`amath` Example

Using `ctext` — 06.06.2017

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1 Introduction

AMATH features lots of neat short commands for symbols and mathematical structures. As seen below, most of them are available through AMSMATH.

2 Equation Styling

AMATH imports AMSMATH with `[fleqn]` option to flush all equations in *align* environments (or other environments serving the same purpose) to the left.

3 Symbols & Abbreviations

For mathematical symbols (those I use most of the time), I added macros like explained in Table 3.1:

Inline Math	Command	Comment
$\mathbb{N}$	\N	To display $\mathbb{N}_0$, use \N_0
$\mathbb{Z}$	\Z	
$\mathbb{R}$	\R	
$\mathbb{Q}$	\Q	
$\mathbb{C}$	\C	
$\mathbb{F}$	\F	For Prime Fields.[1]
GL	\GL	General Linear Group
id	\id	Identity
$\frac{d}{dx}x$	\diff{x}	Analysis: Derivate function
$\mid$	\divides	Operator
$\mid$	\property	Separator for Sets[2]
Var	\Var	Combinatorics: Variations
Perm	\Perm	Combinatorics: Permutation
MComb	\v	Combinatorics: Multicombination
Comb	\Comb	Combinatorics: Combinations
dim	\dim	Dimension function
Im	\Im	Image of certain function
X/m	\modulo{<>}{<>}	Modulus (Sets) operator
$\text{Pot}(X)$	\Pot X	Power set
$\text{Map}(X,Y)$	\Map(X,Y)	Set of Maps from X to Y
Bin	\Bin	
falls	\falls	To be used in case conditions
char	\charakteristik	Characterisic of a field

Table 3.1: Symbols & Abbreviation Commands from AMATH

4 Operators

Quantifiers

AMATH restyles both universal and existential quantifiers to use up more space. It also adds a large version for display mode math, available through \bigforall and \bigexists. In general, they look like this:

$$\forall\ x \in \mathbb{R}\ \exists\ y \in \mathbb{R} : x^2 = y$$

The same formula in inline math mode: $\forall\ x \in \mathbb{R}\ \exists\ y \in \mathbb{R} : x^2 = y$

The adjustment to the default quantifiers looks like this:

$$\forall x \in \mathbb{R}\, \exists y \in \mathbb{R} : x^2 = y$$

Restriction

A macro to display a restriction to function or a map is provided by using

\restr{<function>}{<new source>}{<new target>}.

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[1] GitHub User @ACHinrichs found this command to be malicious with other classes. When he merged this class into his HomeworkAssignment class, he renamed it to \Primes

[2] \property and \divides share the same definition but are intended to be used differently

In math, it looks like this:

$$f\big|_V^U : U \to V, x \mapsto f(x).$$

5 Functions

Absolute value

Using `\abs{<>}`, you can display an absolute value.

$$|x - y| = \text{"Distance of x and y"}.$$

Rounding functions

For rounding up and down, AMATH provides `\ceil{<>}` and `\floor{<>}`.

$$\lfloor 3.5 \rfloor = 3, \quad \lceil 3.5 \rceil = 4.$$

6 Utilities

Relations

You can define your own relation by using `\rel{<>}`. For example, reflexivity of a relation m looks like this:

$$x \; m \; y \Rightarrow x = y.$$

Large brackets

Wrapping brackets around fractions can be a pain, therefore AMATH provides the `\labra{<>}` command, which sets fitting brackets around the given argument.

$$\left(\frac{n+2}{n+1} \right)$$

Vectors

You can create a vector without using any environments yourself by using `\colvec{<>}` and seperating the rows with a general linebreaking LaTeX operator.

$$a := \begin{pmatrix} a_1 \\ a_2 \\ a_3 \end{pmatrix}$$