

# The Xmath<sup>1</sup> L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> Macros for Manuscript Preparation

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## Abstract

*The XMATH<sup>1</sup> package is an easy way to write math in L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub>. XMATH<sup>1</sup> is an extension of frequently used mathematical packages with new commands for specific sets, arrows and operators. This package also implements useful shortcuts.*

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## 1 Patch notes

This is the version 3.0.0 of XMATH<sup>1</sup>. 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<sup>2</sup> package dedicated to the writing and layout. This document was last compiled on June 22, 2021.

## 2 Extensions

This package is an extension of the `amssymb`<sup>5</sup>, `amsmath`<sup>6</sup> and `dsfont`<sup>3</sup> packages. All rights reserved to their authors.

## 3 Package option

By default, no options are loaded when calling the XMATH<sup>1</sup> 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 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.  
`\Aut` : automorphism.  
`\dom` : domain.  
`\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` : quotient with an adaptive style.

`\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.

`\Sym` : symmetric.

`\ZnZ{<m>}` : ring of integers modulo  $\langle m \rangle$  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 :

$$\langle f \rangle : \begin{cases} \langle I \rangle & \longrightarrow & \langle 0 \rangle \\ \langle x \rangle & \longmapsto & \langle y \rangle \end{cases} .$$

`\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

`\Car` : characteristic (french).

`\card` : cardinality.

`\dist` : distance.

`\ev` : evaluation.

`\Id` : identity.

`\ord` : order.

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

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

`\sign` : signature.

## 4.5 Others

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

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

## 5 Contact

If you have a suggestion or if you encounter a problem with X<sup>M</sup>A<sup>T</sup>H<sup>1</sup>, 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] Olaf Kummer. Ctan. <https://www.ctan.org/pkg/doublestroke>.
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