

# THE SYMBOL FONT DBNSYMB

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ABSTRACT. This is the user manual for the symbol font `dbnsymb`.

This document is available electronically at <http://www.math.toronto.edu/~drorbn/projects/dbnsymb/>.

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## 1. INTRODUCTION

Over the last few years I occasionally needed new symbols for the papers I was writing: overcrossings ( $\bowtie$ ), undercrossings ( $\underset{\times}{\bowtie}$ ), pentagons ( $\diamond$ ), whatever. I've always settled for partial and ad-hoc solutions — drawing little  $\LaTeX$  figures, combining existing symbols, etc. But if the AMS can have its own symbol package (`amssymb.sty`), why can't I have one too, with symbols to my liking, which are placed and scaled just like  $\TeX$ 's own?

`dbnsymb` is an attempt to create this personal font. I plan to use it in my own papers and ship it with those when I ship them out, just like I ship macros and figures. I plan to continue adding symbols to it as needed (or as requested by others) and to continue improving the existing symbols in it.

This document documents `dbnsymb`, its usage, and how it can be modified. If you also need wheels ( $\odot$ ) or double points ( $\bowtie$ ) or anything else that's in, feel free to use it yourself. Finally, if you need your own symbols too, you are welcome to download `dbnsymb` and use it as a basis for your own modifications. I will also be happy to add symbols to `dbnsymb` for you, provided they are likely to be of interest for me and/or others with similar research interests.

## 2. USAGE

To use `dbnsymb`, you need to have the files `dbnsymb.mf` and `dbnsymb.sty` somewhere where  $\LaTeX$  would see them — your current working directory or in any other place where  $\LaTeX$

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looks. These files can be downloaded by clicking on their names on the html version of this manual, which is available at <http://www.math.toronto.edu/~drorbn/projects/dbnsymb/>.

This done, you should include the package `dbnsymb.sty` in your document, cross your fingers, and hope for the best.

### 3. EXAMPLE

If all goes well and the files `dbnsymb.mf` and `dbnsymb.sty` really are in  $\text{\LaTeX}$ 's sight, the following example file should produce the output that follows it:

```
\documentclass{article}
\usepackage{dbnsymb}
\begin{document}
Here's a famous formula:
\[ V(\doublepoint) := V(\overcrossing) - V(\undercrossing), \]
and here's another way of writing it, with the new symbols as
superscripts:
\[ V(K^{\doublepoint}) := V(K^{\overcrossing}) - V(K^{\undercrossing}). \]
\end{document}
```

Here's a famous formula:

$$V(\text{\textcircled{X}}) := V(\text{\textcircled{X}}) - V(\text{\textcircled{X}}),$$


























and here's another way of writing it, with the new symbols as superscripts:

$$V(K^{\text{\textcircled{X}}}) := V(K^{\text{\textcircled{X}}}) - V(K^{\text{\textcircled{X}}}).$$

A more extensive example is this manual page itself. The source files are available from the html version of this manual, at <http://www.math.toronto.edu/~drorbn/projects/dbnsymb/>.

### 4. THE SYMBOL TABLE

Symbol	$\text{\LaTeX}$ command	Usage example
	<code>\doublepoint</code>	$V(\text{\textcircled{X}})$
	<code>\overcrossing</code>	$V(\text{\textcircled{X}})$
	<code>\undercrossing</code>	$V(\text{\textcircled{X}})$
	<code>\virtualcrossing</code>	Virtual crossings ( $\text{\textcircled{X}}$ ) are endemic to quantum algebra
	<code>\semivirtualover</code>	Semi-virtuals are differences: $\text{\textcircled{X}} \leftrightarrow \text{\textcircled{X}} - \text{\textcircled{X}}$ .
	<code>\semivirtualunder</code>	$\text{\textcircled{X}} \leftrightarrow \text{\textcircled{X}} - \text{\textcircled{X}}$ .
	<code>\slashoverback</code>	$\langle \text{\textcircled{X}} \rangle$
	<code>\svslashoverback</code>	$\text{\textcircled{X}} = \text{\textcircled{X}} - \text{\textcircled{X}}$

Symbol	L <sup>A</sup> T <sub>E</sub> Xcommand	Usage example
	<code>\backoverslash</code>	$\langle \backslash \rangle$
	<code>\svbackoverslash</code>	$\backslash = \backslash - \backslash$
	<code>\Associator</code>	$\swarrow$ and $\searrow$ generate parenthesized tangles.
	<code>\righttwist</code>	“ $\curvearrowright$ ” denotes a ribbon with a right-handed twist
	<code>\lefttwist</code>	“ $\curvearrowleft$ ” denotes a ribbon with a left-handed twist
	<code>\MobiusSymbol</code>	“ $\circlearrowright$ ” denotes the trivially embedded Möbius band
	<code>\crossing</code>	
	<code>\smoothing</code>	$zC(\smoothing)$
	<code>\hsmoothing</code>	The $A_1$ relation: $\smoothing = 2\hbar(\smoothing - \smoothing)$
	<code>\HSaddleSymbol</code>	The cobordism $\smoothing : \smoothing \rightarrow \smoothing$
	<code>\ISaddleSymbol</code>	The cobordism $\smoothing : \smoothing \rightarrow \smoothing$
	<code>\fourinwheel</code>	The cobordism $\odot : \bigcirc \rightarrow \emptyset$
	<code>\twowheel</code>	$\Omega = 1 + \frac{\circlearrowright}{48}$
	<code>\fourwheel</code>	The wheeled Kontsevich integral $Z^{\square}(K)$
	<code>\pentagon</code>	The $\diamond_m$ equation
	<code>\hexagon</code>	The $\diamond_{\pm}$ relations
	<code>\tetrahedron</code>	$\triangle$ is $6j$
	<code>\isolatedchord</code>	The framing correction $e^{f \frac{\hbar}{2}}$
	<code>\righttrefoil</code>	$J(\text{righttrefoil}) = -t^4 + t^3 + t$
	<code>\lefttrefoil</code>	$J(\text{lefttrefoil}) = -t^{-4} + t^{-3} + t^{-1}$
	<code>\OpenHopfUp</code>	The open Hopf link $\phi_x^y$
	<code>\OpenHopf</code>	The undirected open Hopf link $\phi_x^y$
	<code>\HopfLink</code>	$Z^{\square}(\text{HopfLink}) = \langle \Omega, \Omega \rangle \exp^{x \frown y}$
	<code>\botright</code>	$\sigma_y Z(\phi_x^y) = \Omega_y \exp_{\#}(\downarrow_x^y)$
	<code>\SGraph</code>	The STU relation: $\smoothing = \smoothing - \smoothing$

Symbol	L <sup>A</sup> T <sub>E</sub> X command	Usage example
	<code>\TGraph</code>	$\Downarrow = \Upsilon + \X$
	<code>\UGraph</code>	$\X = \Downarrow - \Upsilon$
	<code>\IGraph</code>	The IHX relation: $\Upsilon = \H - \X$
	<code>\HGraph</code>	$\H = \Upsilon + \X$
	<code>\XGraph</code>	$\X = \H - \Upsilon$
	<code>\YGraph</code>	The AS relation: $\Upsilon + \Upsilon = 0$
	<code>\TwistedY</code>	$\Upsilon = -\Upsilon$
	<code>\ThetaGraph</code>	$Z(\Theta) = \nu^{1/2} \otimes \nu^{1/2} \otimes \nu^{1/2}$
	<code>\dumbbell</code>	
	<code>\wiggle</code>	$Z^{\text{naive}}(\curvearrowright) = \nu^{-1}$
	<code>\stonehenge</code>	The Stonehenge pairing $\langle D, K \rangle_{\square}$
	<code>\inup</code>	$X$ $\psi$ $x$
	<code>\actsonleft</code>	$G$ acts on $X$ on the left: $G \curvearrowright X$
	<code>\actsonright</code>	$G$ acts on $X$ on the right: $X \curvearrowright G$
	<code>\isotopic</code>	
	<code>\rightarrowdiagram</code>	$Z(\curvearrowright) := \exp(\curvearrowright)\curvearrowright$
	<code>\leftarrowdiagram</code>	$Z(\curvearrowright) := \exp(-\curvearrowright)\curvearrowright$
	<code>\cappededge</code>	$\mathcal{A}^w(\uparrow)$
	<code>\upcap</code>	In $\mathcal{A}^w(\uparrow)$ , only wheels survive
	<code>\doubletree</code>	The $\varphi$ map is key to associators and $Z^w$ .
	<code>\CanadianFlag</code>	Canad $\overset{\{\text{CanadianFlag}\}}{\text{a}}$ : Canad $\ddot{a}$
	<code>\dbnframe</code>	$\hbox to 0pt{\backslashoverback}\dbnframe$ : $\boxtimes$

## 5. MODIFYING dbnsymb

The symbols in `dbnsymb` were all drawn using `xfig`, an X-windows drawing program, and then converted to metafont using `fig2dev` (a standard companion program to `xfig`) assisted by a simple `perl` script that I wrote.

To add new symbols or create your own symbol font, follow the following steps:

- Pick a new name for your font or addition; I would much prefer that you don't reuse the name `dbnsymb`. For the sake of concreteness, I will assume below that the name you have picked is "`dptsymb`".
- Download the `perl` script `makefont`, save it, and make it executable on your machine.
- Create a directory for the `xfig`-generated `.fig` files containing the symbols (for the sake of concreteness, let's call this directory `figs`). You can start with an empty `figs` directory or start with the `.fig` files used for the creation of `dbnsymb` by downloading, uncompressing and unpacking the file `figs.tar.gz`.
- Use `xfig` to draw your favorite symbols and to save them in the directory `figs`. You should fit your drawing within the 4in by 4in rectangle bounded by the horizontal and vertical 1in and 5in lines on the `xfig` canvas. The `dbnsymb` symbol `\dbnframe` ( $\square$ ) is precisely that rectangle; if you wish, you can extract the file `figs/040dbnframe.fig` from `figs.tar.gz` and use it as your guide. When saving a symbol in the directory `figs`, use the file name format `figs/nnnxxxxxx.fig`, where "nnn" is the 3-digit decimal character code you wish to use for that symbol (0-255), and the arbitrary length string `xxxxxx` is that symbol's name.
- Run the script `makefont` to create the files `dptsymb.mf` and `dptsymb.sty` (in the current working directory) by typing "`makefont -fn dptsymb -s figs`".
- You are done. Use the files `dptsymb.mf` and `dptsymb.sty` as if they were the files `dbnsymb.mf` and `dbnsymb.sty` of Section 2.

The script `makefont` has an additional optional parameter, `-f2m_opts filename`, that may contain symbol by symbol options for `fig2dev`. See the manual page for `fig2dev` and the options file `dbnsymb.f2m-opts` used for the creation of `dbnsymb`.

## 6. ACKNOWLEDGEMENT

I wish to thank Dylan P. Thurston for his comments, suggestions and extra symbols. The base for the Canadian flag symbol  $\blacksquare$  came from the Xfig Flag Library.

## 7. REVISION HISTORY

**November 30, 2011:**  $\wp$  added.

**May 29, 2010:**  $\uparrow$  added.

**September 25, 2009:**  $\times$  and  $\times$  added.

**April 19, 2009:**  $\uparrow$  added.

**November 28, 2008:**  $\subsetneq$  and  $\supsetneq$  added.

**November 12, 2008:**  $\updownarrow$  and  $\updownarrow$  added.

**September 25, 2008:**  $\times$  and  $\times$  added.

**August 22, 2008:**  $\times$  added.

**October 29, 2003:** `Canadã` added!

**October 27, 2003:** Move to Toronto, some new symbols.

**November 11, 2001:** Some new symbols.

**October 21, 2001:** Some new symbols.

**March 22, 2001:** Bigger sized symbols in Section 4 in the html version.

**January 25, 2001:** Some new symbols.

**May 18, 2000:** Some new symbols, sizes adjusted so that  $\square \simeq \square$  ( $\backslash\text{dbnframe}\backslash\text{simeq}\backslash\text{square}$ ).

**May 7, 2000:** Minor modifications and some extra symbols added.

**April 26, 2000:** Minor modifications.

**April 25, 2000:** Added “full mirror” download option.

**April 24, 2000:** Added a few symbols and Sections 5, 6 and 7 and made a few minor modifications.

**March 19, 2000:** First version posted.

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