

README

xint 1.2q

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im	A, p. 1
sage	U, p. 2
ith LaTeX	W, p. 2
ith TeX	W, p. 2
nstallation	I, p. 2
ethod A: using the package manager of your TeX distribution	M, p. 2
ethod B: manual installation using xint.tds.zip and unzip	M, p. 3
ethod C: manual installation using Makefile and xint.dtx	M, p. 3
ethod D: installation starting with only xint.dtx	M, p. 3
icense	L, p. 4

Source: xint.dtx 1.2q 2018/02/06 (doc 2018/02/06)

Author: Jean-Francois Burnol

Info: Expandable operations on big integers, decimals, fractions

License: LPPL 1.2qc

This README is also available as README.pdf and README.html.

Change log is to be found in CHANGES.pdf or CHANGES.html.

The user manual is xint.pdf, and the commented source code is available as sourcexint.pdf.

Aim

The basic aim is provide *expandable* computations on integers, fractions, and floating point numbers. For example

```
\xinttheexpr reduce(37189719/183618963+11390170/17310720)^17\relax
```

will evaluate exactly the fraction; the result has 462 characters (including the fraction slash.) One can also work with dummy variables:

```
\xinttheexpr mul(add(x(x+1)(x+2), x=y..y+15), y=171286,98762,9296)\relax
```

evaluates to 15979066346135829902328007959448563667099190784.

Float computations are possible at an adjustable precision (default 16).

```
\xintDigits:=48;\xintthefloatexpr 123_456_789^1_000.5\relax  
->3.63692761822782679930738270515740797370813691938e8095
```

But currently, only integer and half-integer exponents are allowed for the power operation in expressions and only the square-root operation is implemented besides the four arithmetic operations. Square-root and the four operations achieve correct rounding in the given arbitrary precision.

Sub-units `xintcore`, `xint` and `xintfrac` provide the underlying macros, and `xintexpr` loads all of them and provides expandable parsers allowing computations such as the above (and more).

Usage

It is possible to use the package with Plain (via `\input` anywhere) or with LaTeX (via `\usepackage` in the preamble).

With LaTeX

```
\usepackage{xint}      % expandable arithmetic with big integers
\usepackage{xintfrac}  % decimal numbers, fractions, floats
\usepackage{xintexpr}  % expressions with infix operators
```

Further packages: `xintbinhex`, `xintgcd`, `xintseries` and `xintcfrac`.

Main dependencies are handled automatically. For example `xintexpr` automatically loads `xintfrac` which itself loads `xint`; but use of the `gcd` and `lcm` functions in expressions require explicit loading of `xintgcd`, and hexadecimal notation requires explicit loading of `xintbinhex`.

Package `xintcore` is the subset of `xint` providing only the five operations on big integers: `\xintiAdd`, `\xintiMul`, ... It is (by default) loaded by the (LaTeX only) package `bnumexpr` which provides a more light-weight expression parser handling only big integers, the four operations, the power operation and the factorial.

There is also `xinttools` which is a separate package providing, among others, expandable and non-expandable loops such as `\xintFor`.

With TeX

One does for example:

```
\input xintexpr.sty
```

The packages may be loaded in any catcode context such that letters, digits, `\` and `%` have their standard catcodes.

`xintcore.sty` and `xinttools.sty` both import `xintkernel.sty` which has the catcode handler and package identifier and defines a few utilities such as `\oodef`, `\fdef`, or `\xint_dothis/\xint_orthat`.

Installation

Method A: using the package manager of your TeX distribution

`xint` is included in [TeXLive](#) (hence also [MacTeX](#)) and [MikTeX](#).

There can be a few days of delay between apparition of a new version on [CTAN](#) and availability via the distribution package manager.

Method B: manual installation using `xint.tds.zip` and `unzip`

Assumes a GNU/Linux-like system (or Mac OS X).

1. obtain `xint.tds.zip` from CTAN: <http://mirror.ctan.org/install/macros/generic/xint.tds.zip>

2. cd to the download repertory and issue:

```
unzip xint.tds.zip -d <TEXMF>
```

where `<TEXMF>` is a suitable TDS-compliant destination repertory. For example, with TeXLive:

- Linux, standard access rights, hence `sudo` is needed, installation into the “local” tree:

```
sudo unzip xint.tds.zip -d /usr/local/texlive/texmf-local
```

```
sudo texhash /usr/local/texlive/texmf-local
```
- Mac OS X, installation into user home folder (no `sudo` needed, and it is recommended to not have a `ls-R` file there, hence no `texhash`):

```
unzip xint.tds.zip -d ~/Library/texmf
```

Method C: manual installation using `Makefile` and `xint.dtx`

The `Makefile` automatizes rebuilding from `xint.dtx` all documentation files as well as `xint.tds.zip`. It is for GNU/Linux-like (inc. Mac OS X) systems, with a `teTeX` like installation such as TeXLive. Furthermore the [Pandoc](#) software is required.

1. obtain `xint.dtx` and `Makefile` from <http://mirror.ctan.org/macros/generic/xint>.
2. put them in an otherwise empty working repertory, run `make` or equivalently `make help` for further instructions.

Method D: installation starting with only `xint.dtx`

Run `"tex xint.dtx"` or `"etex xint.dtx"` to extract from `xint.dtx` all packages as well as these files:

README.md the current README with Markdown formatting.

CHANGES.md the changes across successive releases.

xint.tex used to generate `xint.pdf` via `"latex xint.tex"` (thrice) then `"dvipdfmx xint.dvi"`.

It is also possible to compile `xint.tex` with `xelatex`, or with `pdflatex` (this latter option produces a bigger pdf).

For successful compilation, packages `newtxtt`, `newtxmath`, `etoc`, `mathastext` are needed. Inclusion of the source code is off by default, but the toggle can be set in `xint.tex`.

A third option is to generate `xint.pdf` via `xelatex xint.dtx` or `pdflatex xint.dtx`. Source code is then included by default (but some code comments in French use 8bit characters, hence for `xelatex` an a priori conversion of `xint.dtx` into utf-8 will give a better result).

Makefile.mk this is for UNIX-like systems. Note: this file is only produced with `"etex xint.dtx"`, not with `"tex xint.dtx"`. Rename it to `Makefile` and run `make` on the command line for further help.

doHTMLs.sh and **doPDFs.sh** these are scripts (for UNIX-like systems) which can be used to convert the `README.md` and `CHANGES.md` to HTML and PDF formats. They require [Pandoc](#).

pandoctpl.latex a Pandoc template used by `doPDFs.sh`.

Finishing the installation in a TDS hierarchy:

- move the style files to `TDS:tex/generic/xint/`
- `xint.dtx` goes to `TDS:source/generic/xint/`
- the documentation (`xint.pdf`, `README.md`, ...) goes to `TDS:doc/generic/xint/`

Depending on the destination, it may then be necessary to refresh a filename database.

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<http://www.latex-project.org/lppl/lppl-1-3c.txt>

and version 1.3 or later is part of all distributions of LaTeX version 2005/12/01 or later.

This Work has the LPPL maintenance status `author-maintained`.

The Author of this Work is Jean-Francois Burnol.

This Work consists of the source file `xint.dtx` and of its derived files: `xintkernel.sty`, `xintcore.sty`, `xint.sty`, `xintfrac.sty`, `xintexpr.sty`, `xintbinhex.sty`, `xintgcd.sty`, `xintseries.sty`, `xintcfrac.sty`, `xinttools.sty`, `xint.ins`, `xint.tex`, `README`, `README.md`, `README.html`, `README.pdf`, `CHANGES.md`, `CHANGES.html`, `CHANGES.pdf`, `pandoctpl.latex`, `doHTMLs.sh`, `doPDFs.sh`, `xint.dvi`, `xint.pdf`, `Makefile.mk`.