

The Xmath¹ L^AT_EX 2_ε Macros for Manuscript Preparation

Martin Debaisieux⁴

Abstract

The X_MATH¹ package is an easy way to write math in L^AT_EX 2_ε. X_MATH¹ is an extension of frequently used mathematical packages with new commands for specific sets, arrows and operators. This package also implements useful shortcuts.

Contents

1	Patch notes	1
2	Extensions	1
3	Package option	1
4	Commands	2
4.1	Arrows and symbols	2
4.2	Specific sets	2
4.3	Objects	2
4.4	Operators	3
4.5	Others	3
5	Contact	4

as minor bug fixes. This document was last compiled on October 17, 2021.

1 Patch notes

This is the version 3.1.0 of X_MATH¹. This release brings the addition of new commands for specific sets, objects and others, as well

2 Extensions

This package is an extension of the amssymb⁵, amsmath⁶ and dsfont³ packages. All rights reserved to their authors.

3 Package option

By default, no options are loaded when calling the X_MATH¹ package. However, at the time of import, it is possible to call

```
\usepackage[mathbb]{xmath}
```

which has the effect of making available shortcuts of the form \I<X> where <X> is a majuscule letter taken in the alphabetical range [A - Z]. For instance, you can use \IC instead of \mathbb{C}.

4 Commands

4.1 Arrows and symbols

`\assign` : \coloneqq .
`\hooklongleftarrow` : \hookleftarrow .
`\hooklongrightarrow` : \hookrightarrow .
`\longsimleftarrow` : $\xleftarrow{\sim}$.
`\longsimrightarrow` : $\xrightarrow{\sim}$.
`\longtwoheadleftarrow` : \twoheadleftarrow .
`\longtwoheadrightarrow` : \twoheadrightarrow .
`\signa` : \coloneqq .
`\simleftarrow` : $\xleftarrow{\sim}$.
`\simrightarrow` : $\xrightarrow{\sim}$.
`\rest{<f>}{<S>}` : the restriction of $\langle f \rangle$ on $\langle S \rangle$.
`\widebar` : adaptive bar solving the size problems of `\bar` and `\overline`.

4.2 Specific sets

`\Alt` : alternating.
`\Ann` : annihilator.
`\Aut` : automorphism.
`\coker` : coker.
`\dom` : domain.
`\End` : endomorphism.
`\Frac` : fraction.
`\Gal` : Galois.
`\gen{<x>}` : generated by $\langle x \rangle$.
`\GL` : linear group.
`\Graph` : graph.
`\Hom` : homomorphism.
`\im` : image.
`\Int` : interior.
`\Orb` : orbit.
`\quot{<A>}{}` : quotient of $\langle A \rangle$ by $\langle B \rangle$ with an adaptive style.

`\Rac` : roots (french).

`\range[<type>]{<x>}{<y>}` : produces a correctly displayed interval from $\langle x \rangle$ to $\langle y \rangle$ of the type $\langle \text{type} \rangle$ taking the value of `cc` (default), `co`, `oc` or `oo` where `c` means closed and `o` means open.

`\set[<size>]{a|b}` : displays a set of the size $\langle \text{size} \rangle$ – for instance `\Big` – of the form

$$\{a \mid b\}.$$

The use of the `|` character is important, it is used to delimit the two areas within the set.

`\SL` : special linear.

`\SO` : special orthogonal.

`\Stab` : stabilizer.

`\Syl` : Sylow.

`\Sym` : symmetric.

`\ZnZ{<n>}` : ring of integers modulo $\langle n \rangle$ with an adaptive style.

4.3 Objects

`\func[<a>]{<f>}{<I>}{<O>}{<x>}{<y>}` : displays the definition of a function. In inline mode, this produces

$$\langle f \rangle : \langle I \rangle \rightarrow \langle O \rangle : \langle x \rangle \mapsto \langle y \rangle.$$

where the variable $\langle a \rangle$ can be replaced by an arrow. For this example, I used `\rightarrow`. By default, the arrow is set to `\longrightarrow`. In display math mode, this produces

$$\langle f \rangle : \begin{array}{ccc} \langle I \rangle & \longrightarrow & \langle O \rangle \\ \langle x \rangle & \longmapsto & \langle y \rangle \end{array}.$$

The `\bfunc` command is used in the same way but produces the following result in a

display math

$$\langle f \rangle: \begin{cases} \langle I \rangle & \longrightarrow & \langle O \rangle \\ \langle x \rangle & \longmapsto & \langle y \rangle \end{cases} .$$

`\afunc[<a>]{<I>}{<O>}{<x>}{<y>}` : displays the definition of an anonymous function. In inline mode, this produces

$$\langle I \rangle \rightarrow \langle O \rangle: \langle x \rangle \mapsto \langle y \rangle.$$

where the variable `<a>` can be replaced by an arrow. For this example, I used `\rightarrow`. By default, the arrow is set to `\longrightarrow`. In display math mode, this produces

$$\begin{array}{ccc} \langle I \rangle & \longrightarrow & \langle O \rangle \\ \langle x \rangle & \longmapsto & \langle y \rangle \end{array} .$$

The `\abfunc` command is used in the same way but produces the following result in a display math

$$\begin{cases} \langle I \rangle & \longrightarrow & \langle O \rangle \\ \langle x \rangle & \longmapsto & \langle y \rangle \end{cases} .$$

`\link[<a>]{<f>}{<I>}{<O>}` : displays the definition of a link. This produces

$$\langle f \rangle: \langle I \rangle \rightarrow \langle O \rangle$$

where the variable `<a>` can be replaced by an arrow which is by default `\longrightarrow`. `\alink[<a>]{<I>}{<O>}` : displays the definition of an anonymous link. This produces

$$\langle I \rangle \rightarrow \langle O \rangle$$

where the variable `<a>` can be replaced by an arrow which is by default `\longrightarrow`.

`\vect[<d1>][<d2>]{<v>}` : instantiates a vector of the form

$$\langle v \rangle_{\langle d1 \rangle}, \dots, \langle v \rangle_{\langle d2 \rangle}.$$

If there is no optional argument, then it creates a vector of the variable `<v>` from 1 to n . If `<d1>` is present and if `<d1>` is an integer, then it creates a vector of the variable `<v>` from `<d1>` to n . However, if `<d1>` is not an integer, then it creates a vector of the variable `<v>` from 1 to `<d1>`. Finally, if every argument is present, then it creates a vector of the variable `<v>` from `<d1>` to `<d2>`.

4.4 Operators

`\adh` : adherence.

`\Car` : characteristic (french).

`\card` : cardinality.

`\cis` : $x \mapsto \cos(x) + i \sin(x)$ contraction.

`\dist` : distance.

`\ev` : evaluation.

`\Frob` : Frobenius.

`\Id` : identity.

`\ord` : order.

`\pgcd` : greatest common divisor (french).

`\ppcm` : least common multiple (french).

`\sign` : signature.

4.5 Others

`\eg` : *exempli gratia*.

`\ie` : *id est*.

`\Xmath` : **Xmath** logo.

5 Contact

If you have a suggestion or if you encounter a problem with the `XMATH`¹ package, send me a pull request on :

<https://github.com/MartinDbx/xmath>.

References

- [1] Martin Debaisieux. Github repository. <https://github.com/MartinDbx/xmath>.
- [2] Martin Debaisieux. Github repository. <https://github.com/MartinDbx/xwriter>.
- [3] Taco Hoekwater Jeremy Gibbons and Alan Jeffrey. Ctan. <https://www.ctan.org/pkg/stmaryrd>.
- [4] Debaisieux Martin. <https://github.com/MartinDbx>.
- [5] The American Mathematical Society. Ctan. <https://www.ctan.org/pkg/amsfonts>.
- [6] The American Mathematical Society. Ctan. <https://www.ctan.org/pkg/amsmath>.

Releases

v2.0.1 : February 19, 2021.

Creation of new commands and environments.

v3.1.0 : June 23, 2021.

This new major update gets rid of old, unnecessary commands and packages and brings the `mathbb` option, which prevents users from being flooded with unwanted shortcuts. All previous environments have been removed and brought together in the new `XWRITER`² package dedicated to the writing and layout.