README

xint 1.2g

2016/03/19

```
Source:  xint.dtx 1.2g 2016/03/19 (doc 2016/03/19)
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Info:    Expandable operations on big integers, decimals, fractions
License: LPPL 1.3c
```

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).

`\xintthefloatexpr 123456789^1000.5\relax`

Mathematical functions (apart from `sqrt` which achieves correct rounding in arbitrary precision) are yet to be implemented.

It is possible to use the package with Plain as well as with LaTeX.

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). A more light-weight package bnumexpr (LaTeX only) loads only `xintcore` and provides a parser which handles only big integers, the four operations, the power operation and the factorial (1.2).

Usage

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`. All dependencies are handled automatically. For example `xintexpr` automatically loads `xintfrac` which itself loads `xint`. Package `xintcore` is the subset of `xint` providing only the five operations on big integers: `\xintiiAdd`, `\xintiiMul`, ... 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
```

Again, all dependencies are handled automatically. 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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