

$$f'(a) = f^{(1)}(a) = \frac{\mathrm{d}f}{\mathrm{d}x}(a) = \mathrm{d}_x f(a)$$

Example of use #2

```
$\displaystyle f'''(a)
              = \derpow[3]{f} (a)
              = \derfrac[3]{f}{x} (a)
              = \dersub[3]{f}{x} (a)$
and
$\displaystyle \cos''' a = \derfrac[3]{\cos}{x} (a)$.
```

$f'''(a) = f^{(3)}(a) = \dfrac{\mathrm{d}^3 f}{\mathrm{d}x^3}(a) = \mathrm{d}_x^3 f(a)$ and $\cos''' a = \dfrac{\mathrm{d}^3 \cos}{\mathrm{d}x^3}(a)$.

Technical IDs

`\derpow [1 Option] (1 Argument)`

— `Option:` if used, this argument will be the exponent of derivation put inside braces.

— `Argument:` the function to be differenciated.

`\derfrac [1 Option] (2 Arguments)`
`\dersub [1 Option] (2 Arguments)`

— `Option:` if used, the exponent of derivation.

— `Argument #1:` the function to be differenciated.

— `Argument #2:` the variable used for the derivation.

3.4.3 Partial derivation

Example of use #1

```
$\displaystyle \partialfrac{f}{x} (a;b)
              = \partialsub{f}{x} (a;b)
              = \partialprime{f}{x} (a;b)$
```

$\dfrac{\partial f}{\partial x}(a\,;b) = \partial_x f(a\,;b) = f'_x(a\,;b)$

Example of use #2

```
$\displaystyle \partialfrac[3]{G}{f^{2} // v} (a;b)
              = \partialfrac{G}{f^{2} // v} (a;b)
              = \partialsub{G}{f^{2} // v} (a;b)
              = \partialprime{G}{f^{2} // v} (a;b)$
```

$\dfrac{\partial^3 G}{\partial f^2\,\partial v}(a\,;b) = \dfrac{\partial G}{\partial f^2\,\partial v}(a\,;b) = \partial_{f(2)\,v} G(a\,;b) = G'_{f(2)\,v}(a\,;b)$

Technical IDs

`\partialfrac [1 Option] (2 Arguments)`

— `Option:` if used, the exponent of ∂ associated to the function differenciated.

— `Argument #1:` the function to be partially differenciated.

— `Argument #2:` the variables used for the partial derivation. The syntax is particular : for example, `x // y^3 // ...` indicates regarding to the variables x one time, y three times... and so on.

`\partialsub (2 Arguments)`
`\partialprime (2 Arguments)`

— `Argument #1:` the function to be partially differenciated.

— `Argument #2:` the variables used for the partial derivation. The syntax is particular : for example, `x // y^3 // ...` indicates regarding to the variables x one time, y three times... and so on.

3.5 Integral calculus

3.5.1 The hook operator - 1st version

Example of use #1

```
By definition, $\displaystyle \int_{a}^{b} f(x) \dd{x} = \hook{F(x)}{a}{b}$ where
$\hook{F(x)}{a}{b} = F(b) - F(a)$.
```

By definition, $\displaystyle \int_{a}^{b} f(x) \,\mathrm{d}x = \big[F(x)\big]_{a}^{b}$ where $\big[F(x)\big]_{a}^{b} = F(b) - F(a)$.

Example of use #2

```
With the star version, the hooks stretch vertically like in
$\displaystyle \hook*{\frac{x - 1}{5 + x^2}}{a}{b}
             = \hook{\frac{x - 1}{5 + x^2}}{a}{b}$.
```

With the star version, the hooks stretch vertically like in $\displaystyle \left[\frac{x-1}{5+x^2}\right]_{a}^{b} = \big[\frac{x-1}{5+x^2}\big]_{a}^{b}$.

Technical IDs

`\hook (3 Arguments)`
`\hook* (3 Arguments)`

— `Argument #1:` the content inside the hooks.

— `Argument #2:` the lower bound displayed as an index.

— `Argument #3:` the upper bound displayed as an exponent.

3.5.2 The hook operator - 2nd version

Example of use #1

```
You can use $\vhook{F(x)}{a}{b}$ instead of $\hook{F(x)}{a}{b}$.
```

You can use $F(x)\big|_a^b$ instead of $\big[F(x)\big]_a^b$.

Example of use #2

```
With the star version, the left rule stretches vertically like in
$\displaystyle \vhook*{\frac{x - 1}{5 + x^2}}{a}{b}
            = \vhook{\frac{x - 1}{5 + x^2}}{a}{b}$.
```

With the star version, the left rule stretches vertically like in $\displaystyle \frac{x-1}{5+x^2}\bigg|_a^b = \frac{x-1}{5+x^2}\big|_a^b$.

Technical IDs

`\vhook (3 Arguments)`
`\vhook* (3 Arguments)`

— `Argument #1`: the content before the vertical line | .

— `Argument #2`: the lower bound displayed as an index.

— `Argument #3`: the upper bound displayed as an exponent.

3.5.3 Several integrals

The package minimizes spacings between consecutive symbols of integration. Here is an example.

```
$\displaystyle \int \int \int F(x;y;z) \dd{x} \dd{y} \dd{z}
= \int_{a}^{b} \int_{c}^{d} \int_{e}^{f} F(x;y;z) \dd{x} \dd{y} \dd{z}$
```

$$\iiint F(x\,;y\,;z)\,\mathrm{d}x\,\mathrm{d}y\,\mathrm{d}z = \int_a^b\!\!\int_c^d\!\!\int_e^f F(x\,;y\,;z)\,\mathrm{d}x\,\mathrm{d}y\,\mathrm{d}z$$

Remark. By default, LaTeX prints $\displaystyle \int\int\int F(x\,;y\,;z)\,\mathrm{d}x\,\mathrm{d}y\,\mathrm{d}z = \int_a^b\int_c^d\int_e^f F(x\,;y\,;z)\,\mathrm{d}x\,\mathrm{d}y\,\mathrm{d}z$.

3.6 Asymptotic comparisons of sequences and functions

3.6.1 The $\mathcal{O}$ and o notations

Example of use

```
Let’s see how to use the symbols $\bigO{}$ and $\smallO{}$ created by Landau.

\medskip

You can write $\bigO{x} \neq \smallO{x}$ and $e^{t + \smallO{t}} = e^{\bigO{t}}$.
```

Let’s see how to use the symbols $\mathcal{O}$ and o created by Landau.

You can write $\mathcal{O}(x) \neq o(x)$ and $e^{t+o(t)} = e^{\mathcal{O}(t)}$.

Technical IDs

`\bigO (1 Argument)`
`\smallO (1 Argument)`

— `Argument:` the content inside the braces after the symbol $\mathcal{O}$ or o.

3.6.2 The Ω notation

Example of use

```
Let’s see how to use the symbol $\bigomega{}$ created by Hardy and Littlewood.

\medskip

$f(n) = \bigomega{g(n)}$ means: $\exists (m, n_0)$ such that
$n \geqslant n_0$ implies $f(n) \geqslant m g(n)$.
```

Let’s see how to use the symbol $\boldsymbol{\Omega}$ created by Hardy and Littlewood.

$f(n) = \boldsymbol{\Omega}(g(n))$ means : $\exists (m, n_0)$ such that $n \geqslant n_0$ implies $f(n) \geqslant mg(n)$.

Technical IDs

`\bigomega (1 Argument)`

— `Argument:` the content inside the braces after the symbol $\boldsymbol{\Omega}$.

3.6.3 The $\mathbf{\Theta}$ notation

Example of use

```
Let's see how to use the symbol $\bigtheta{}$.

\medskip

$f(n) = \bigtheta{g(n)}$ means: $\exists (m, M, n_0)$ such that
$n \geqslant n_0$ implies $m g(n) \leqslant f(n) \leqslant M g(n)$.
```

Let's see how to use the symbol $\mathbf{\Theta}$.

$f(n) = \mathbf{\Theta}(g(n))$ means : $\exists (m, M, n_0)$ such that $n \geqslant n_0$ implies $mg(n) \leqslant f(n) \leqslant Mg(n)$.

Technical IDs

`\bigtheta (1 Argument)`

— `Argument:` the content inside the braces after the symbol $\mathbf{\Theta}$.

4 Geometry

4.1 Points

4.1.1 Example of use

```
We can call $\pt{I}$ the middle of $[\pt{A}\pt{B}]$.
```

We can call I the middle of [AB].

4.1.2 Technical IDs

`\pt (1 Argument)`

— `Argument:` one text indicating the name of a point.

4.2 Vectors

4.2.1 Example of use

```
Here is one vector $\vect{ABCDEF}$ using a lot of letters and you can write
$\vect*{e}{rot}$ instead of $\vect{e_{rot}}$.
```

Here is one vector $\overrightarrow{ABCDEF}$ using a lot of letters and you can write $\vec{e}_{rot}$ instead of $\overrightarrow{e_{rot}}$.

4.2.2 Technical IDs

\vect (1 Argument)

— Argument: one text indicating the name of a vector.

\vect* (2 Arguments)

— Argument #1: one text indicating *up* in the name $\overrightarrow{up}_{down}$ of a vector.

— Argument #2: one text indicating *down* in the name $\overrightarrow{up}_{down}$ of a vector.

4.3 Inner angles

4.3.1 Example of use

```
Here is one inner angle $\anglein{ABCDEF}$ using a lot of letters, and you can
write $\anglein*{A}{rot}$ instead of $\anglein{A_{rot}}$.
```

Here is one inner angle $\widehat{ABCDEF}$ using a lot of letters, and you can write $\widehat{A}_{rot}$ instead of $\widehat{A_{rot}}$.

4.3.2 Technical IDs

\anglein (1 Argument)

— Argument: one text indicating the name of an inner angle.

\anglein* (2 Arguments)

— Argument #1: one text indicating *up* in the name $\widehat{up}_{down}$ of an inner angle.

— Argument #2: one text indicating *down* in the name $\widehat{up}_{down}$ of an inner angle.

4.4 Circular arcs

4.4.1 Example of use

```
Here is one arc $\arc{ABCDEF}$ using a lot of letters, and you can write
$\arc*{A}{rot}$ instead of $\arc{A_{rot}}$.
```

Here is one arc $\overparen{ABCDEF}$ using a lot of letters, and you can write $\overparen{A}_{rot}$ instead of $\overparen{A_{rot}}$.

4.4.2 Technical IDs

\arc (1 Argument)

— Argument: one text indicating the name of a circular arc.

\arc* (2 Arguments)

— Argument #1: one text indicating *up* in the name $\overparen{up}_{down}$ of a circular arc.

— Argument #2: one text indicating *down* in the name $\overparen{up}_{down}$ of a circular arc.

5 Arithmetic

5.1 Continued fractions

5.1.1 Standard continued fractions

Example of use

```
It is easy to write what is just after where the inline notation seems to have been
introduced by Alfred Pringsheim (the left notation is always space consuming for a
better readability).

$ \contfrac{u_0 // u_1 // u_2 // \dots // u_n}
= \contfrac*{u_0 // u_1 // u_2 // \dots // u_n}$
```

It is easy to write what is just after where the inline notation seems to have been introduced by Alfred Pringsheim (the left notation is always space consuming for a better readability).

$u_0 + \cfrac{1}{u_1 + \cfrac{1}{u_2 + \cfrac{1}{\dots + \cfrac{1}{u_n}}}} = u_0 + \frac{1\,|}{|\,u_1} + \frac{1\,|}{|\,u_2} + \frac{1\,|}{|\,\dots} + \frac{1\,|}{|\,u_n}$

Technical IDs

\contfrac (1 Argument)
\contfrac* (1 Argument)

— `Argument`: all the elements of the continued fraction separated by `//`.

5.1.2 Generalized continued fractions

Example of use

```
You can use similar notations for generalized continued fractions :

$\displaystyle \contfracgene{a // b // c // d // e // f // \dots // y // z}
             = \contfracgene*{a // b // c // d // e // f // \dots // y // z}$
```

You can use similar notations for generalized continued fractions :

$\displaystyle a + \cfrac{b}{c + \cfrac{d}{e + \cfrac{f}{\dots + \cfrac{y}{z}}}} = a + \frac{b\,|}{|\,c} + \frac{d\,|}{|\,e} + \frac{f\,|}{|\,\dots} + \frac{y\,|}{|\,z}$

Technical IDs

\contfracgene (1 Argument)

\contfracgene* (1 Argument)

— `Argument`: all the elements of the generalized continued fraction separated by `//`.

5.1.3 Single like continued fraction

Example of use

```
Crazy men really (?) need to write things like $\singlecontfrac{a}{b}$.

% The existence of this macro just comes from its use internally.
```

Crazy men really (?) need to write things like $\left.\frac{a}{\left\lceil b\right.}\right|$.

Technical IDs

\singlecontfrac (2 Arguments)

— `Argument #1`: the pseudo numerator

— `Argument #2`: the pseudo denominator

5.1.4 The $\mathcal{K}$ operator

Example of use #1

```
The following notation is very closed to the one used by Carl Friedrich Gauss:

$\displaystyle
  \contfracope_{k=1}^{n} (b_k:c_k)
= \cfrac{b_1}{\contfracgene{c_1 // b_2 // c_2 // b_3 // \dots // b_n // c_n}}$
```

The following notation is very closed to the one used by Carl Friedrich Gauss :
$\displaystyle \mathop{\mathcal{K}}_{k=1}^{n}(b_k : c_k) = \cfrac{b_1}{c_1 + \cfrac{b_2}{c_2 + \cfrac{b_3}{\dots + \cfrac{b_n}{c_n}}}}$

Remark. The letter $\mathcal{K}$ comes from "kettenbruch" which means "continued fraction" in german.

Example of use #2

```
$\displaystyle
  u_0 + \contfracope_{k=1}^{n} (1:u_k)
= \contfrac{u_0 // u_1 // u_2 // \dots // u_n}$
```

$$u_0 + \mathop{\mathcal{K}}_{k=1}^{n}(1:u_k) = u_0 + \cfrac{1}{u_1 + \cfrac{1}{u_2 + \cfrac{1}{\dots + \cfrac{1}{u_n}}}}$$